

List of required inputs
for
SMF Clauses 122 and 123

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Introduction

- ❑ Editing is in progress for Clause 122, for 400GBASE-DR4, and Clause 123, for 400GBASE-FR8 and 400GBASE-LR8,
- ❑ Considering that all three PMDs use PAM4 optical signals there is a lot of new ground to be broken for the specification methodology.
- ❑ Therefore a lot of additional input is needed on several optical interface parameters and testing methodology.
- ❑ There are also several parameters in existing clauses which were not mentioned in the adopted baselines.

Parameters missing from 400GBASE-DR4 baseline

Parameter	Common Value
<i>Transmitter</i>	
Side-mode suppression ratio (SMSR), (min)	30 dB
Average launch power of OFF transmitter, each lane (max)	-30 dBm
Optical return loss tolerance (max)	
<i>Receiver</i>	
Receive power, each lane (OMA_{inner}) (max)	
Stressed receiver sensitivity (OMA_{inner}), each lane (max)	
Receiver 3 dB electrical upper cutoff frequency, each lane (max)	31 GHz (NRZ)
<i>Channel characteristics</i>	
Optical return loss (min)	

Parameters missing from 400GBASE-FR4 and 400GBASE-LR4 baselines

Parameter	Common Value
<i>Transmitter</i>	
Side-mode suppression ratio (SMSR), (min)	30 dB
Average launch power, each lane (max) and (min)	
Difference in launch power between any two lanes (OMA_{outer}) (max)	~5 dB
Average launch power of OFF transmitter, each lane (max)	-30 dBm
Transmitter reflectance (max)	-12 dB
Transmitter eye mask definition	
<i>Receiver</i>	
Damage threshold	AOP + 1 dB
Average receive power, each lane (max) & (min)	
Receive power, each lane (OMA_{inner}) (max)	
Difference in receive power between any two lanes (OMA_{inner}) (max)	~5.5 dB

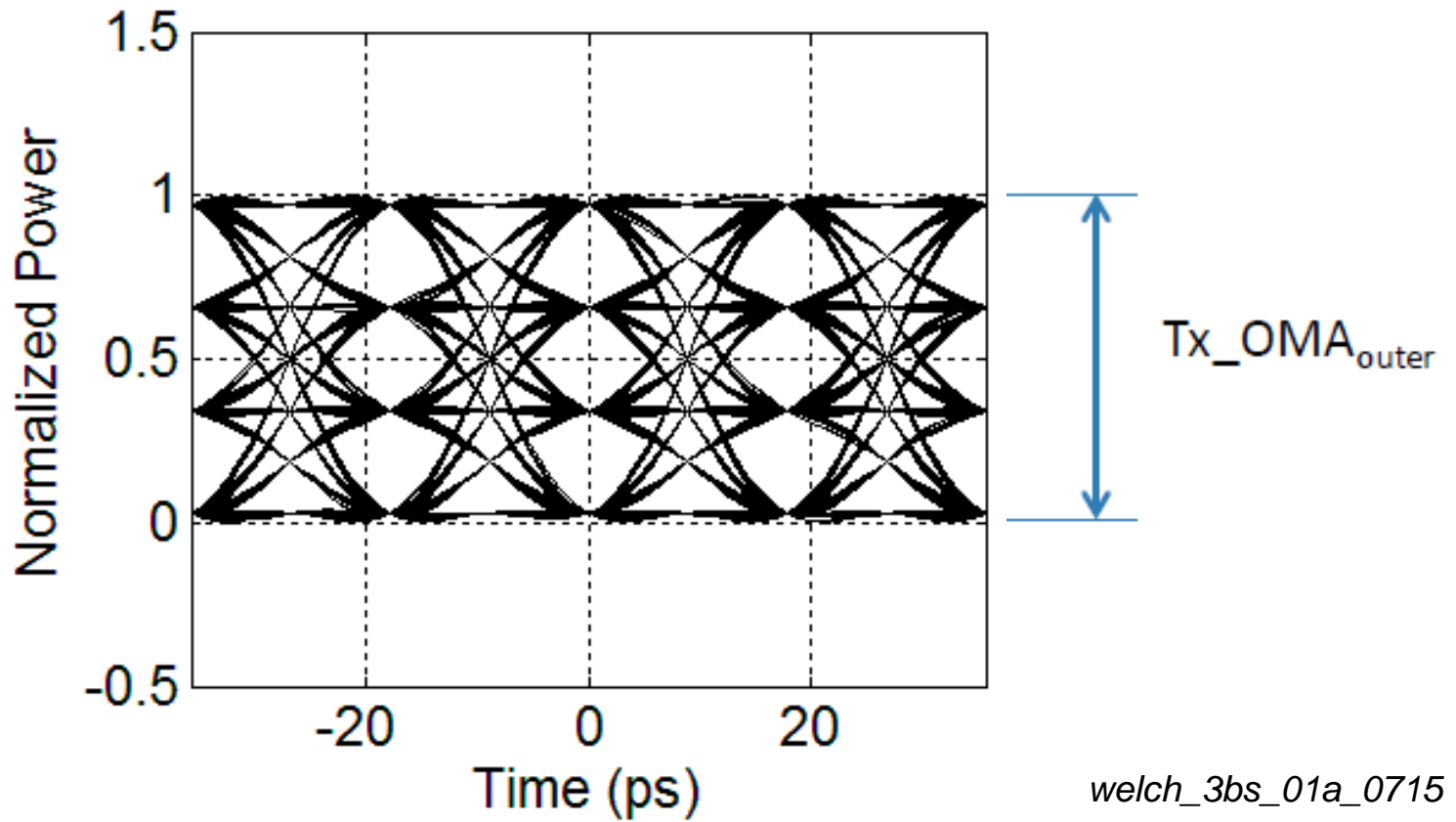
New OMA definitions

- ❑ In Clause 88.8.4 OMA is defined as in Clause 52.9.5 using a square wave test pattern.
- ❑ For PAM4 signals we will need new OMA definitions and associated test patterns
- ❑ In adopted baseline for 400GBASE-DR4, OMA TX_OMA_{outer} is used to specify the transmitter max OMA and ER, and the minimum of TX_OMA_{upp} , TX_OMA_{mid} and TX_OMA_{low} for the receiver sensitivity and link budget
- ❑ In adopted baselines for 400GBASE-FR8 and 400GBASE-LR8, the transmitter OMA is specified as a OMA_{outer} and the receiver OMA as OMA_{inner} together with a 5 dB allocation for modulation penalty.

New OMA definitions, continued

- Editor proposal: Use OMA_{outer} for transmitter spec (for Tx power and ER) and OMA_{inner} , as minimum of 3 inner eye openings, for both transmitter and receiver specs, considering that there is only a theoretical relation in the range 4.8 to 5 dB for OMA_{outer}/OMA_{inner}
- Editor proposal: Include PAM4 specific OMA definitions in Clause 122, to which reference is made in Clause 123, using the existing Clause 52.9.5 as a starting point

New OMA definitions, continued 2



- For PAM4 signals we will need new methodology for TDP
 - Should this be based on a reference transmitter and reference receiver as per previous SMF clauses?
 - As the required BER is $2E-4$ can this be based on a captured waveform?
- Conventional channel requirements can be used for PAM4 signals

Further new definitions, continued

□ **Extinction Ratio:**

- Current definition in Clause 88.8.6 applies to conventional NRZ signal:
 - *The extinction ratio of each lane shall be within the limits given in Table 88–7 if measured using the methods specified in IEC 61280-2-2, with the sum of the optical power from all of the lanes not under test below –30 dBm. The extinction ratio is measured using the test pattern defined in Table 88–11.*
- We need a new definition for ER in Clauses 122 and 123.

□ **Transmitter optical waveform (transmit eye):**

- Current definition in Clause 88.8.8 applies to conventional NRZ signals
- We need a new definitions for PAM4 in Clauses 122 and 123.

Further new definitions, continued

- **Stressed Receiver Sensitivity:**
 - Current definition in Clause 88.8.10 applies to conventional NRZ signal:
 - We need new definitions in Clauses 122 and 123.

Need for new test patterns

- ❑ Current test patterns in Table 88-10 and test pattern definitions in Table 88-11 all apply to conventional NRZ signals.
- ❑ We need new definitions appropriate for PAM4 signals that tie in with the new test methodologies for TDP and stressed receiver sensitivity.

Request for inputs

- P802.3bs Task Force participants are invited to prepare inputs for the items listed in this presentation.

Q & A

Thank you