

Baseline for CGMII Extender, CGMII Extender Sublayer (100GXS)

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Supporters

- **Mark Gustlin – Cisco**
- **Ilya Lyubomirsky – Inphi**
- **Jeff Slavick – Broadcom**

Relevant Objectives

- **Proposed Objectives**

- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current Ethernet standard
- Provide appropriate support for OTN

- **100 Gb/s Ethernet**

- Support a MAC data rate of 100 Gb/s
- Support a BER of better than or equal to 10^{-12} at the MAC/PLS service interface (or the frame loss ratio equivalent) for 100 Gb/s
- Provide a physical layer specification supporting 100 Gb/s operation on a single wavelength capable of at least 80 km over a DWDM system.

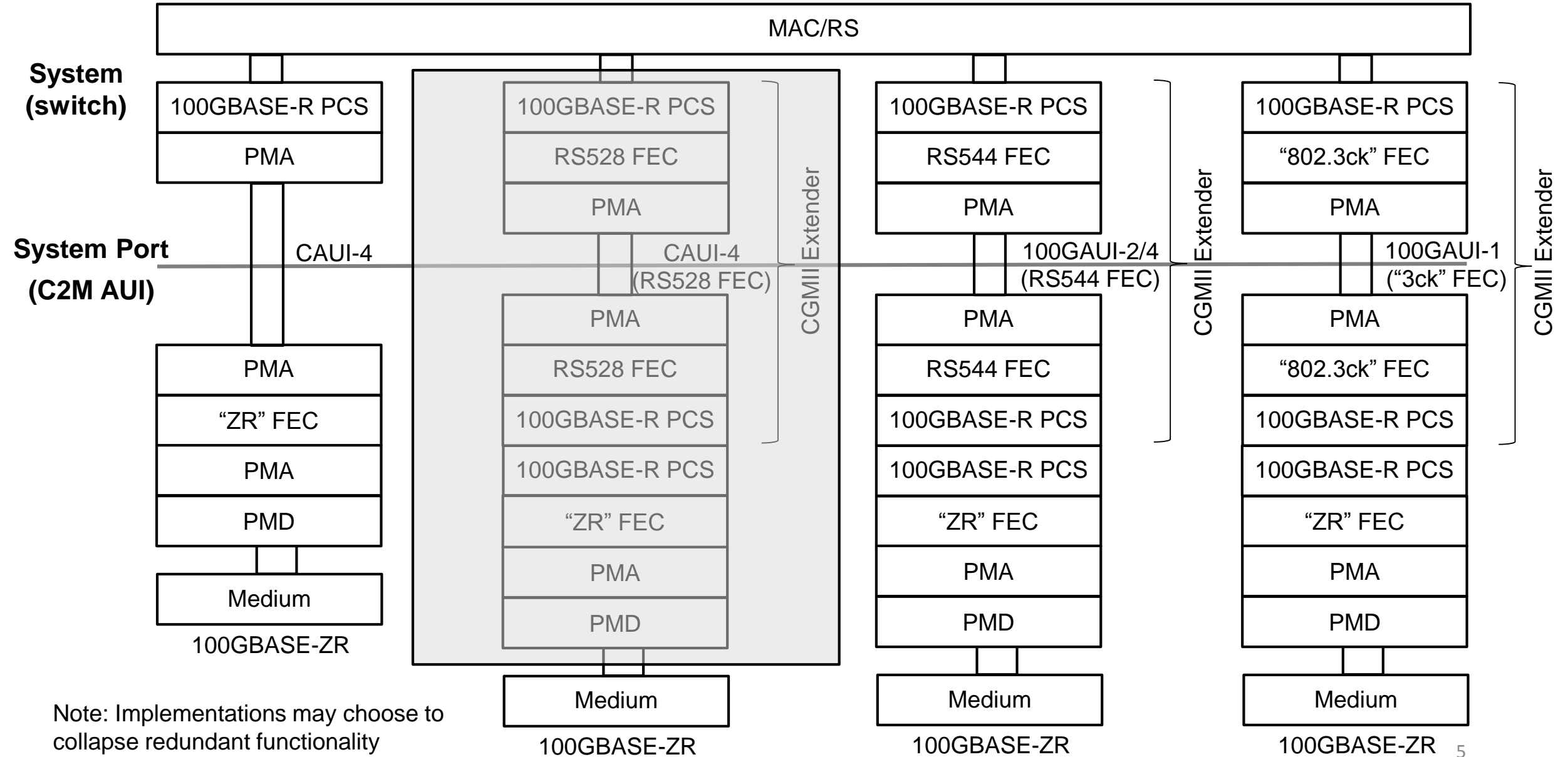
- **400 Gb/s Ethernet**

- Support a MAC data rate of 400 Gb/s
- Support a BER of better than or equal to 10^{-13} at the MAC/PLS service interface (or the frame loss ratio equivalent) for 400 Gb/s
- Provide a physical layer specification supporting 400 Gb/s operation on a single wavelength capable of at least 80 km over a DWDM system.

Background

- **Previous work on this topic includes the following:**
 - [nicholl_b10k_01a_0518](#) proposed using the Clause 118 existing 400GMII Extender and 400GMII Extender Sublayer (400GXS) to enable a new 400GBASE-ZR PHY to interface to a 400GAUI-n and address the 400G 80km DWDM PHY objective.
 - [nicholl_b10k_01a_0518](#) also highlighted that there is no existing 100 Gb/s Extender Sublayer
 - [nicholl_3cn_01_1118](#) described the motivation for a CGMII Extender Sublayer (100GXS) to enable a new 100GBASE-ZR PHY to interface to one of several possible 100 Gigabit Ethernet AUIs and address the 100G 80km DWDM PHY objective:
 - CAUI-4/10 without FEC
 - CAUI-4 with RS(528,514) FEC
 - 100GAUI-2/4 with RS(544,514) FEC
 - 100GAUI-1 which is under development in P802.3ck
 - The new CGMII Extender and CGMII Extender Sublayer (100GXS) will take an approach that is similar to the existing 400GMII Extender and 400GMII Extender Sublayer (400GXS)
 - While other approaches have been considered (for example, “upside side down FEC”), the CGMII Extender provides a means to capture the required functionality in a manner like previously used
- **This presentation proposes a baseline for the CGMII Extender Sublayer (100GXS)**

100GBASE-ZR Use Cases – Functional Stack up

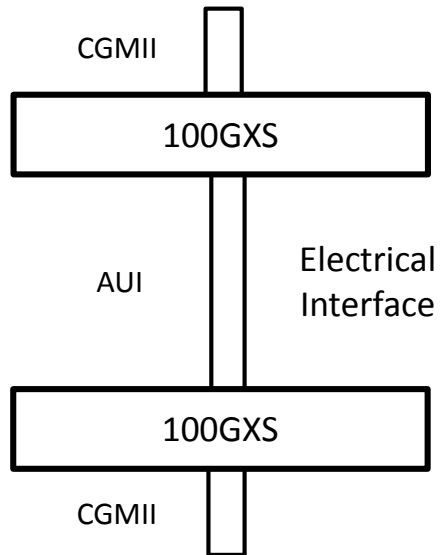


Note: Implementations may choose to collapse redundant functionality

CGMII Extender Sublayer (100GXS)

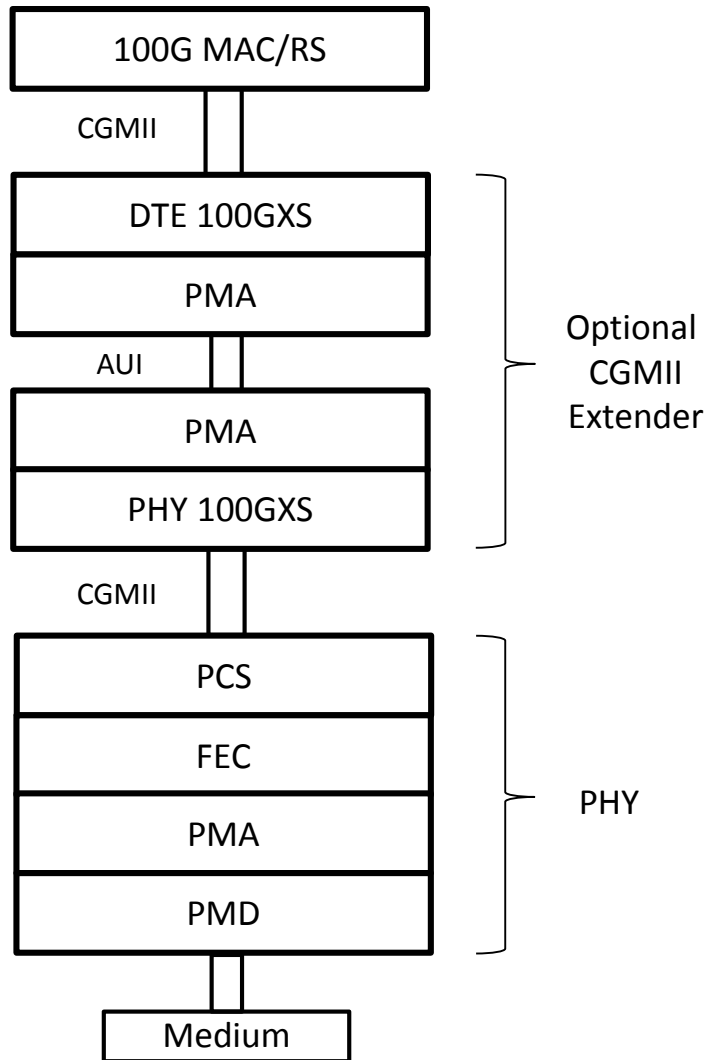
- **The 100GXS is the proposed extender sublayer to extend the CGMII**
 - A typical instantiation is a high speed parallel SerDes interface
- **It is optional for 100 Gb/s Ethernet, only used if the PCS/FEC does not cover both the electrical and optical interface needs**
 - Note: The 100GXS is likely to be used in all 100GBASE-ZR PHYs
- **The 100GXS contains PCS, FEC, and PMA functionality related to the extender sublayer**

Comments on 100GXS



- For 100 Gb/s Ethernet, CGMII is the only media independent interface
- Support for different implementations, alternate FEC coding, or future PHYs is accomplished through a return to CGMII (from a standardization perspective)
- The 100GXS, used as a pair along with AU as shown, is used to extend the CGMII
- This allows support for new PCS/PMA functionality below the extended CGMII, if needed
- The 100GXS provides the coding / FEC of the electrical interface, not the coding / FEC of the PHY

CGMII Extender Concept



- **The CGMII Extender is used to extend the CGMII across a physically instantiated AUI**
- **The CGMII Extender is composed of the following:**
 - 100GXS at the RS end
 - 100GXS at the PHY end
 - Physical instantiation of 100 Gb/s AUI between the adjacent PMA sublayers
- **This allows support for new PCS/FEC/PMA functionality below the extended CGMII, if needed.**
- **The 100GXS is a combination of the functionality of the 100G PCS sublayer and the FEC sublayer associated with a specific AUI interface**

Editorial Guidance

- **Add new Clause TBD – CGMII Extender, CGMII Extender Sublayer (100GXS)**
 - The new clause can take an approach similar to 802.3-2018 Clause 118

✓	🔖	118. 200GMII Extender, 400GMII Extender, 200GMII Extender Sublayer (200GXS), and 400GMII Extender Sublayer (400GXS)
✓	🔖	118.1 Overview
	🔖	118.1.1 Summary of major concepts
	🔖	118.1.2 200GXS/400GXS Sublayer
	🔖	118.1.3 200GAUI-n/400GAUI-n
✓	🔖	118.2 FEC Degradation
	🔖	118.2.1 DTE XS FEC Degradation signaling
	🔖	118.2.2 PHY XS FEC Degradation signaling
	🔖	118.3 200GXS and 400GXS partitioning example
	🔖	118.4 200GXS and 400GXS MDIO function mapping
>	🔖	118.5 Protocol implementation conformance statement (PICS) proforma for Clause 118, 200GMII Extender, 400GMII Extender, 200GMII Extender Sublayer (200GXS), and 400GMII Extender Sublayer (400GXS)

Supported AUI instantiations

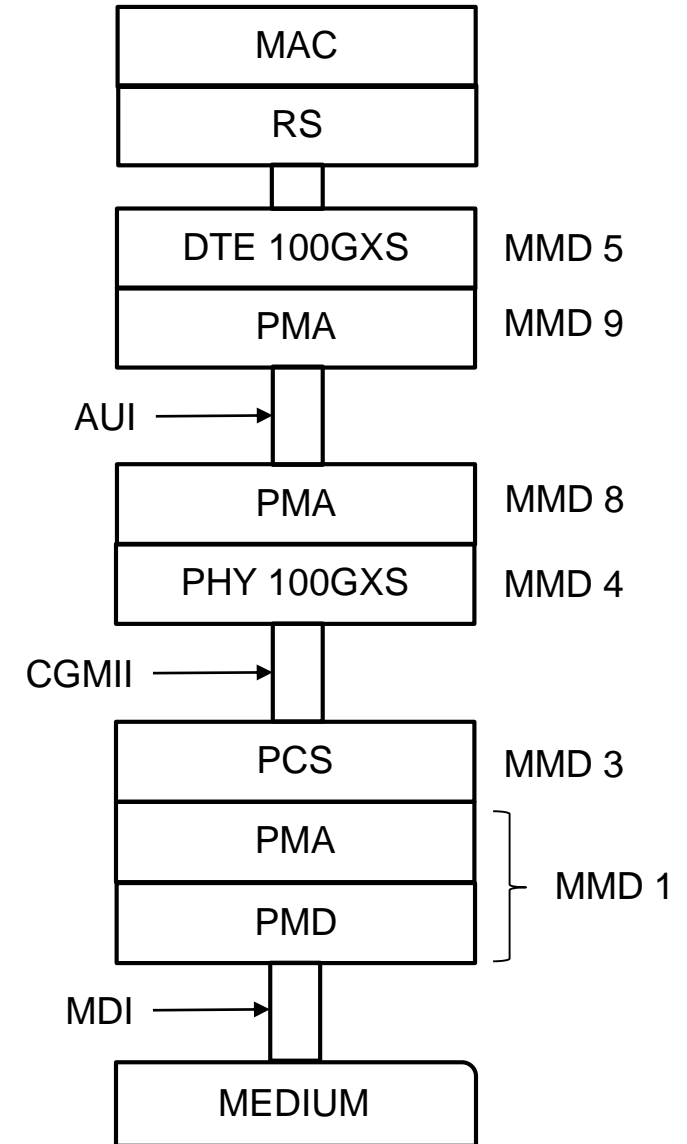
- **Like Clause 118, the new Clause TBD should indicate that a CGMII Extender may use any of the following 100G AUI instantiations:**
 - 100GAUI-2/4 (Annex 135D, 135E, 135F, 135G)
 - With RS(544,514) FEC
 - 100GAUI-1 (Annex TBD)
 - Anticipated to be developed in P802.3ck
 - With RS(544,514) FEC
 - With new Interleaved FEC
- **Intentionally omitted from the above list are:**
 - ~~CAUI-10 (Annex 83A)~~
 - ~~Without RS-FEC~~
 - ~~CAUI-4 (Annex 83E)~~
 - ~~Without RS-FEC~~
 - ~~With RS(528,514) FEC~~

MMD Numbering

- Like Clause 118, the new Clause TBD should contain the 100GXS MDIO function mapping for MDIO PHY XS and DTE XS registers
- MMD addresses as per Clause 45

Table 45-1—MDIO Manageable Device addresses

Device address	MMD name
0	Reserved
1	PMA/PMD
2	WIS
3	PCS
4	PHY XS
5	DTE XS
6	TC
7	Auto-Negotiation
8	Separated PMA (1)
9	Separated PMA (2)
10	Separated PMA (3)
	Separated PMA (4)



Thank You!