

PMA Conceptual Consistency

A work in progress

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Preamble

- Not saying anything can't be implemented
- Need to specify externally observable behaviour
- Any implementation that meets this conforms
 - Not sure we are there yet
 - (not unreasonable since only in Task Force review)
- Need architecture that supports all speeds
- Need architecture that supports future projects

Intro

- This presentation addresses comments 134, 142, 143, 157, and 158
- The P802.3ba PMA addresses
 - Two rates
 - Multiple PMD types, i.e. # of lanes and lane rates
 - Physical interconnect, i.e. XLAUI / CAUI
 - Future implementations of PMDs and physical interconnects
- But, conceptually, what is the “PMA”?
 - A single black box that consists of multiple PMAs?
 - Multiple PMAs?

Background

- MMD - MDIO Manageable Devices
- Need to clearly define each 'device'
 - Each device will be assigned an address

Table 45-1—MDIO Manageable Device addresses

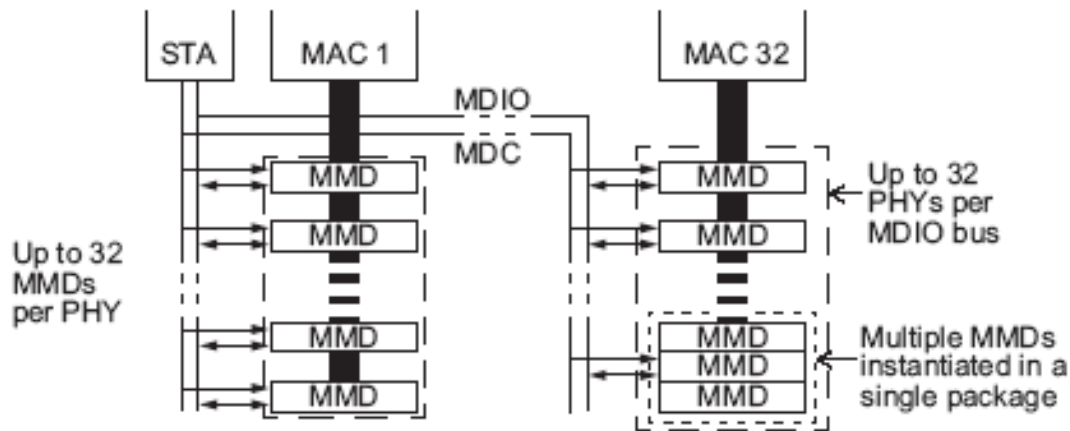
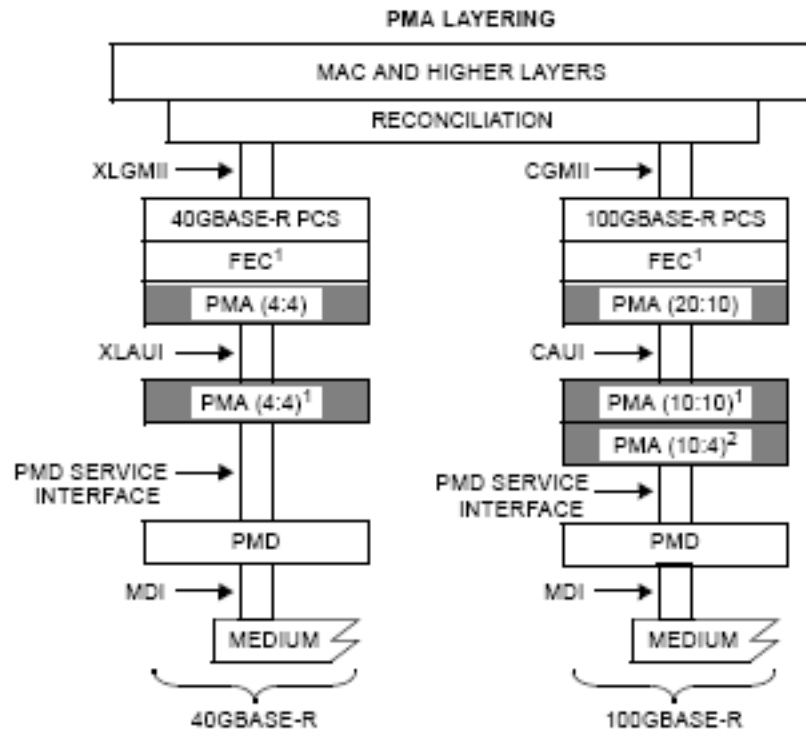


Figure 45-1—DTE and MMD devices

Device address	MMD name
0	Reserved
1	PMA/PMD
2	WIS
3	PCS
4	PHY XS
5	DTE XS
6	TC
7 through 28	Reserved
29	Clause 22 extension
30	Vendor specific 1
31	Vendor specific 2

The PMA Identity per 83.1.4



CAUI - 100 Gb/s ATTACHMENT UNIT INTERFACE
 CGMII - 100 Gb/s MEDIA INDEPENDENT INTERFACE
 FEC - FORWARD ERROR CORRECTION
 MAC - MEDIA ACCESS CONTROL
 MDI - MEDIUM DEPENDENT INTERFACE
 PCS - PHYSICAL CODING SUBLAYER
 PMA - PHYSICAL MEDIUM ATTACHMENT

PMD - PHYSICAL MEDIUM DEPENDENT
 XLAUI - 40 Gb/s ATTACHMENT UNIT INTERFACE
 XLGMII - 40 Gb/s MEDIA INDEPENDENT INTERFACE

NOTE1—OPTIONAL
 NOTE2—CONDITIONAL BASED ON PMD TYPE

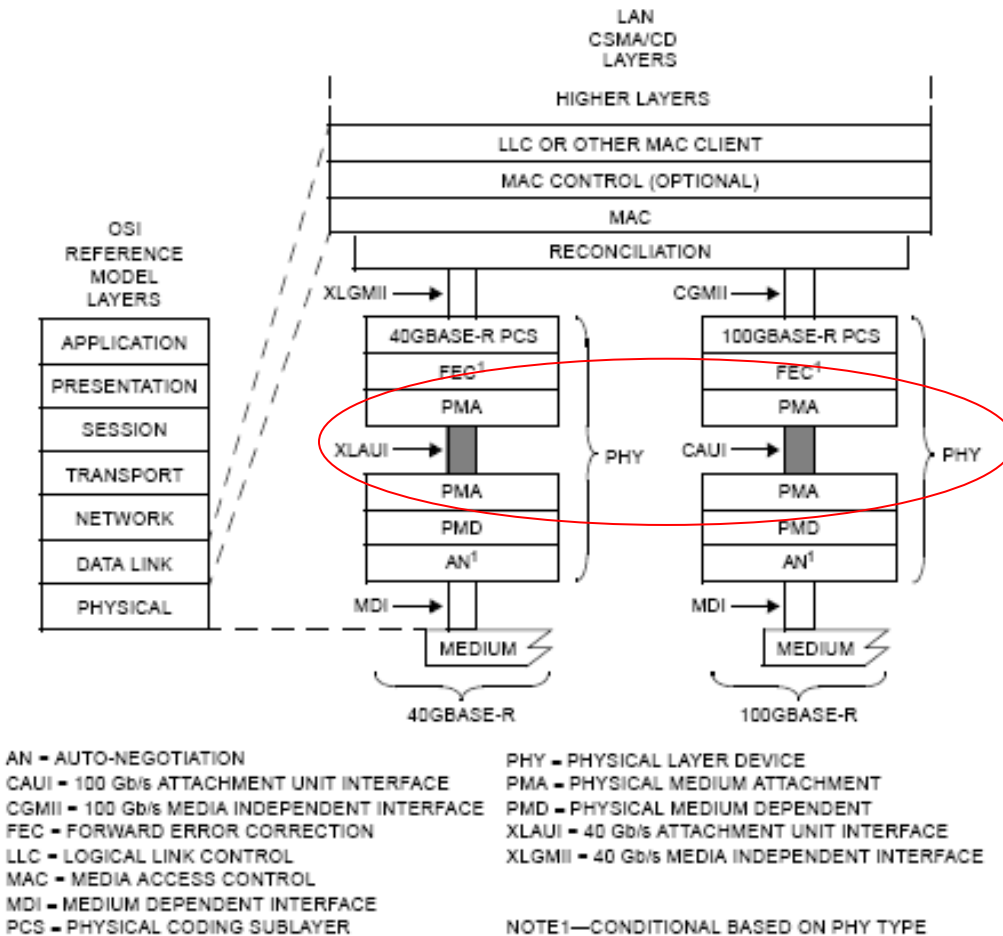
Per 83.1.4 –

The PMA is modeled in stages as illustrated in Figure 83–2. Each stage of the PMA recombines the virtual lanes originating from the PCS from m PMA input lanes to n PMA output lanes.

Various stages of the PMA are optional, depending on the number of lanes required for a particular PMD and whether there is a need for an extender sub-layer (XLAUI/CAUI). A PMA with an equal number of input and output lanes is used to provide retiming and signal drivers, if required.

Figure 83–2—40GBASE-R and 100GBASE-R PMA layering

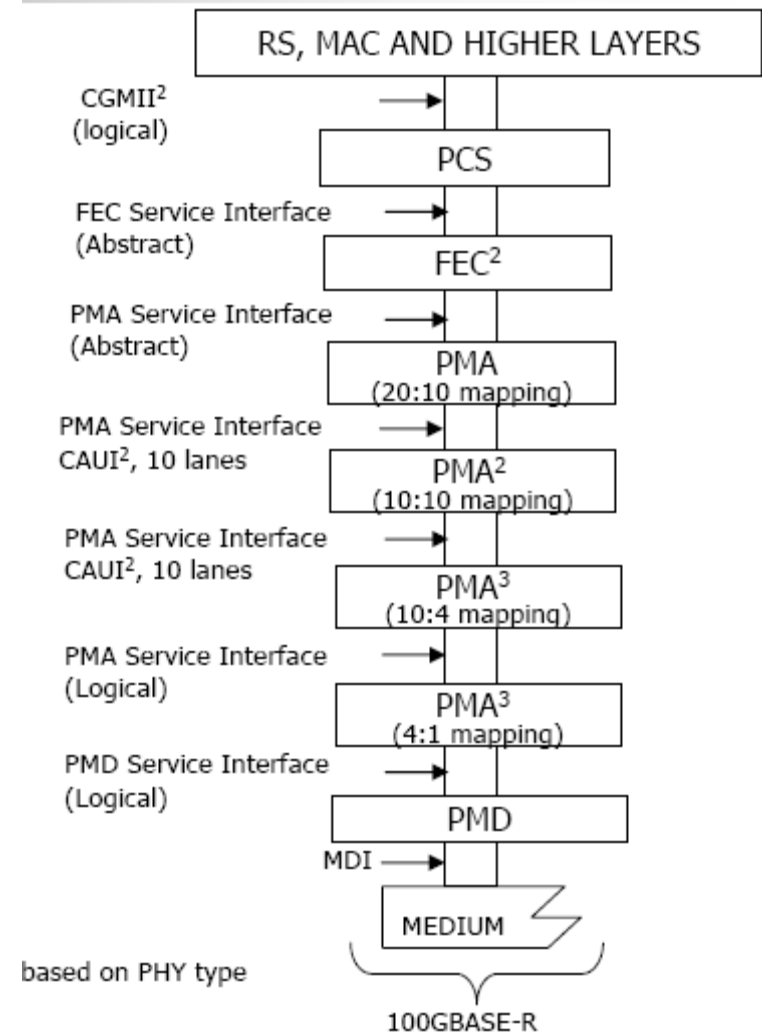
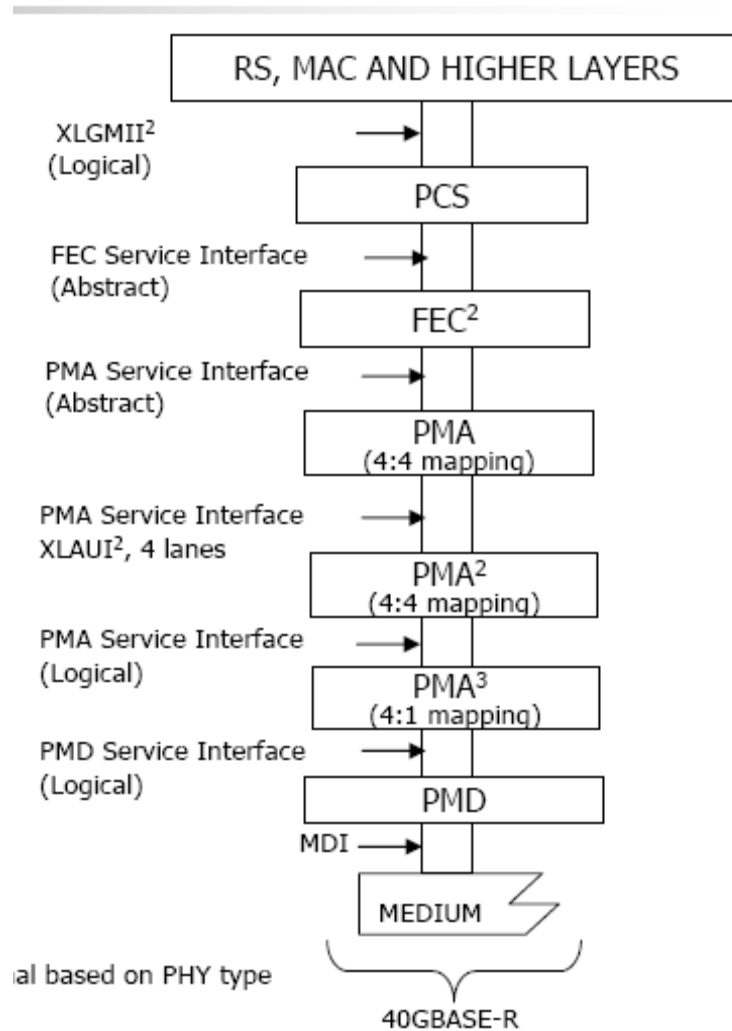
The PMA Identity per Annex 83A



- PMA doesn't appear as stages
- “PMA” labeling boxes above and below XLAUI / CAUI imply boxes have identical functions
- XLAUI / CAUI exists between stages of PMA, not between two different PMA

Figure 83A-1—40 Gb/s and 100 Gb/s attachment unit interface relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model and IEEE 802.3 CSMA/CD LAN model

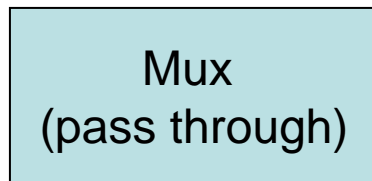
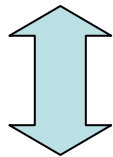
From ganga_02_0508



The Different “Types” of PMAs

Type #1

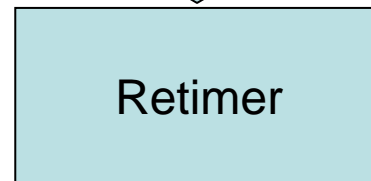
Abstract



- Service Interface always connects to PCS
- 2 types currently
- 4:4 virtual to physical
- 20:10 virtual to physical

Type #2

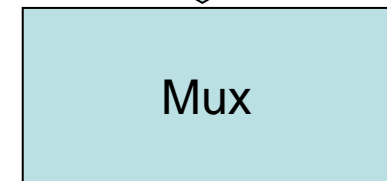
Physical
(XLAUI / CAUI)



- Optional
- Service Interface may connect to Type 1 or Type 3
- 2 types currently based on 10G lane rates
- But higher speeds possible

Type #3

Logical

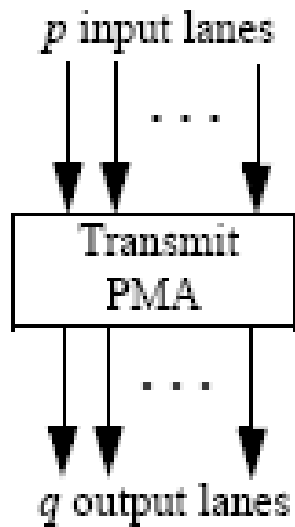


- Optional
- Service interface may connect to Type 1, 2, or 3

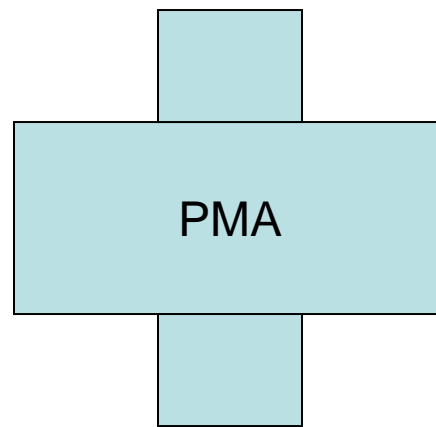
Building the PMA

The PMA is built up from staging of PMA Types

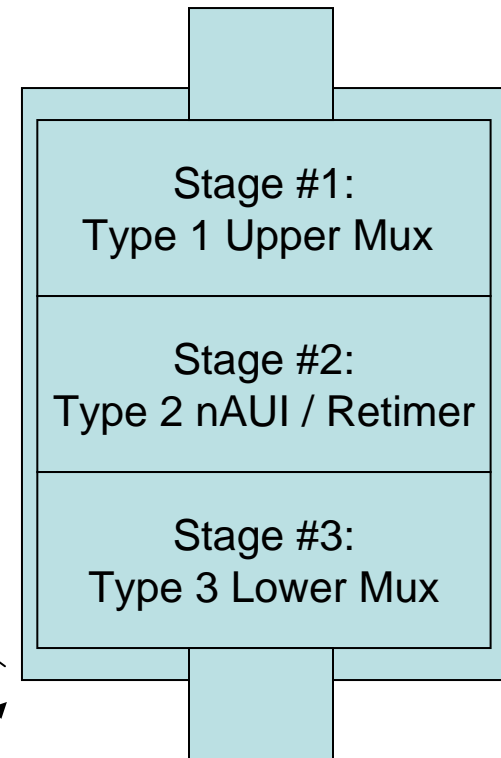
PMA Service interface



PMA Service interface



PMD Service interface

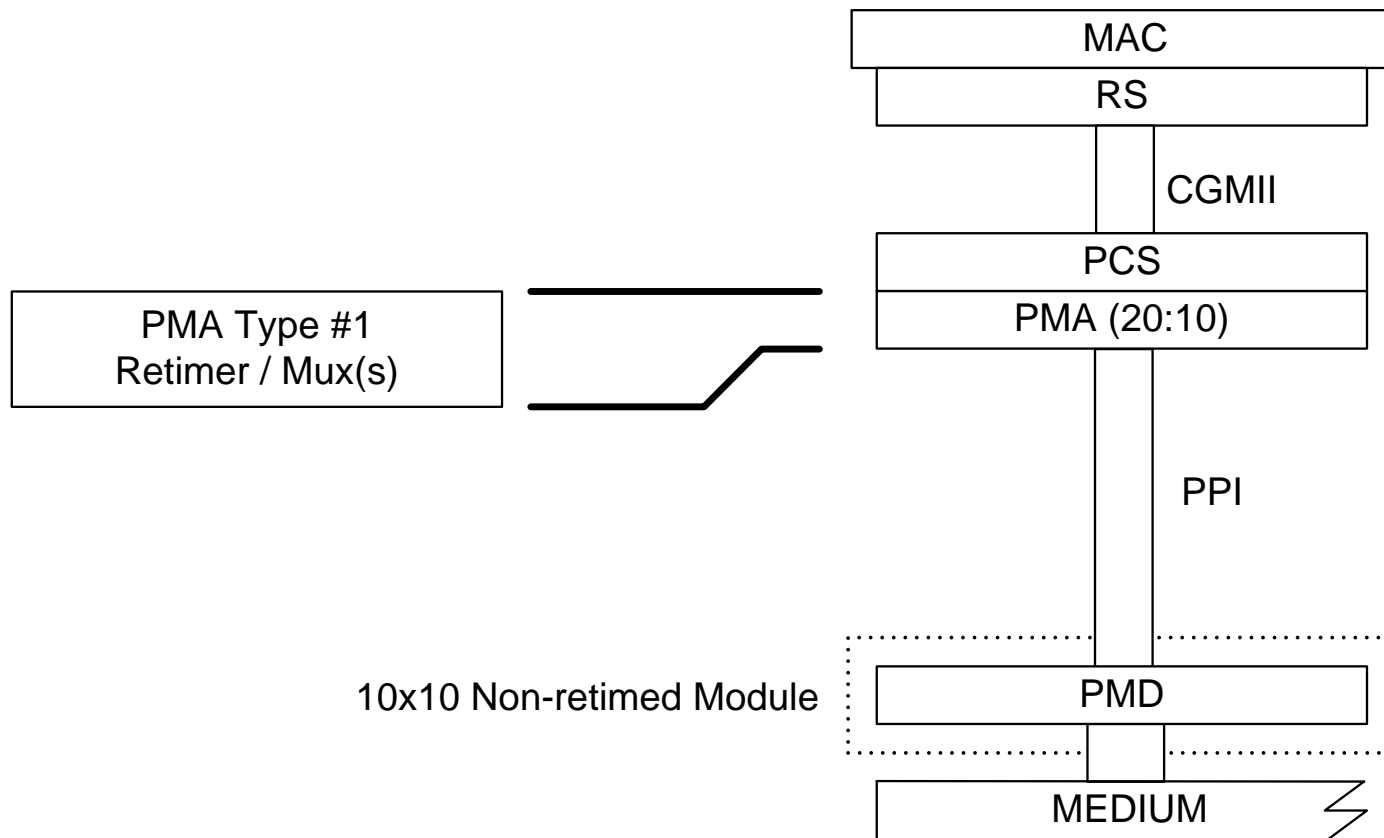


PMD Service interface

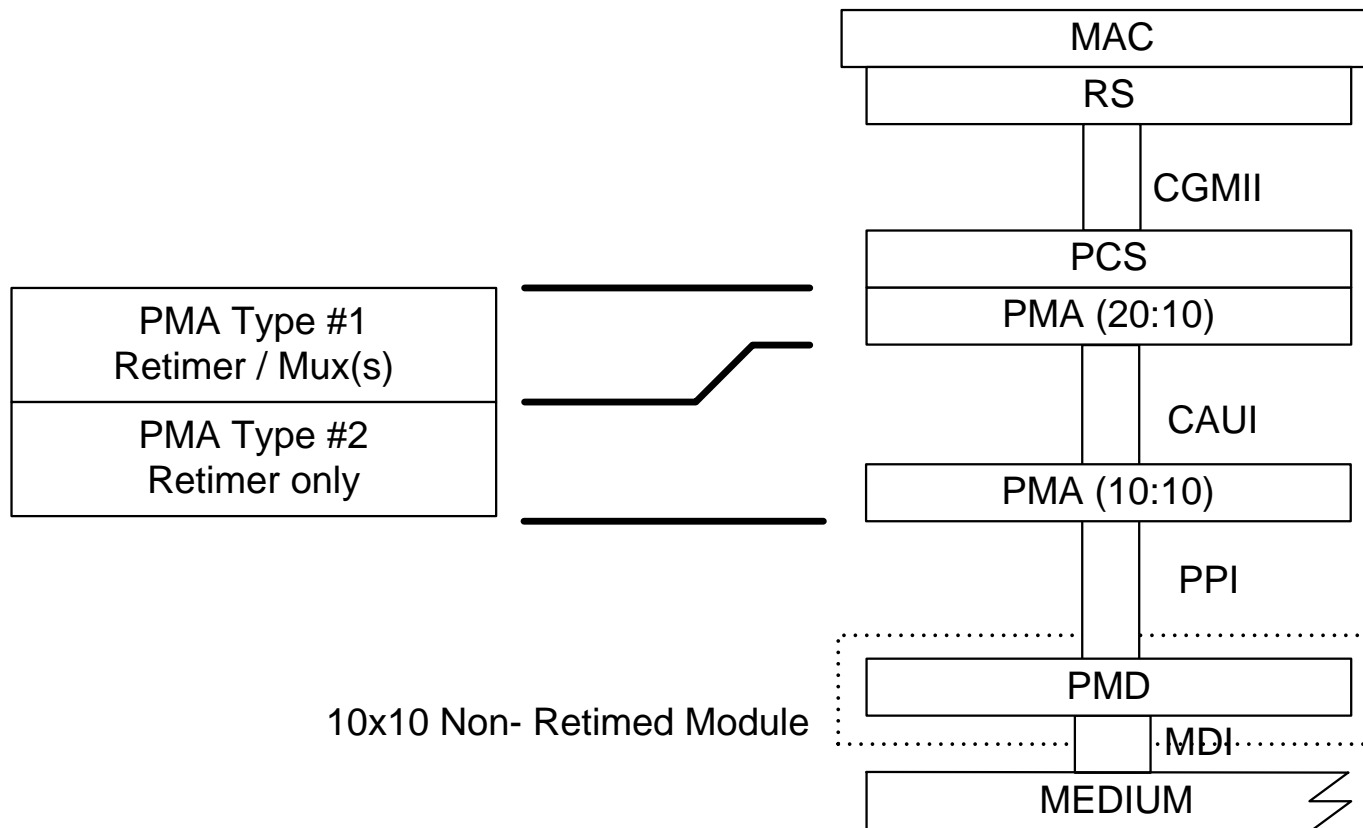
Figure 83-3—Transmit

Note: One Example of a PMA

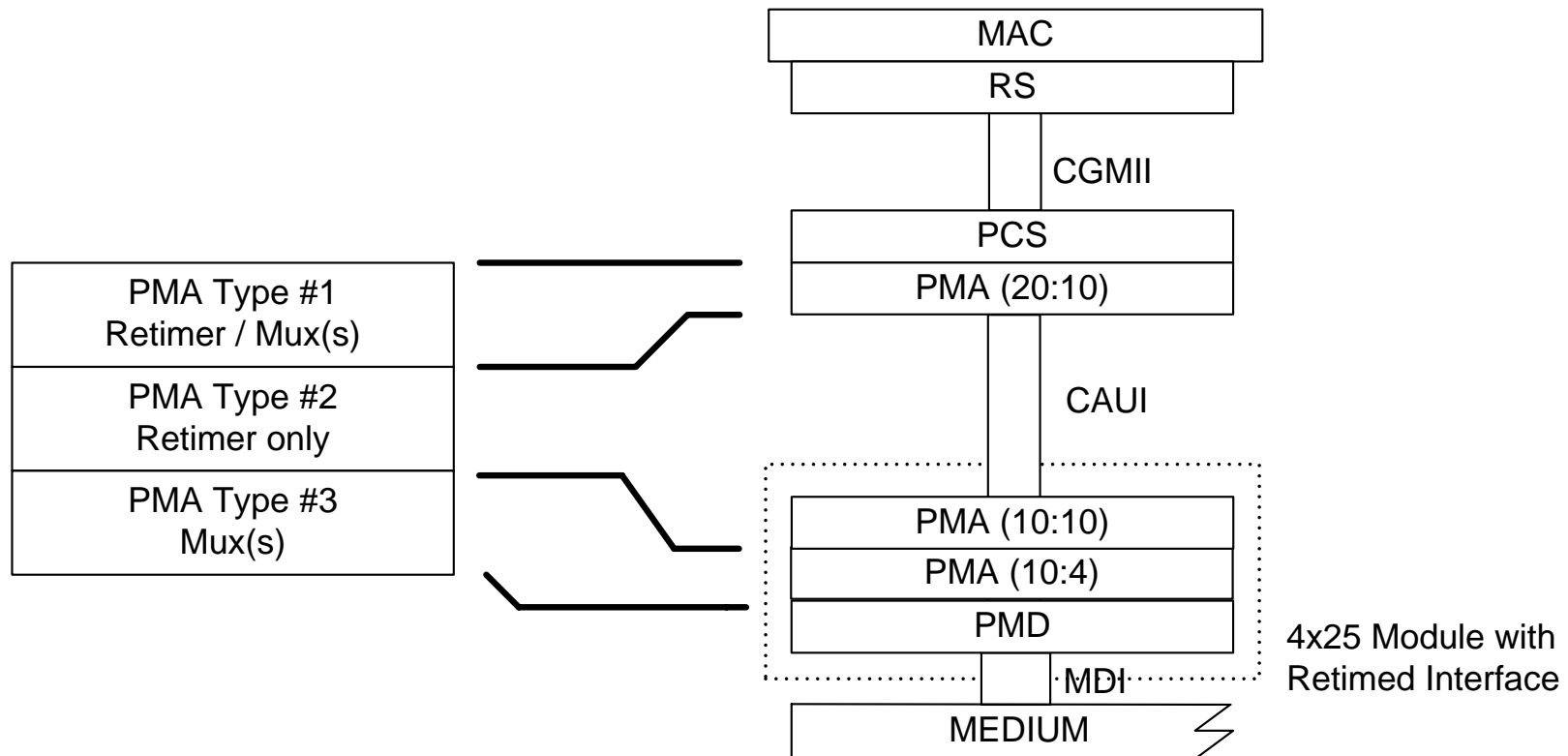
Applications (1 of 4)



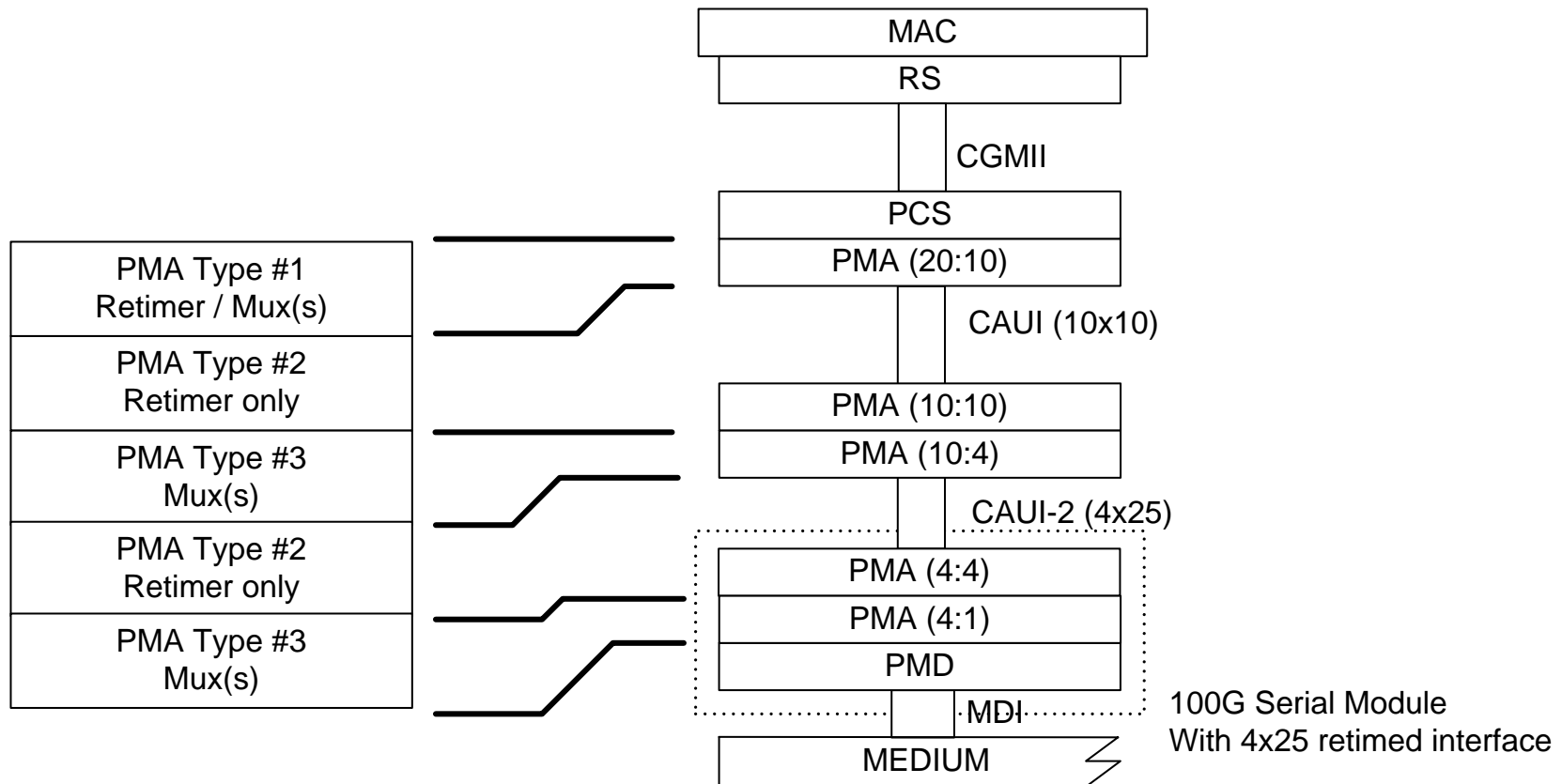
Applications (2 of 4)



Applications (3 of 4)



Applications (4 of 4)



Looking at the Interfaces

- PMA service interface for the PCS described abstractly
- XLAUI / CAUI interfaces defined electrically (Annex 83A)
- No definition for logical interface between PMA types
- PMD service interface either logical or electrical (PPI – Clause 86)

PMA Types Parameterization

	40GBASE-R	100GBASE-R
Upper Mux	4:4	20:10
Retimer	4:4	10:10 Future 4:4
Lower Mux(s)	4:1	10:4 4:2 2:1

Summary

- The P802.3ba PMA is very flexible. With flexibility, potential for confusion. The P802.3ba project needs to minimize this.
- PMA Stage Approach of different PMA Types is the way we are going
 - Review Draft for consistency with this concept
 - Need to consider addressing issue
- Need logical interface definition for between PMA stages
- XLAUI / CAUI is not an extender sublayer
 - It is an electrical interface, currently based on 10G per lane, that requires a Type2 PMA stage