100GBASE-LR1 OMAouter Power Specification

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Overview

- A Peak-to-Peak power spec has been introduced to protect the receiver from transmitters which have overshoots at overload
- The Peak-to-Peak power spec has been set at 0.8 dB above the OMA_{outer} (max) spec
- Additionally, Tx overshoot (max) has been set at 22%

PMD	OMA_{outer} (max)	Pk-to-Pk	Comment
100GBASE-DR	+4.2 dBm	-	Defined in IEEE802.3cd
100GBASE-FR1	+4.2 dBm	+5.0 dBm	
100GBASE-LR1	+5.0 dBm	+5.8 dBm	
400GBASE-DR4	+4.2 dBm	-	Defined in IEEE802.3bs
400GBASE-FR4	+3.7 dBm	+4.5 dBm	Rx DEMUX loss reduces optical power on photodiode
400GBASE-LR4-6	+4.4 dBm	+5.2 dBm	Rx DEMUX loss reduces optical power on photodiode

Concerns

- For the single channel PMDs, the peak-to-peak power represents a potential overload problem
  - Particularly with badly pre-emphasized transmitters
- Current receivers have been designed around OMA_{outer} (max) for overload
- The Tx peak-to-peak specs adds protection for the Rx from extreme peaking
  - Increases overload requirements on the Rx
  - Legitimises higher power into the Rx
- The FR4 and LR4 PMDs are less problematic
  - DEMUX in the Rx reduces the incident power onto the photodiode to an acceptable level
- The LR1 spec is most concerning with +5.8 dBm pk-pk power

Recommendation

- Propose changing the OMA_{outer} and peak-to-peak power specification for 100GBASE-LR1
- Will help to reduce the overload requirements of the receiver
  - Consequence is that there is a small reduction in Tx OMA power range

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100GBASE-FR1	+4.2 dBm	+5.0 dBm	Unchanged
100GBASE-LR1	+4.7 dBm	+5.5 dBm	
400GBASE-DR4	+4.2 dBm	-	Defined in IEEE802.3bs
400GBASE-FR4	+3.7 dBm	+4.5 dBm	Unchanged
400GBASE-LR4-6	+4.4 dBm	+5.2 dBm	Unchanged

Other changes that should be made

- The following changes would keep the standard aligned
- Transmitter table
  - OMAouter (max) = +4.7 dBm (currently +5.0 dBm)
  - Tx peak-to-peak power = +5.5 dBm (currently +5.8 dBm)
  - Average launch power (max) = +4.5 dBm (currently +4.8 dBm)
    - Keeps consistent 5 dB min ER at max OMA across PMDs
- Receiver table
  - Damage threshold = +5.5dBm (currently +6.0 dBm)
  - Average receive power (max) = +4.5 dBm (currently +4.8 dBm)
  - Receiver power OMA (max) = +4.7 dBm (currently +5.0 dBm)

Thank you!