Slightly tighter bmax for CR (comment 183)

Piers Dawe, Nvidia

Introduction

- Comment 183 says that cable channels don't have strong ISI on the later taps. Detail in slide 7

- Comment 237 says that CR transmitters should not make bad ISI beyond $Np = 11$. Detail in slide 8

- dawe_3ck_01a_0921 pointed out that a channel can exceed the tap weight limit by 0.01 to 0.02 before it costs a lot in COM . See slide 6

- heck_3ck_01_0919 surveyed tap weights for many channels; only one relevant channel had a tap <-0.04, and that was a backplane channel. See slide 3
    - We expect that cables will have less ISI than backplane; the cable ends are separated by loss, the bulk cable response is smooth

- healey_3ck_01_0521 also looked at backplane and cable channels' tap weights, although up to tap 12, and found less ISI for cable than backplane. See slides 4 and 5

- This presentation illustrates some of this

Survey of tap weights in heck_3ck_01_0919

From dawe_3ck_01a_0921 with limits added

Tap Weights for bmax(2..n)=0.2

Note: 1st postcursor tap is not shown.

Proposal
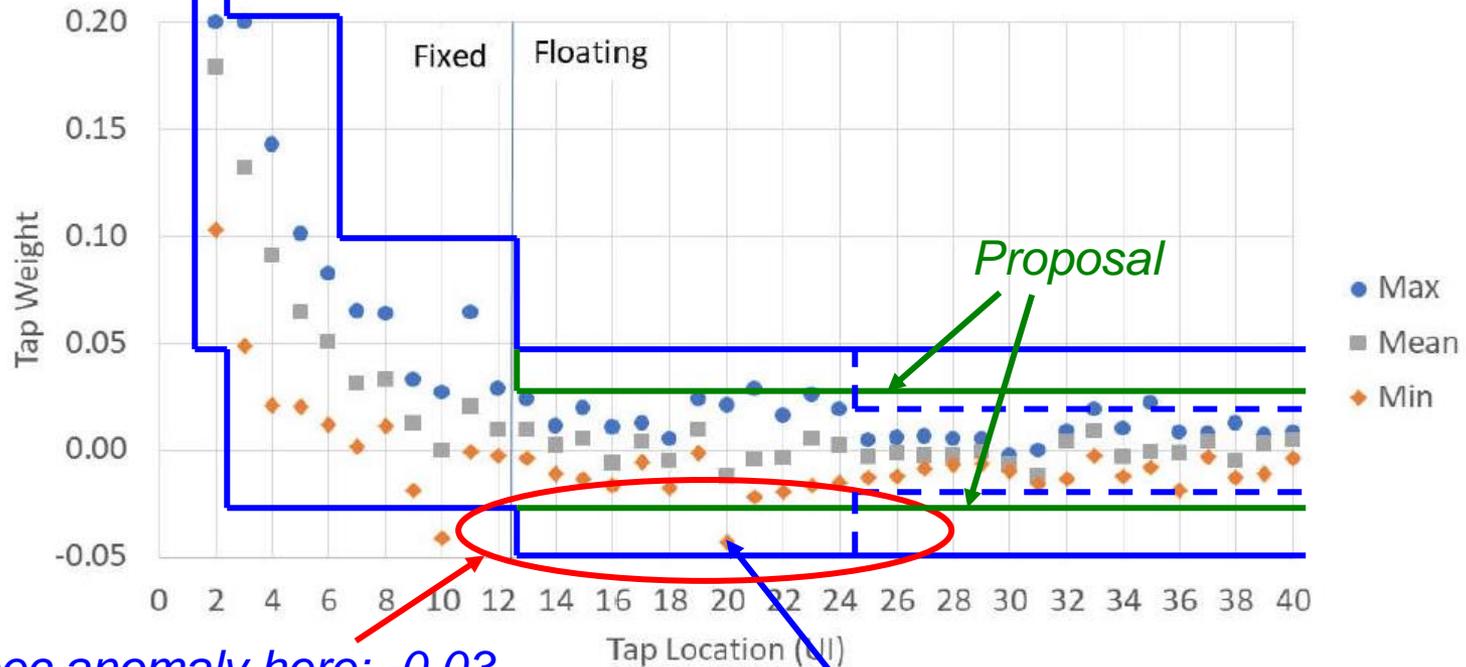
Spec anomaly here: -0.03 before, effectively -0.02 after
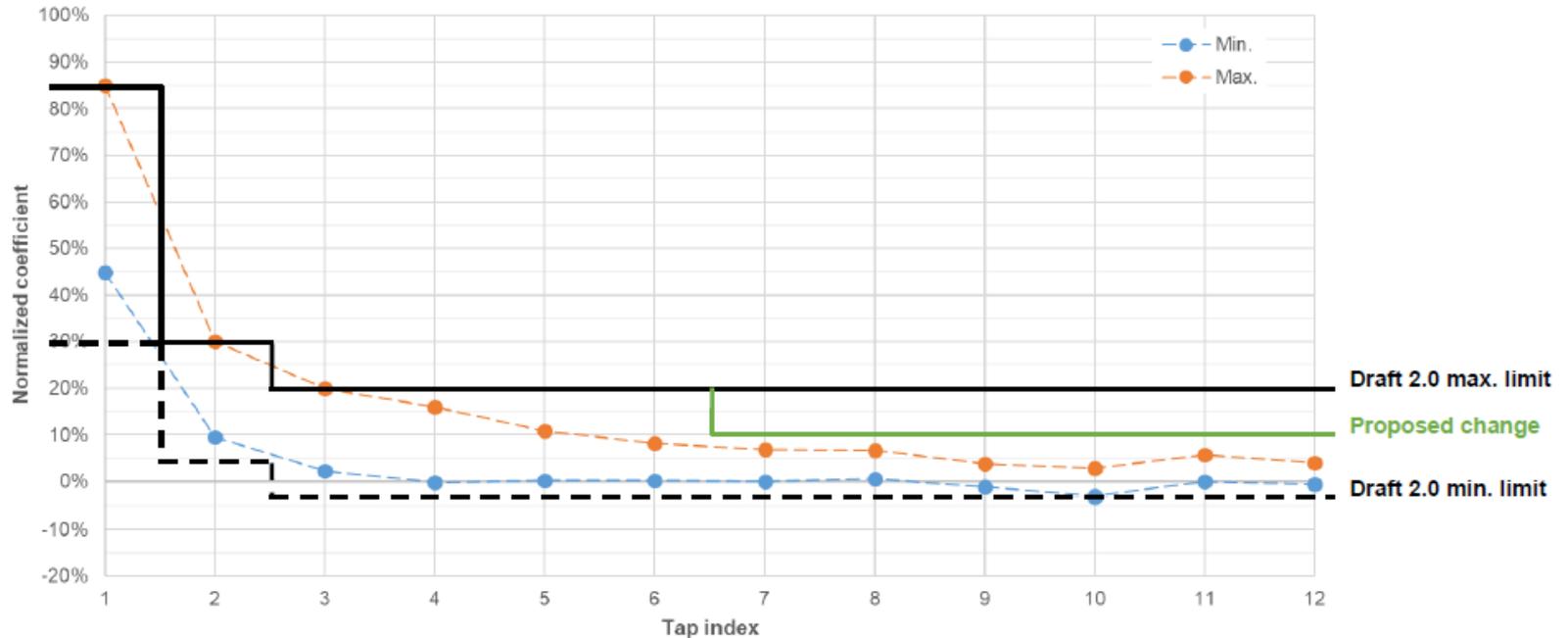
Backplane channel; CR cables don't do this

- Only one channel has a strongly –ve tap above 12 UI
- No channels have taps >~0.03 above 12 UI

Slightly tighter bmax for CR (comment 183)
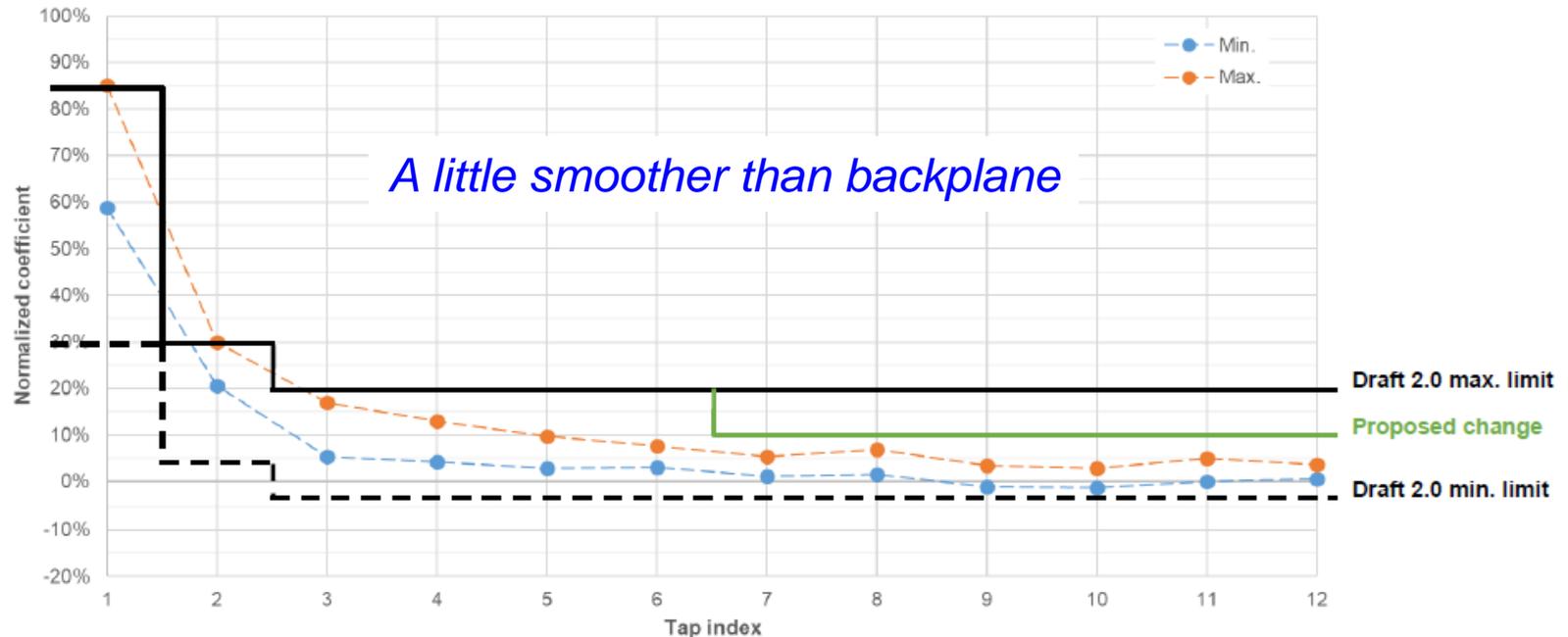
From healey_3ck_01_0521

Backplane and cable (TP0-TP5) channels

101 channels with COM $\geq$ 2.5 dB, 2 tests (package transmission line length) per channel, 202 coefficient sets

From healey_3ck_01_0521

Cable assembly (TP1-TP4) channels
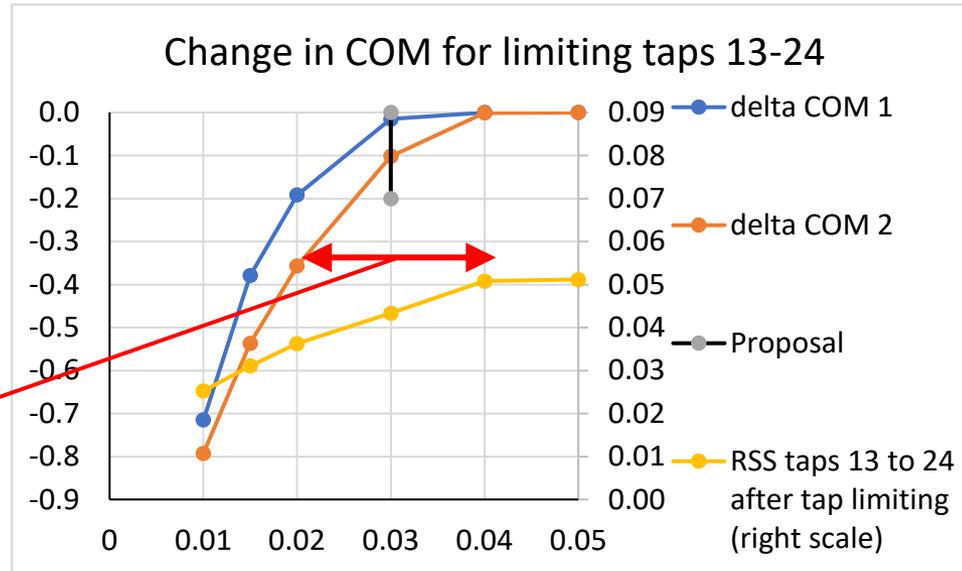

A little smoother than backplane

17 channels with COM $\geq$ 2.5 dB, 2 tests (package transmission line length) per channel, specified host trace model added, 34 coefficient sets

Even at tap 12, a typical tap weight is sightly +ve

Tap limit should be tighter than unconstrained taps observed

From dawe_3ck_01a_0921

Change in COM for limiting taps 13-24

Spec allows *channel* to have one tap more than 0.02 beyond *reference Rx* tap limit

This channel -0.0405, could pass easily with -0.06

For limits of 0.02 to 0.01, one then two +ve taps respectively were truncated too, so the roll-off for –ve tap limit as proposed would be a little less than shown

We should: tighten bbmin(13-24) to reduce COM slightly, at -0.03
Or: set it tighter to reduce COM for worst reference channel to 3 dB
Or: align –ve limit for taps 13 to 40 to limit for taps 3 to 12, at -0.03

Comment 183: for CR, change bgmax from 0.05 to 0.03

- *Cl* **162** *SC* **162.11.7** *P* **187** *L* **31** *#* I-183   *Comment Type* **TR**

- Cable channels' reference receiver tap weights are less -ve than -0.02, and taps 13 to 40 are less than +0.025. The tap weight limits are not hard cable or channel limits, but they let cables that go outside the envelope pay a price in COM for it (see dawe_3ck_01a_0921).

- The normalized DFE coefficient minimum limit bbmin for taps 3 to 12 is -0.03 and for taps 13 to 40 it is -0.05 (bgmax 0.05) but the receiver is protected from bad taps 25-40 by the tail RSS limit. But the receiver is not protected so well for taps 13 to 24.

- We can expect cable channels to be better for reflections than backplane channels because hosts must be designed for maximum-loss performance, and cable technology will also be adequate for maximum-loss performance. As a cable can have worse tap weights than the headline numbers for a very small COM penalty (see dawe_3ck_01a_0921 slide 5), this remedy leaves margin for the cable.

- *Suggested Remedy*

- For CR, in Table 162-19, change Normalized coefficient magnitude limit for DFE floating taps, bgmax, from 0.05 to 0.03.

Comment 237: require good CR Tx ISI beyond Np = 11

- *Cl* **162** *SC* **162.9.3** *P* **166** *L* **45** *#* I-237 *Comment Type* **TR**
- With the Np=200 value used for the linear fit procedure in the SNDR measurement it is possible that the transmitter can have significant pulse distortions at times beyond the reach of the receiver DFE. These pulse distortions cannot be equalized and could increase the BER unacceptably.
- *Suggested Remedy*
- Add a Residual Intersymbol Interference specification with value -31dB max referring to the test procedure in 163.9.2.6