Considerations on how to express receiver sensitivity in P802.3cu

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Acknowledgements

Introduction

- This presentation provides considerations on how to express the relation between receiver sensitivity (RS) in P802.3cu and SECQ

- During the review of comments to D2.0 it was agreed to modify the way RS is presented to the following in Clause 151 of D2.1 for 400GBASE-FR4 and 400GBASE-LR4-6:

	FR4	LR4-6	
Receiver sensitivity (OMA$_{outer}$), each lane (max)			
for SECQ < 1.4 dB	−4.6	−6.8	dBm
for 1.4 dB ≤ SECQ ≤ 3.4 dB	−6 + SECQ	—	dBm
for 1.4 dB ≤ SECQ ≤ 3.5 dB	—	−8.2 + SECQ	dBm

- In this presentation the author clarifies why he thinks this is an excellent representation of RS

Comparison with how Tx OMA_{outer} is specified

- In a parallel presentation by Chris Cole it is argued that because Tx OMA_{outer} is specified as a combination of

	FR4	LR4-6	
Outer Optical Modulation Amplitude (OMA_{outer}), each lane (min)	−0.3	0.2	dBm

- And

	FR4	LR4-6	
Launch power in OMAouter minus TDECQ, each lane (min):			
for extinction ratio ≥ 4.5 dB	−1.7	−1.2	dBm
for extinction ratio < 4.5 dB	−1.6	−1.1	dBm

- That therefore RS minus SECQ should be specified as a fixed value and not as RS = SECQ − 1.7 dB (for ER ≥ 4.5 dB case)
- The author believes there is an important difference between Tx OMA_{outer} and RS

Considerations on RS specification representation

- The receiver sensitivity RS depends on the SECQ (or TECQ) of the transmitter used, which is generally unknown in an interworking condition.
- Thus in this case SECQ (or TECQ) is a variable and therefore RS follows the curve in Figure 151-6
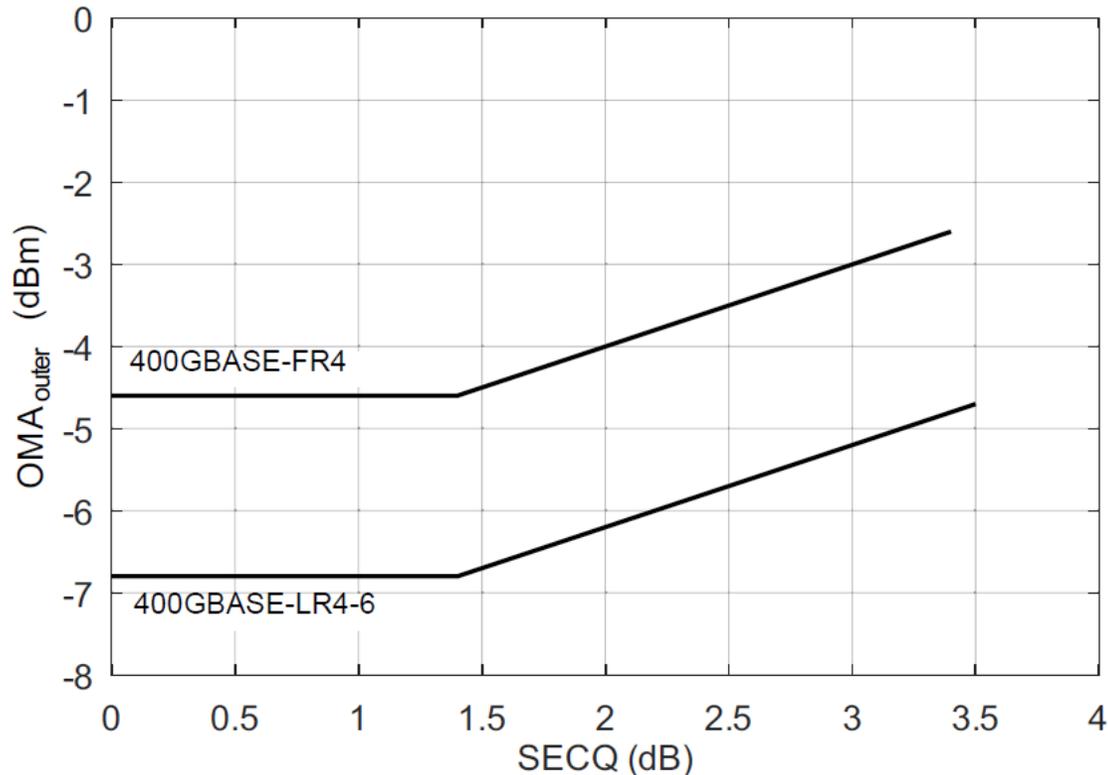
- RS is flat for SECQ < 1.4 dB and above that increasing linearly with SECQ
- It's very appropriate to express RS as "SECQ – 6 dB" for SECQ ≥ 1.4 dB for the 400GBASE-FR4 example

Considerations on Tx OMA$_{outer}$ specification representation

- For a transmitter TDECQ is not a variable, but rather a fixed value.
- Therefore we don't need to express OMA$_{outer}$ in the same way as RS

- It is the author's view that we should maintain the way Tx OMA$_{outer}$ and RS are specified in D2.1.

- However if there is consensus that we need to align the representation of Tx OMAouter and RS, the author feels that it would be better to consider the reverse approach and represent Tx OMA$_{outer}$ as (for the 400GBASE-FR4 example):
- Tx OMAouter (min) = -0.3 dBm for TDECQ < 1.4 dB
- Tx OMAouter (min) = TDECQ – 1.7 dBm for TDECQ ≥ 1.4 dB

- The author feels that this would significantly increase the readability of the specification

Comparison of how to represent OMA_{outer} specification

CURRENT REPRESENTATION IN D2.1 P802.3CU

Description	400GBASE-FR4	400GBASE-LR4-6	Unit
Outer Optical Modulation Amplitude (OMAouter), each lane (min)	-0.3	0.2	dBm
Launch power in OMAouter minus TDECQ, each lane (min): for extinction ratio ≥ 4.5 dB for extinction ratio < 4.5 dB	−1.7 −1.6	−1.2 −1.1	dBm dBm

ALTERNATIVE REPRESENTATION FOR D2.2 P802.3CU

Description	400GBASE-FR4	400GBASE-LR4-6	Unit
Outer Optical Modulation Amplitude (OMAouter), for TDECQ < 1.4 dB, each lane (min)	-0.3	0.2	dBm
Outer Optical Modulation Amplitude (OMAouter), each lane (min) for extinction ratio ≥ 4.5 dB, and 1.4 dB ≤ TDECQ ≤ 3.4 dB for extinction ratio < 4.5 dB, and 1.3 dB ≤ TDECQ ≤ 3.4 dB	TDECQ −1.7 TDECQ −1.6	TDECQ −1.2 TDECQ −1.1	dBm dBm

Further thoughts on improving representation

- Move Figure 151-6 to subclause 151.7.3 on "illustrative link power budgets"

- Create separate curves for 400GBASE-FR4 and 400GBASE-LR4-6

- Add a curve for Tx OMA$_{outer}$ to both cases.

- Point the RS curve to the lower horizontal axis with index for SECQ and the Tx OMAouter curve to the top horizontal axis with index for TDECQ.

- We could use these Figures to clarify the illustrative power budget for a certain Tx / Rx combination

Example curve

ADD EXAMPLE CURVE

Thanks!