

# Minimum SECQ Change to Allow Receiver Sensitivity Margin

Yi Tang, Cisco

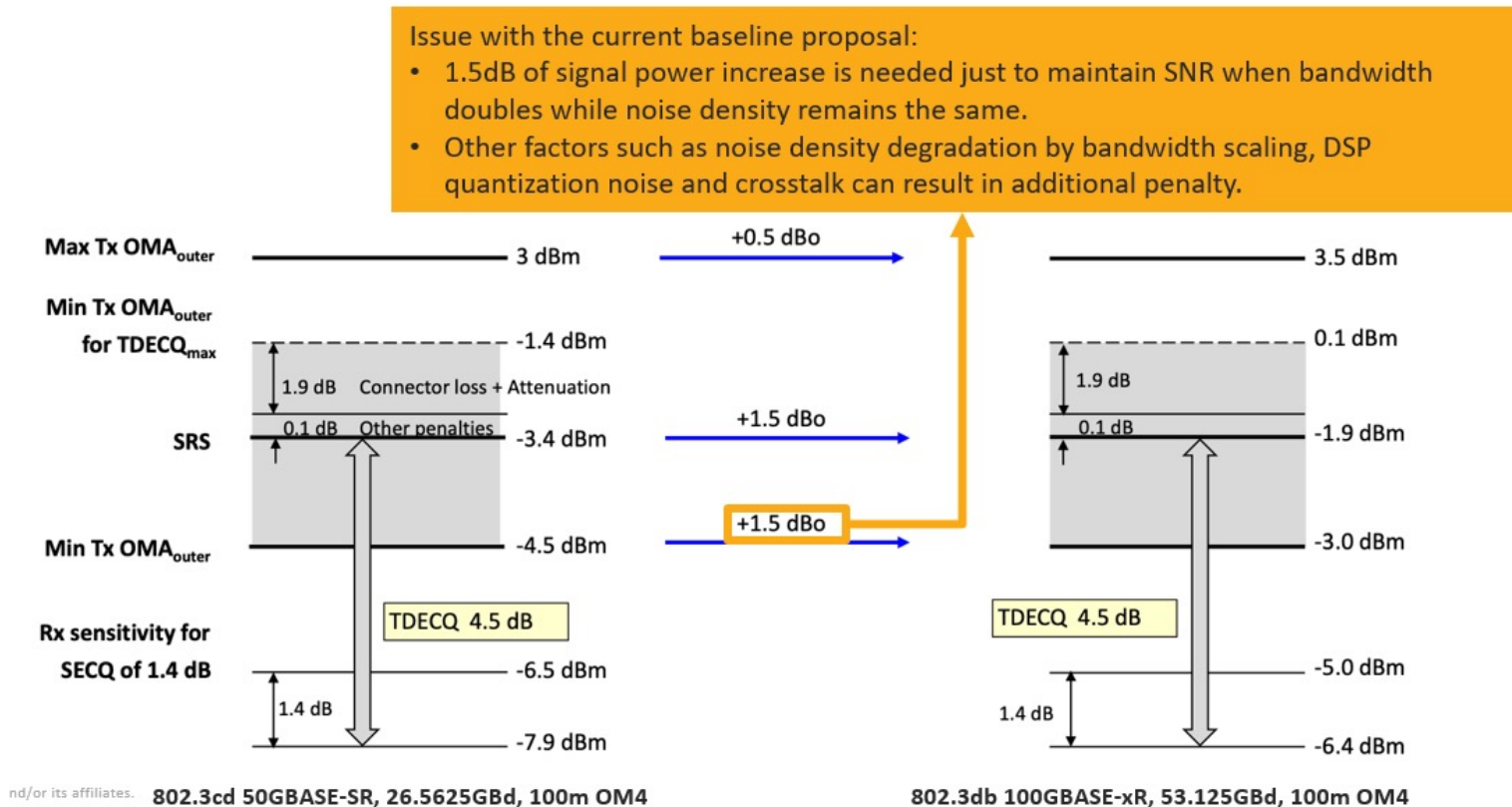
Gary Nicholl, Cisco

IEEE P802.3dB TF Ad Hoc, 06/24/2021

# Supporters

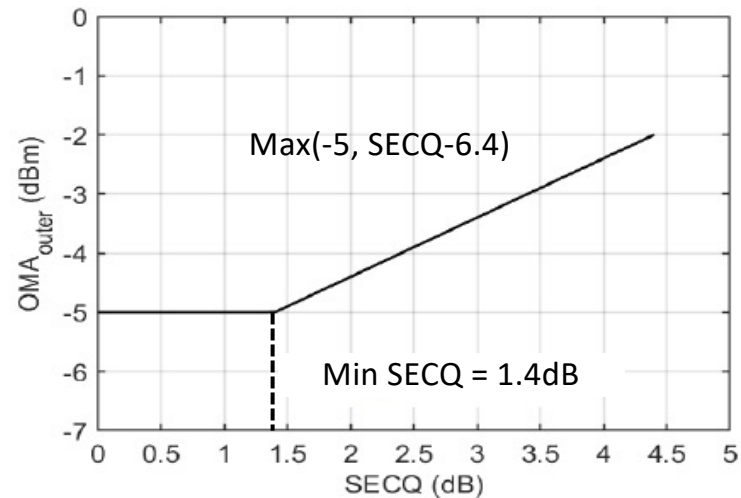
- Ray Nering, Cisco
- Mark Nowell, Cisco
- Ramana Murty, Broadcom
- David W Dolfi, Broadcom
- Vipul Bhatt, II-VI
- David Lewis, Lumentum
- Phil Sun, Credo
- Ali Ghiasi, Ghiasi Quantum LLC

# Receiver Sensitivity Issue Raised - nering 3db 01 021821.pdf

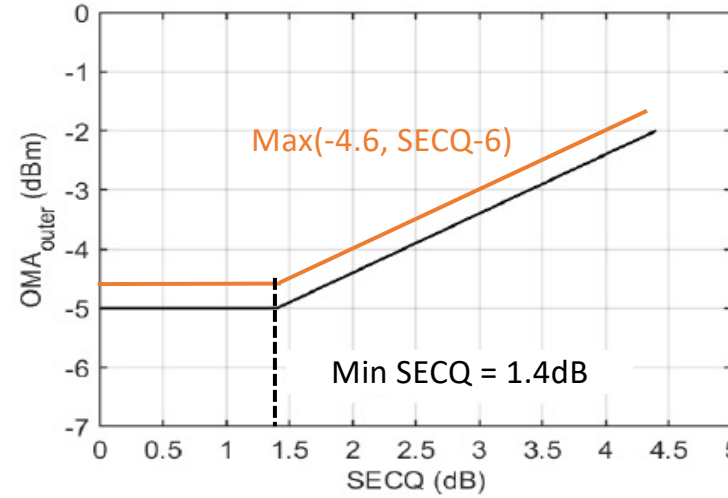


- How to allow additional RX margin without heavily penalizing TX?
- 6 parameters remain TBD in the current draft.

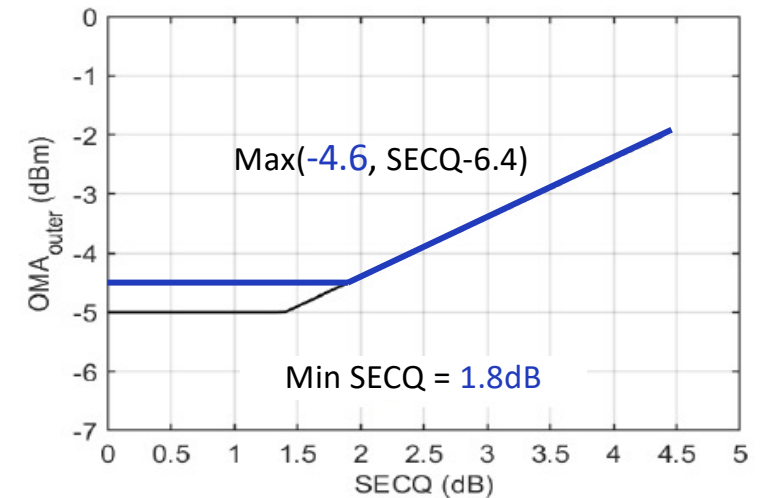
# Proposal to Finalize Receiver Sensitivity



[murty\\_3db\\_adhoc\\_01b\\_121720.pdf](#)



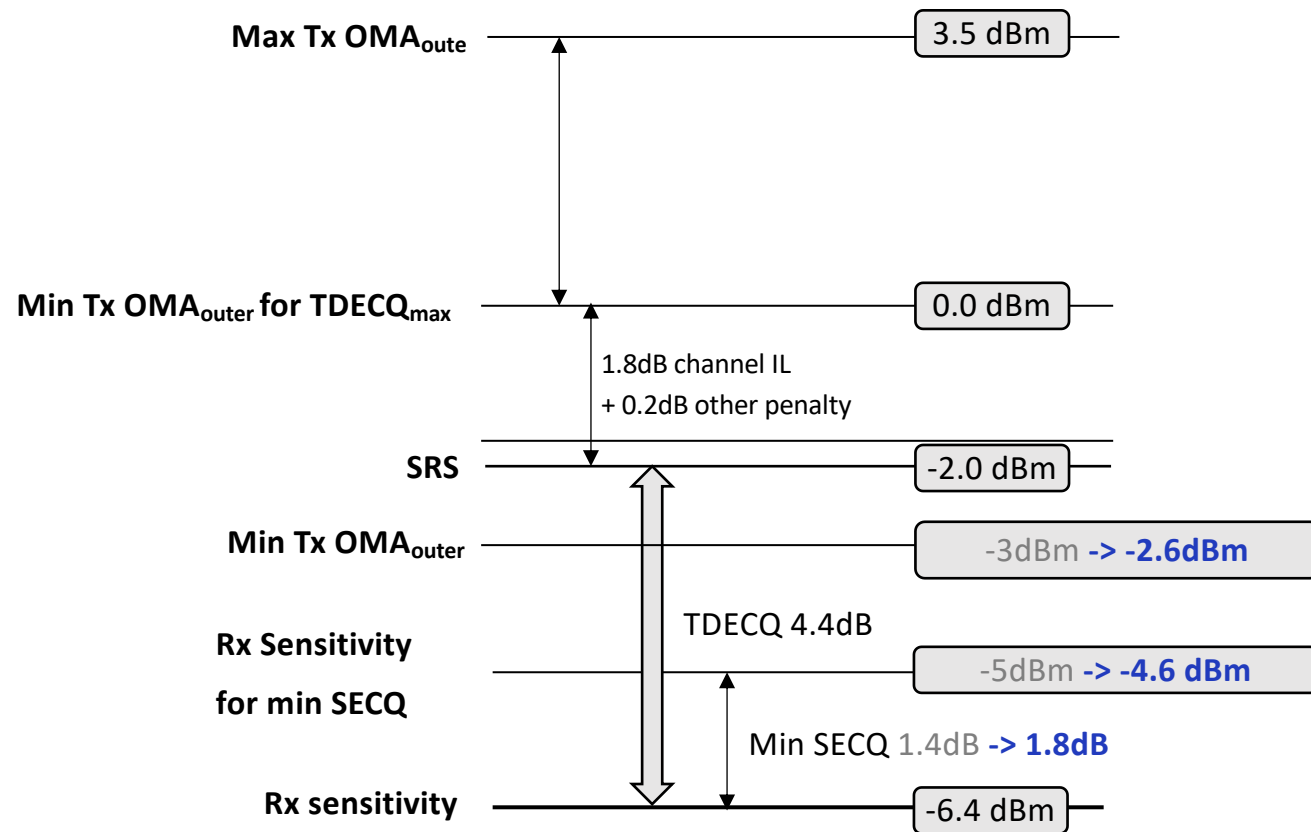
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Proposal

Options	Upside/Downside
<u><a href="#">murty_3db_adhoc_01b_121720.pdf</a></u> : -2.0dBm SRS	<ul style="list-style-type: none"> <li>allocates 1.5dB relaxation on receiver sensitivity that only covers theoretical SNR penalty resulted from 50 Gb/s to 100 Gb/s change</li> <li>Potential problem in the <b>noise limiting region</b> particularly for <b>CMOS TIA implementation</b>.</li> </ul>
<u><a href="#">nering_3db_01_021821.pdf</a></u> : -1.6dBm SRS	<ul style="list-style-type: none"> <li>Allows additional 0.4dB receiver sensitivity margin throughout SECQ range.</li> <li><b>Squeezes TX operating range</b> – requires min TX OMA (for TDECQ=4.4dB) to change from 0.0dBm to 0.4dBm.</li> </ul>
Proposal: Raise minimum SECQ from 1.4dB to 1.8dB; maintain the RS curve based on -2.0dBm SRS above 1.8dB SECQ.	<ul style="list-style-type: none"> <li>Allows some receiver sensitivity margin gain in the noise limiting region (SECQ &lt; 1.8dB).</li> <li>Does not squeeze TX operating range with TDECQ above 1.8dB. Min TX OMA (for TDECQ=4.4dB) remains 0.0dBm. Only affected TX operating region with TDECQ below 1.8dB.</li> </ul>

# Link Budget Based on the Proposal



# Proposed Spec Changes to 8023db D1p1 - TX

- 167.7.1 Transmitter optical specifications

Average launch power, each lane (min) <sup>b</sup>	<u>-4.6</u>		dBm
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (max)	3.5		dBm
Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each lane (min) <sup>b,c</sup>	<u>-2.6</u>		dBm
Transmitter excursion, each lane (max)	2		dBm
Overshoot/undershoot	TBD	TBD	%
Launch power in OMA <sub>outer</sub> minus TDECQ (min) <sup>b</sup>	TBD	-4.4	dBm

<sup>a</sup>RMS spectral width is the standard deviation of the spectrum.

<sup>b</sup>~~Editors' note: Based on stressed receiver sensitivity of 2 dBm, and may increase by up to 0.4 dB based on the choice of stressed receiver sensitivity.~~

<sup>c</sup>Even if the TDECQ < 1.8 dB, the OMA (min) must exceed this value.

<sup>d</sup>If measured into type A1a.2 or type A1a.3, or A1a.4, 50 µm fiber, in accordance with IEC 61280-1-4.

# Proposed Spec Changes to 8023db D1p1 - RX

## • 167.7.2 Receiver optical specification

Average receive power, each lane <sup>b,e</sup> (min)	<u>-6.4</u>	dBm
Receive power, each lane (OMA <sub>outer</sub> ) (max)	3.5	dBm
Receiver reflectance (max)	-12	dB
Stressed receiver sensitivity (OMA <sub>outer</sub> ), each lane <sup>d</sup> (max)	<u>-2</u>	dBm
Receiver sensitivity (OMA <sub>outer</sub> ), each lane <sup>e</sup> (max)	<u>Max(-4.6, SECQ-6.4)</u>	dBm

<sup>a</sup>The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level on one lane. The receiver does not have to operate correctly at this input power.

<sup>b</sup>Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

~~<sup>c</sup>Editors' note: Based on stressed receiver sensitivity of -2 dBm, and may increase by up to 0.4 dB based on the choice of stressed receiver sensitivity.~~

<sup>d</sup>Measured with conformance test signal at TP3 (see 167.8.13) for the BER specified in 167.1.1.

<sup>e</sup>Receiver sensitivity is informative and is defined for a transmitter with a value of SECQ up to 4.4 dB.

<sup>f</sup>These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

<sup>g</sup>Only applies to 200GBASE-VR2, 400GBASE-VR4, 200GBASE-SR2 and 400GBASE-SR4.

## • 167.8.12 Receiver sensitivity

$$RS = \text{Max}(-4.6, \text{SECQ}-6.4) \quad (\text{dBm})$$

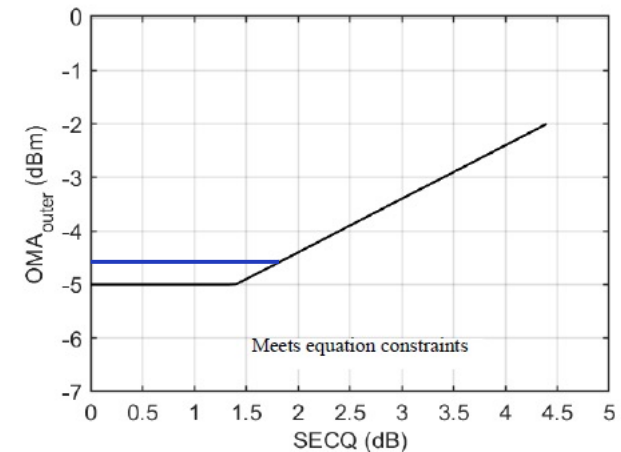


Figure 167-4—Illustration of receiver sensitivity