Improved TDEC and SEC limit for 100GBASE-SR4

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Introduction

- Max TDEC of 4.9 dB is: higher than any other optical PMD
- near a cliff
- much higher than VECP of 4.2, and
- higher we intended

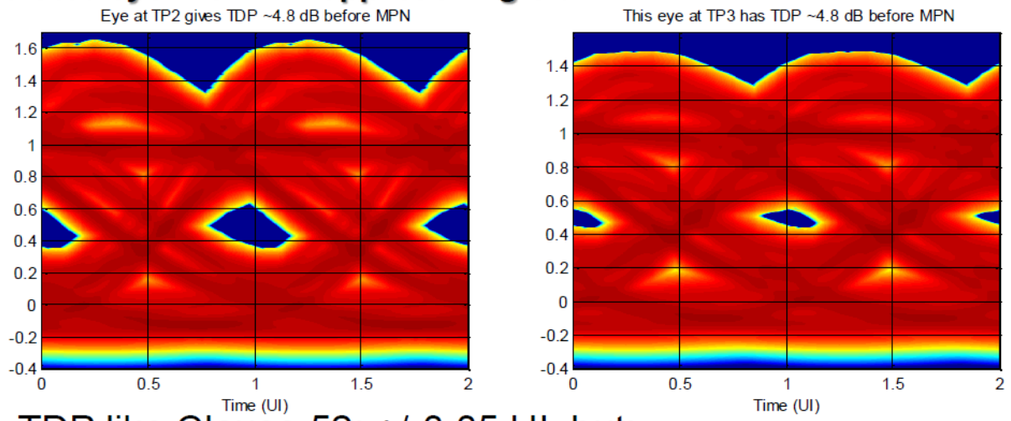
- The reference worst case transmitter and link appears to give a penalty around 4.25 dB at the reference product receiver
- This is a high penalty – going higher is dangerous

- Unlike in previous TDP-based specifications, implementers can readily create transmitters about as bad as the spec – we have to be more careful to protect the link integrity and the receiver

- However, TDEC calculations show a higher penalty than predicted by link modelling
  - Reason for this not understood

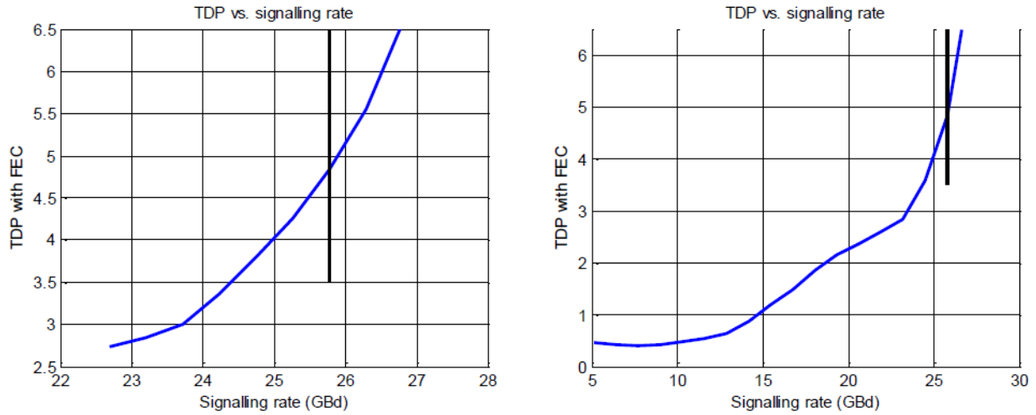
5 dB TDP is too high anyway

Simulated eye with TDP approaching 5 dB



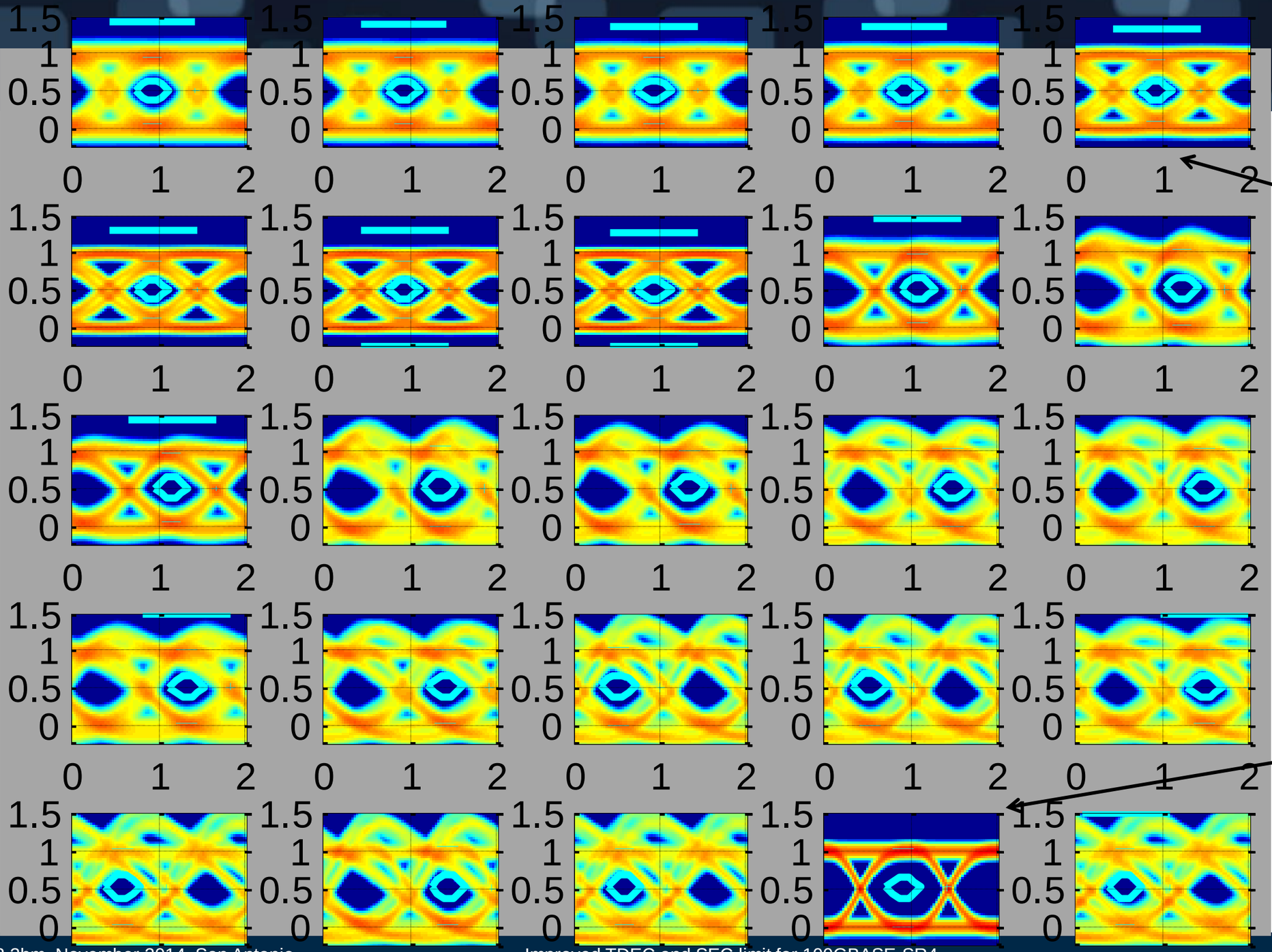
- TDP like Clause 52: +/-0.05 UI, but:
  - BER = 5e-5
  - 100 m of OM4 modelled as a Gaussian filter, like spreadsheet model
  - Standard fourth-order Bessel-Thomson
- Includes ISI from chromatic dispersion but not MPN
- Is this on the cliff edge?

TDP vs. signalling rate



- IC bandwidths scaled with signalling rate, laser not scaled
- 2% rate change increases TDP by 0.7 dB – yes, cliff edge

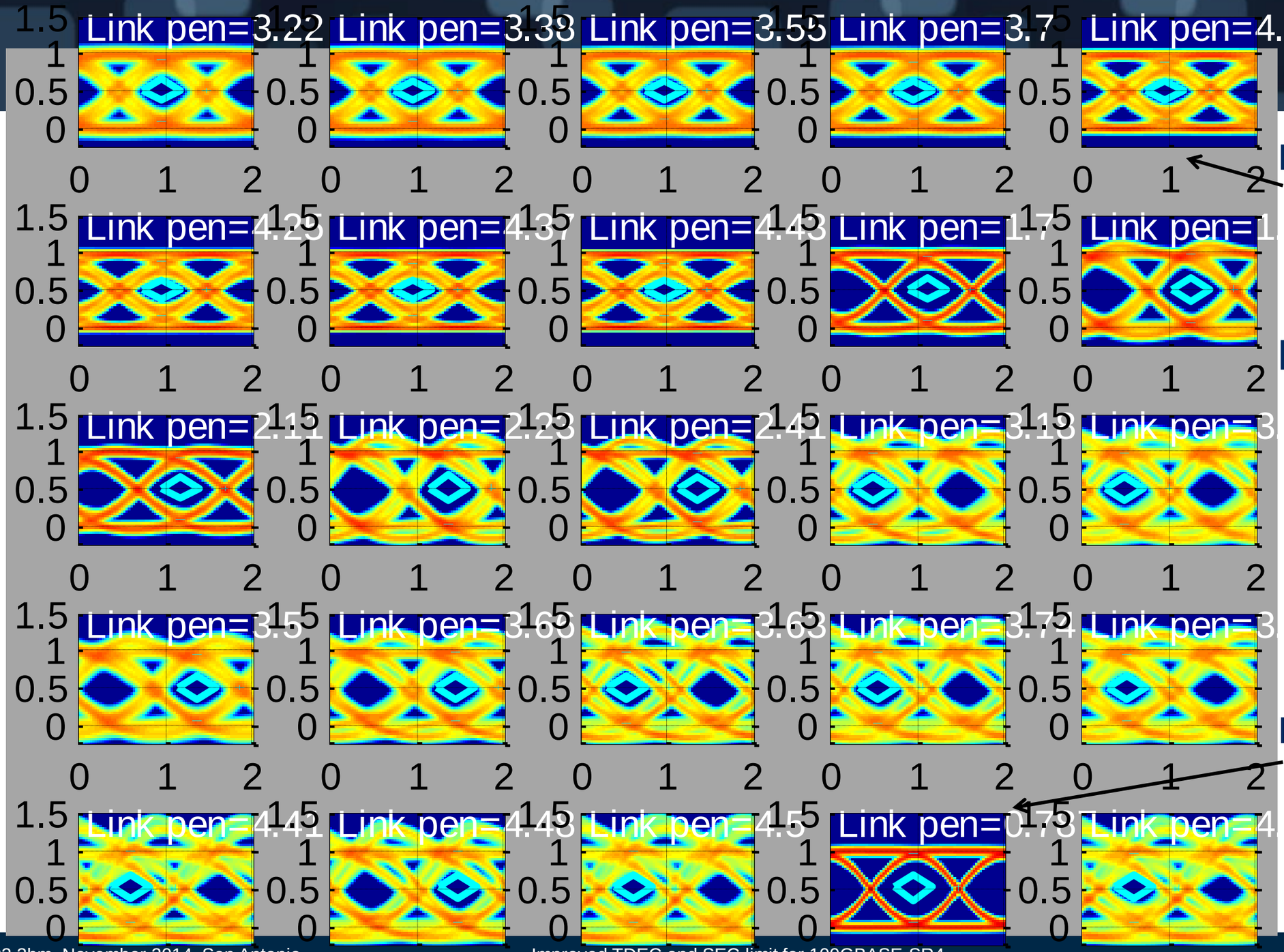
- Slide 12 of dawe_02a_0114_optx, slides 4, 5 of dawe_01_0513_optx
- This eye is on the "**cliff edge**": about to collapse
- Since this work, widening the decision timing offsets and changing to TDEC has helped
- TDEC limit should be reduced from 4.9 dB
- See dawe_01_0914_optx



Reference worst case transmitter

Eyes at TP2

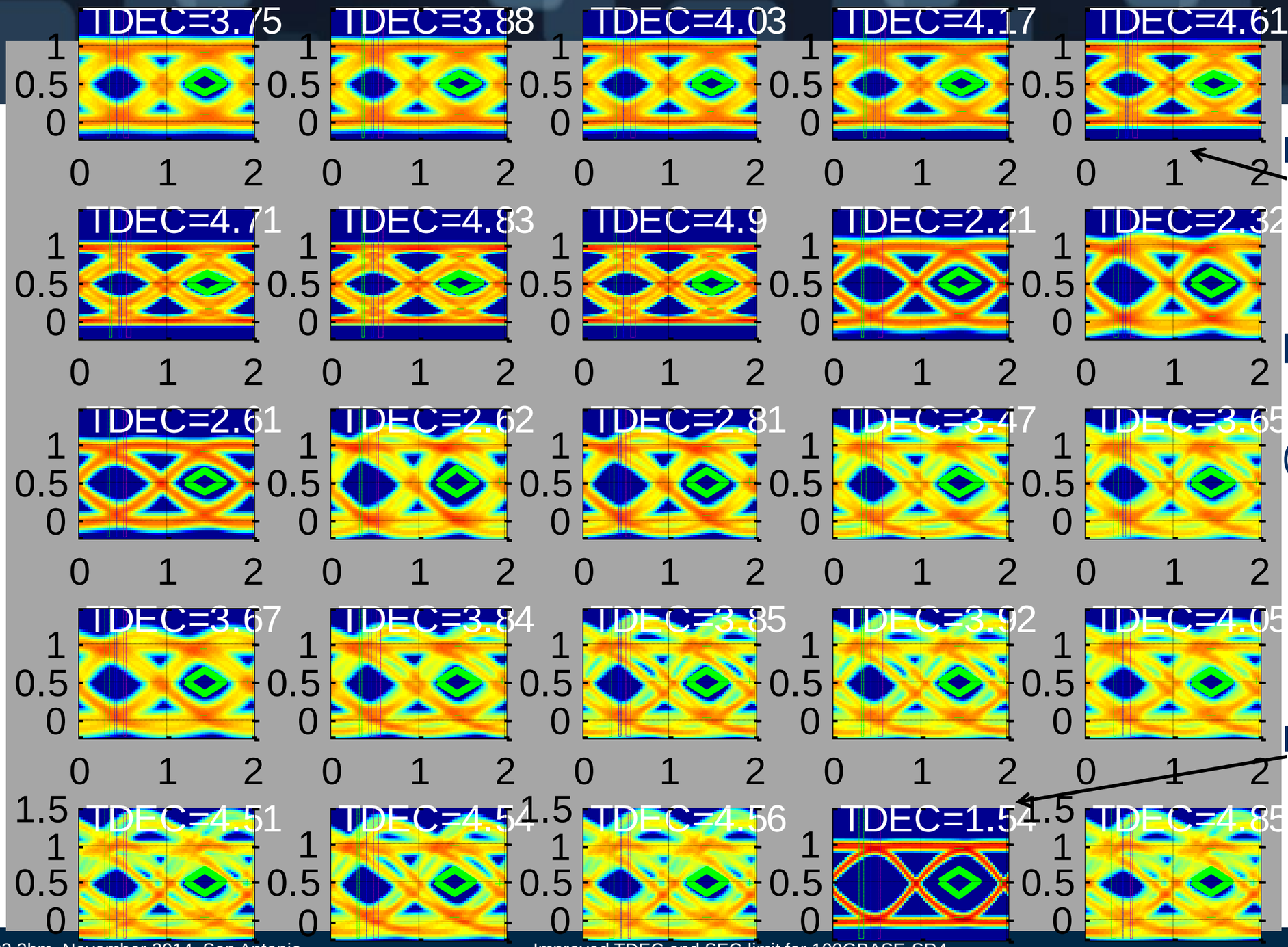
Ideal transmitter



Reference worst case transmitter, link and receiver

Eyes at TP3a

Ideal transmitter, worst link and receiver



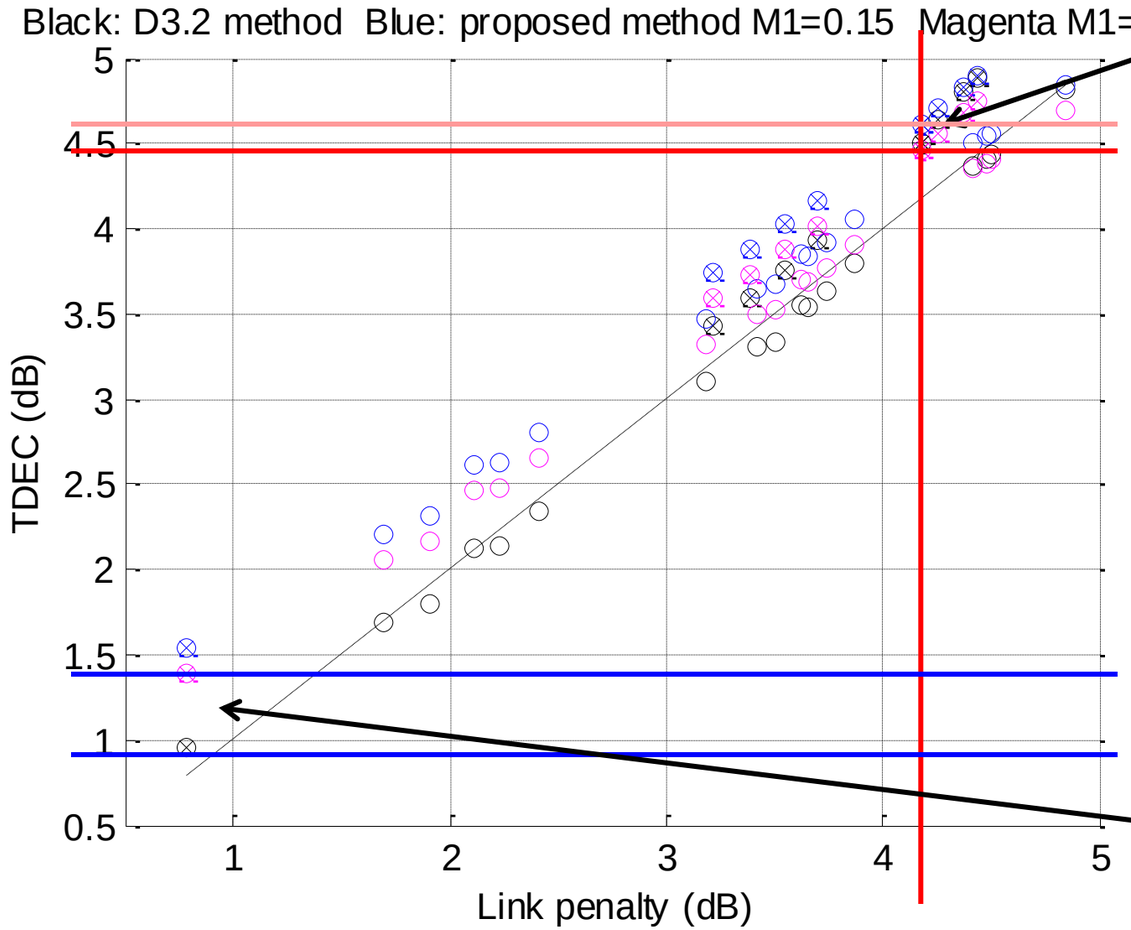
Reference worst case transmitter, TDEC receiver

Eyes in TDEC test

(after change proposed in dawe_01_1114_optx, using M1 = 0.15)

Ideal transmitter, TDEC receiver

TDEC against simulated link penalty



- Reference worst case
- Max TDEC should be 4.5 dB
  - Unless we can make TDEC and link penalty align better
- M1 in dawe_01_114_optx should be adjusted for max TDEC = 4.5 dB
  - Megenta points are lower than the blue points
- However, SEC target should be 4.3 dB
  - (TBC) Representing worst transmitter and channel, 19.34 GHz reference receiver
- At present we don't give credit for TDEC less than 0.9 dB
- This could be increased to 1.4 dB

Thank You