



PMA Line “Network” Loopback

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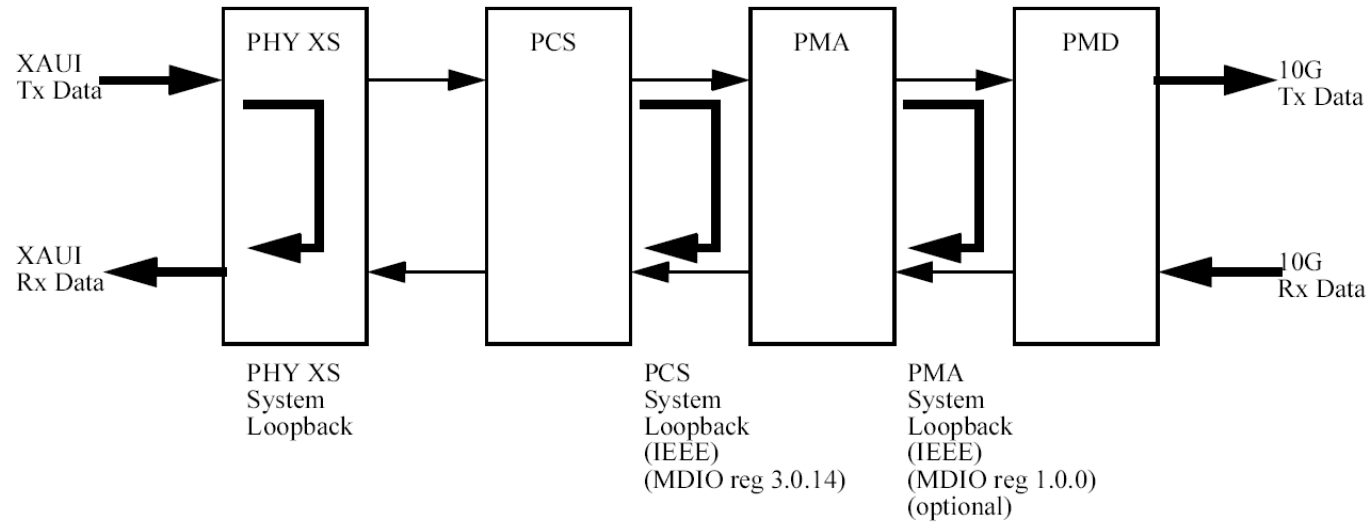
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Introduction

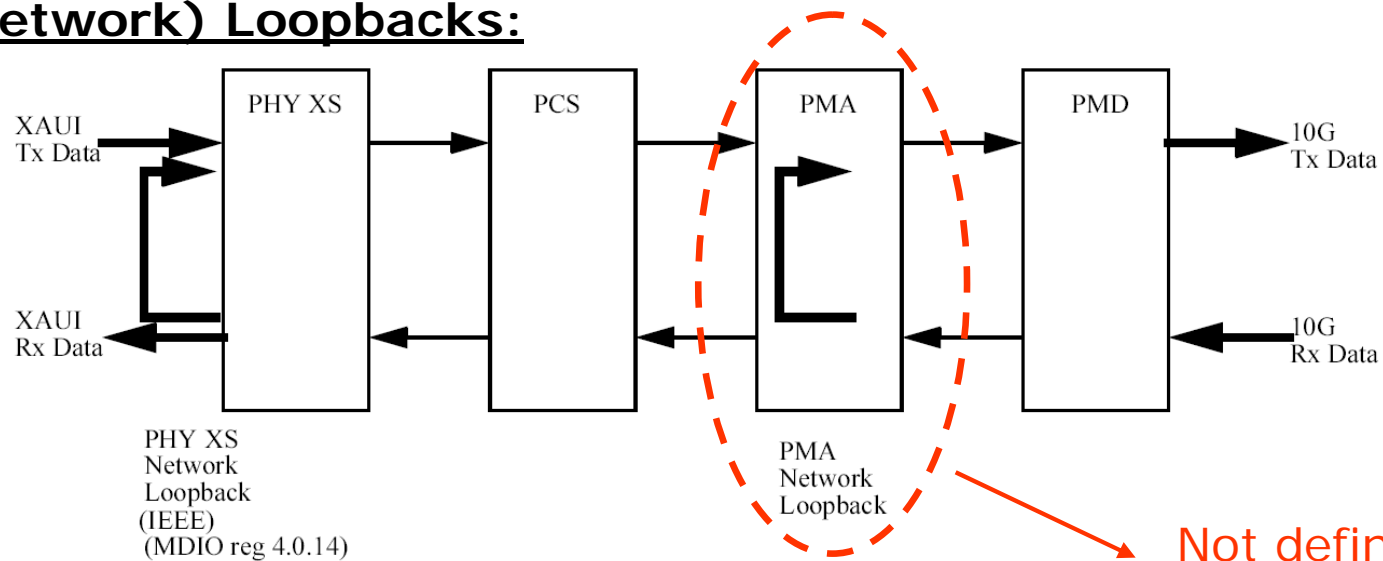
- This presentation is in support of Comment #643, and proposes that 802.3ba make a PMA Line 'network' loopback mandatory.

10GE PHY Loopbacks

System Loopbacks:



Line (Network) Loopbacks:



Not defined in 802.3ae for 10GE

10GE PHY Loopbacks

- A PMA Line (Network) loopback was not defined in 802.3ae.
- However every PHY device that I am aware of supports a PMA Line Loopback, but at vendor specific MDIO addresses.
- PMA Line Loopbacks are routinely used to isolate facility (fiber) failures from equipment failures, and also to isolate the PMD optics from the rest of a host card for optical parametric testing, i.e. stressed receiver sensitivity, etc (see later)
- Having a widely used function such as 'PMA Line Loopback' implemented with vendor specific MDIO addresses is not ideal (requires vendor specific code on the host)

Example of 10GE PMA Line Loopback

Table 41. Network Loopback Modes and MDIO Control Registers

Loopback name	Loopback Enable	Loopback Data Override	RxXAUI output when data override=0	RxXAUI output when data override=1 (default) ¹
XGXS network loopback	4.0.14	4.C000h.13	all 0's	received data
PMA network loopback	1.C001h.4	1.C001h.5	idle at RxXAUI	received data

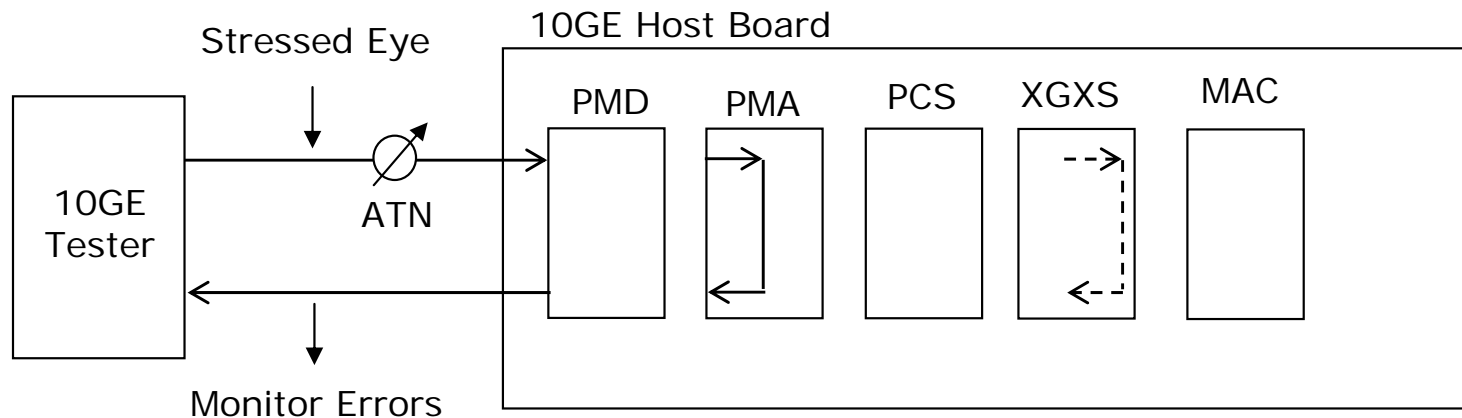
1. The Loopback Data Override bits are set to 1 by default for all network loopbacks

When in PMA network loopback mode, the recovered and retimed 10Gb/s data is looped to the transmitter output driver and output at TXOUTP/N. The clock output at TXPLLOUTP/N is still synchronous to the Tx path PLL 10GHz clock. To lock the Tx PLL to the receive data, use line timing mode. The receive path XAUI output data will be received data. XAUI idle codes will be output instead of the received data if the 'network loopback data out enable bit' is set high. In IEEE 802.3 standard XGXS network loopback the recovered received data is looped back to the transmit path in the XAUI block.

- PMA line loopback control is at a vendor specific MDIO address of 1.C001.4 (and different to other vendors)
- Behavior of PMA line loopback also tends to be vendor specific.

What is PMA Line Loopback used for ?

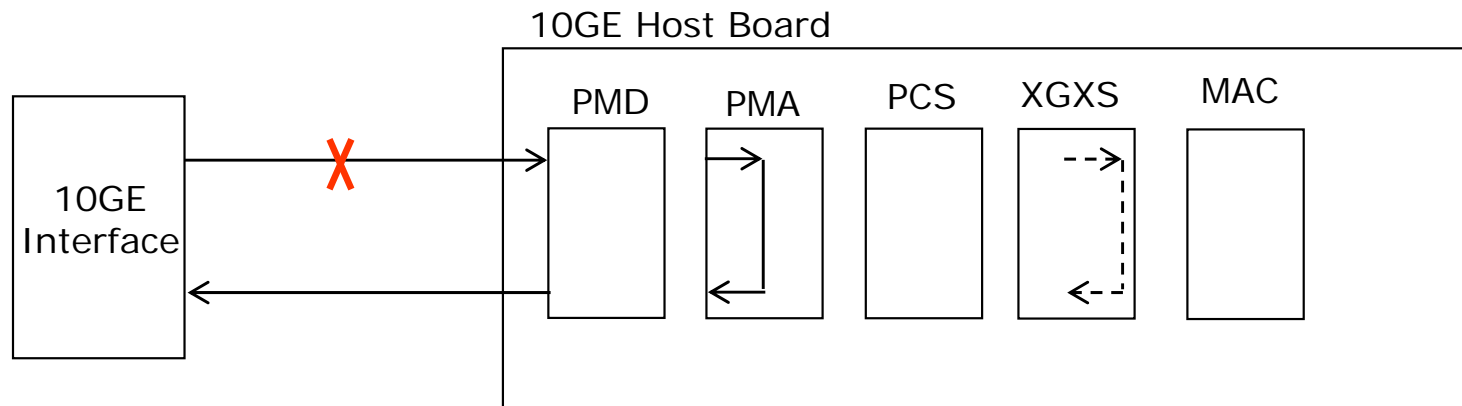
PMD Stressed Receiver Measurement



- 10GE tester generates an un-framed PRB stressed optical signal which is fed via an optical attenuator to the Rx optical input of the unit under test
- A PMA line loopback is used to loop the recovered received signal back to the 10GE tester so that the error rate can be monitored
- The IEEE XGXS loopback cannot be used as the PCS does not understand the un-framed signal from the tester
- Alternative is to use XGXS loopback with a 64B66B framed signal from tester, but it is difficult for tester to measure the Rx error rate from a framed signal

What is PMA Line Loopback used for ?

Network Fault Isolation



- Having a loopback as close as possible to the ‘faceplate’ of the host card, allows operators to easily isolate whether a failure is due a facility (fiber) issue or an equipment issue
- In the example above putting up a PMA line loopback would quickly point to the fiber as being the cause of the failure. An XGXS loopback would not provide the same confidence.

Summary

- As at 10GE expect that all PHY vendors will implement a PMA line loopback, irrespective of whether it is defined in 802.3ba or not
- Recommend that 802.3ba adopt a PMA line loopback, to ensure a consistent implementation across the industry (and avoid what happened at 10GE)
- A PMA line loopback for a generic M:N PMD would be defined as a Rx to Tx loopback on each of the N individual high speed lanes.