

Signaling rate range

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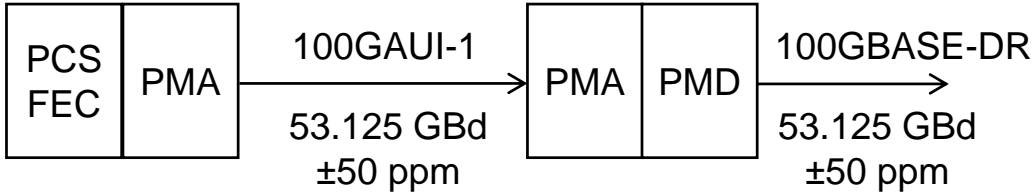
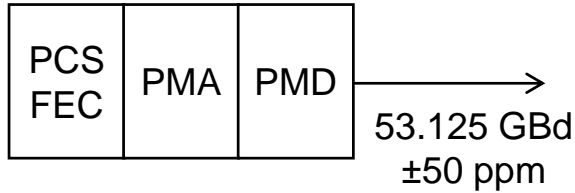
Assertions

- While ± 100 ppm is the “traditional” range for signaling rate, ± 50 ppm frequency references could be used without meaningful impact to cost
- Multiple Ethernet PHYs already specify higher precision references, e.g.,

PHY(s)	Reference	Tolerance
nGBASE-T (n = 2.5, 5, 10, 25, 40)	IEEE Std 802.3-2018	± 50 ppm
nGBASE-T1 (n = 2.5, 5, 10)	IEEE P802.3ch / D3.2	± 50 ppm
100GBASE-ZR	IEEE P802.3ct / D1.2	± 20 ppm

- A smaller signaling rate range may be leveraged to improve performance margin (implementation-dependent)
- This presentation considers migration to a higher precision reference and compatibility with “legacy” designs

Compatibility considerations

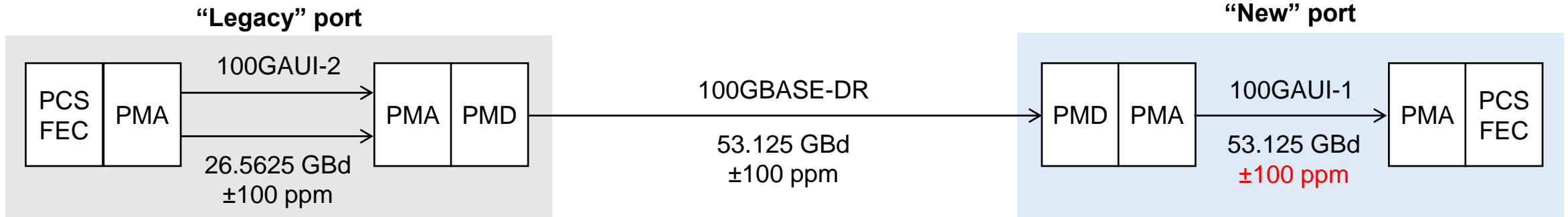


No obvious issues for integrated PHYs

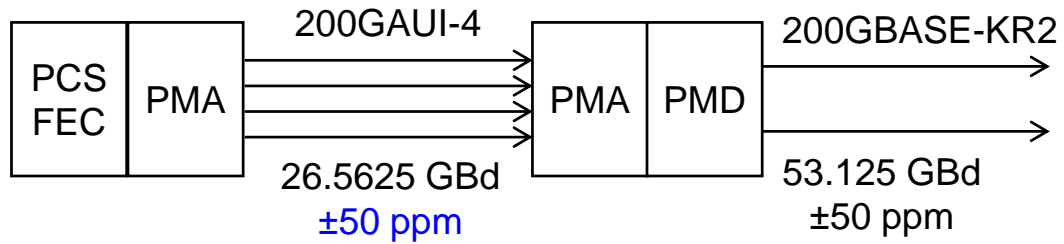
PMA output inherits the frequency precision of its input

This is not an issue for a co-packaged PMD transmitter since the signaling rate range is a superset of existing requirements

The co-packaged PMA output cannot meet the ±50 ppm limit when the PMD receives a ±100 ppm input



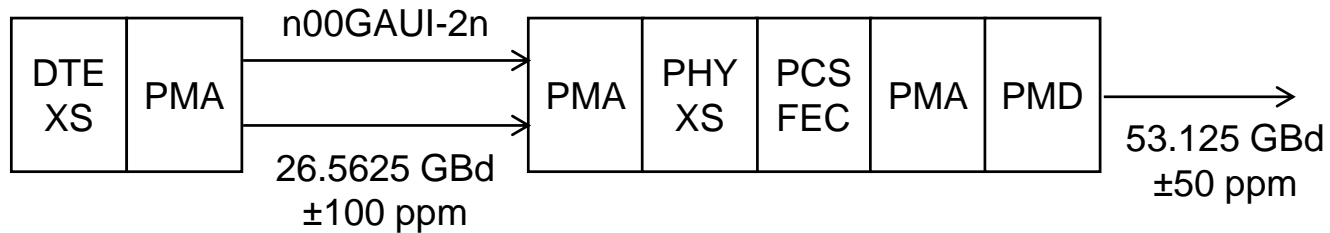
Migration considerations



Consider addition of a gearbox to adapt a wider “legacy” interface to a new narrower interface or PHY

Tighter signaling range for new interface or PHY implies the frequency reference for original interface must also be updated

Extender sublayer presents an opportunity to reconcile clock frequencies



Proposal

- Propose to tighten signaling rate range to ± 50 ppm to exploit favorable cost-benefit trade-off
- Specification for chip-to-module interface must account for the fact that signaling rate range for the module output is set by the link partner
- Leave module output and host input signaling rate ranges unchanged but consider adding a note to explain why
- Set host output and module input signaling rate ranges to ± 50 ppm to encourage transition to higher precision references over time (there is no impact on PMD compliance)
- Change all other signaling rate ranges to ± 50 ppm