

Retimed Interface Considerations for IEEE P802.3ba

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Outline

- Overview
- CTBI / APL Interface
- Block Diagram
- Crosstalk Considerations
- Jitter Budget Proposal

Overview

Retimed interface add significant value to SFP+ modules and should not be overlooked in 40G and 100G Ethernet

- Integration with existing module components minimize extra power and cost
- CDRs have potential to save significant cost & power in design and manufacturing
 - No extra components on host board
- CDRs reset crosstalk budget. Linear & Limiting interfaces do not

Retimed interface is the interface which could have low cost, common specs for 4x10G, 10 x 10G, and 4x25G

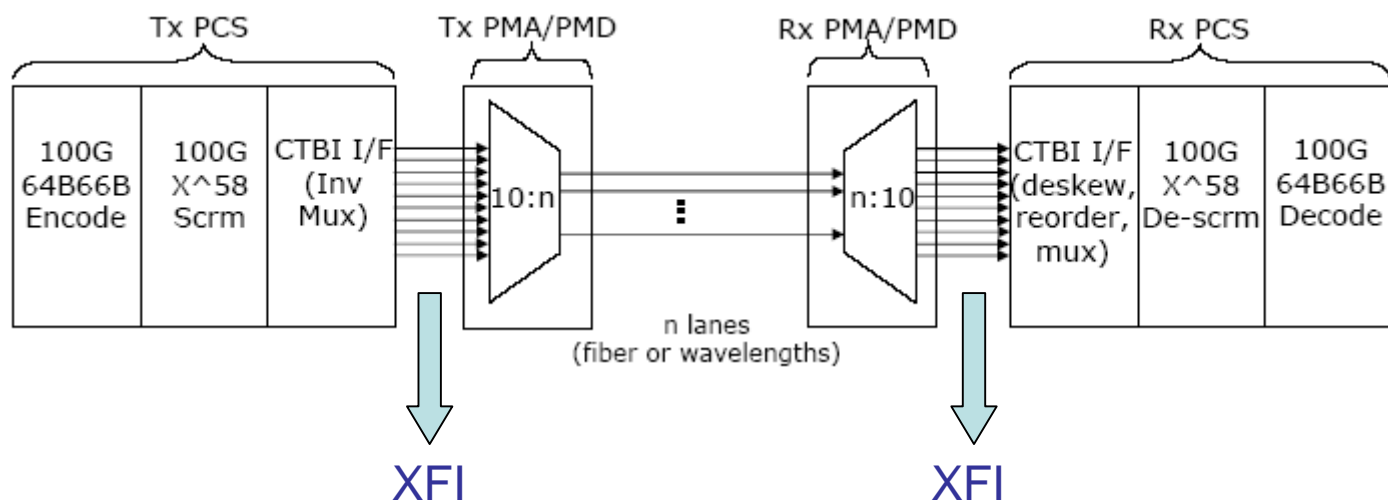
CTBI PCS – PMA Interface

XFI is a well proven interface

- Higher robustness relative to linear and limiting
- Allows for highest level of host integration at lowest power
- Enables closed form compliance within optical module – little dependence on host ASIC / design

Input / Output of Mux / De-Mux will be XFI type -> Retimed

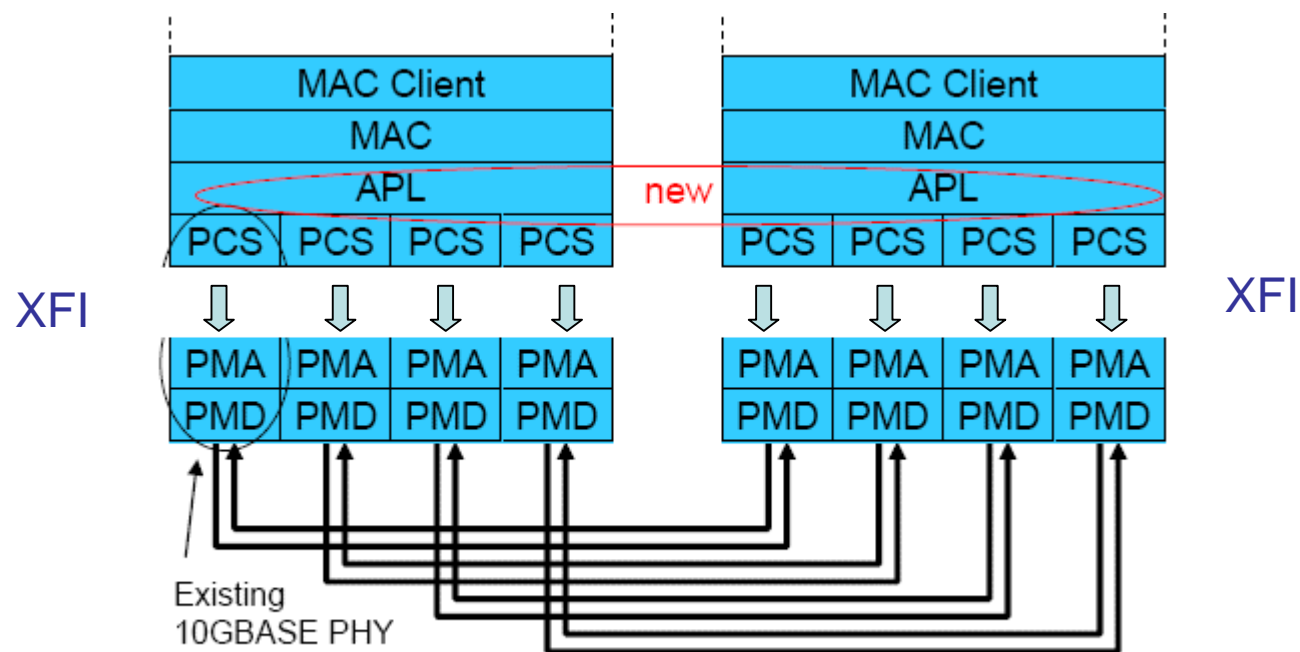
- (not linear, not limiting)



APL PCS – PMA Interface

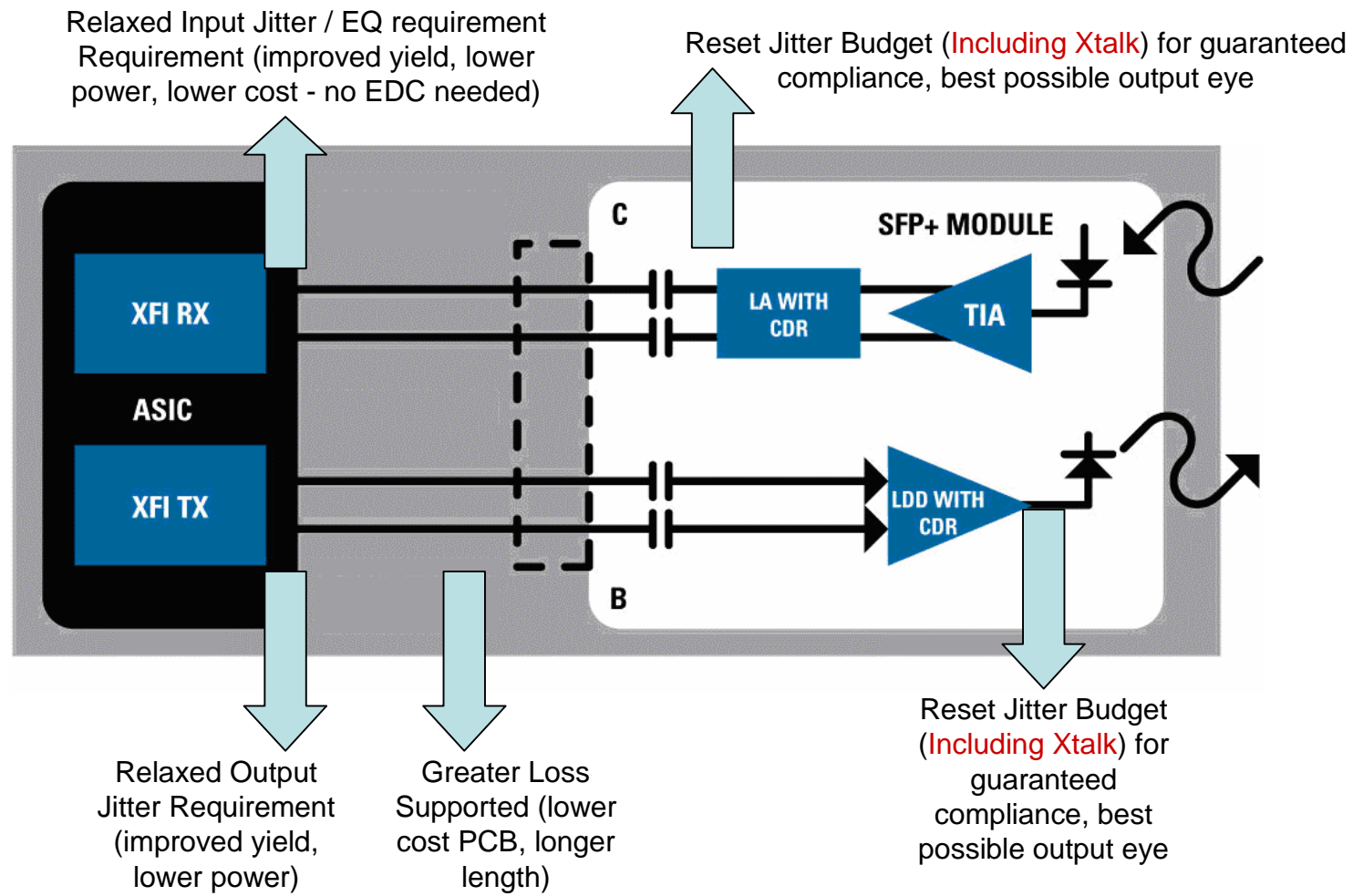
XFI is a well proven interface

- Higher robustness relative to linear and limiting
- Allows for highest level of host integration at lowest power
- Enables closed form compliance within optical module – little dependence on host ASIC / design



Block Diagram – Retimed Interface

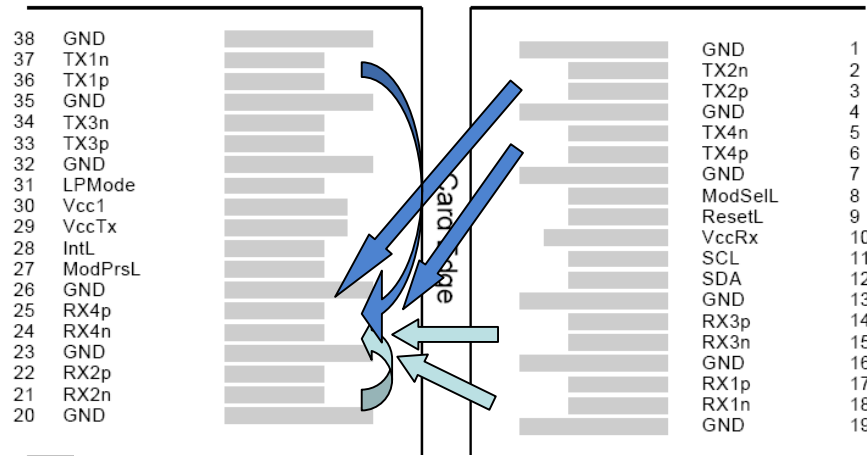
Retimed – Saves power, lowers cost, and increases performance



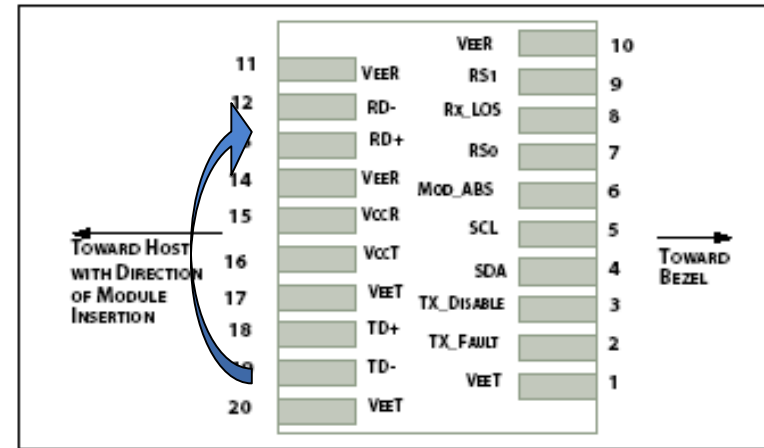
Crosstalk Considerations – At the Connector

QSFP Connector vs. SFP+ Connector

Figure 2 — QSFP Transceiver Pad Layout



QSFP

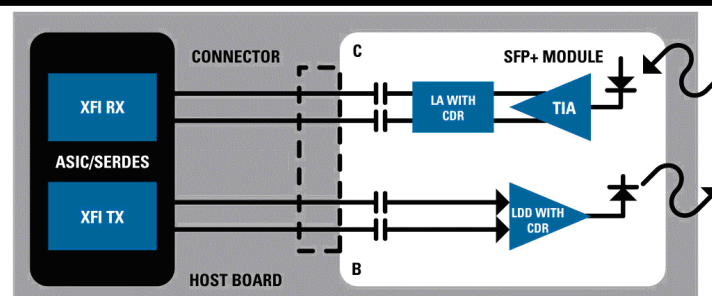


SFP+

Cross Talk Considerations	Retimed	Limiting	Linear
Relative Amplitude	High	High	Low
Rise / Fall Time	Short	Short	Long
Jitter Margin	High	Low	Low
A 10 x 10 interface will be more susceptible to crosstalk			
Jitter Margin helps ensure low cost, low power host design			

Retimed Jitter Budget Proposal – XFI Like

Jitter Compliance Points 4x10G, 10x10G, 4x25G Ulpp (1UI = 97ps)	A (ASIC Output)	Channel Tx (After Pre- emphasis)	B (At Connector)	C (At Connector)	Channel Rx (After Pre- emphasis)	D (ASIC Input)
DJ	0.15	0.10	0.25	0.15	0.10	0.25
RJ (psrms)	1.5	1.0	1.8	1.5	1.0	1.8
Total Jitter	0.37		0.51	0.37		0.51



Comparing EDC with a Retimed Interface

$$\text{Power Consumption of CDR Relative to EDC} = \frac{\text{Limiting Amp with CDR} - \text{Limiting Amplifier}}{\text{XAUISERDES with EDC} - \text{XAUISERDES without EDC}} < 20\%$$

$$\text{Cost of CDR Relative to EDC} = \frac{\text{Limiting Amp with CDR} - \text{Limiting Amplifier}}{\text{XAUISERDES with EDC} - \text{XAUISERDES without EDC}} < 20\%$$

CDRs are significantly lower power and cheaper than EDC

Analysis does not include manufacturing & integration benefits of CDRs which further reduce cost and power

Conclusion

Retimed interface add significant value to SFP+ modules and should not be overlooked in in 40G and 100G Ethernet

- Integration with existing module components minimize extra power and cost
- CDRs have potential to save significant cost & power in design and manufacturing
 - No extra components on host board
- CDRs reset crosstalk budget. Linear & Limiting interfaces do not
 - Retimed interface is the highest performing, most reliable interface for in 40G and 100G Ethernet

Retimed interface is the interface which could have low cost, common specs for 4x10G, 10 x 10G, and 4x25G

Recommendation: IEEE P802.3ba adopt a common retimed interface for CTBI and APL applications



Backup

Retimed Interface vs. Limiting Interface

