Cl **93A** *SC* **93A.1.2.4** *P* **198** *L* **53** # 265

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **A** *COM parameter*

Typos in 93A. Eq 93A–16a has S(rp) on both sides. S(l2) has appeared from nowhere. Table 93A-1, COM parameters, says "See 93A.1.2" for zp2 yet it's not here.

SuggestedRemedy

Should the rp on the right be rd?
Explain what zp2 represents. Maybe modify 93A.1.2.3 to say that S(l2) is derived from zp2 in the same way that S(l) is derived from zp. (z is a bad choice for a length anyway, it looks too much like an impedance.)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **20** # 165

Ran, Adee Intel

Comment Type **T** *Comment Status* **D**

(cross clause)
Addressing Vf (min) in C2C which is TBD.

The minimum allowed value should be 0.4 as in C163.

C162 has a lower value 0.387, possibly due to measurement with Nv=13 in clause 136. As the measurement in C162 is done with Nv=200, it isn't clear why the value should be lower than in C163. If there is a reason, a footnote or informative NOTE would be helpful to avoid confusion.

SuggestedRemedy

Change TBD to 0.4.

Consider changing the value in Table 162–9 to 0.4, or adding a note with explanation of the different value.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **29** # 168

Ran, Adee Intel

Comment Type **T** *Comment Status* **D**

Jitter specifications refer to 120D.3.1.8 which expliciitly states that they hold at any equalization setting. But this is not feasible and not important.

In C162 and C163 there is a footnotw that jitter is measured in a single equalizer setting. Another comment suggests making it more explicit.

SuggestedRemedy

If my other comment does not apply here:
Add a table footnote that "J3u, JRMS, and even-odd jitter measurements are made with a single transmit equalizer setting selected to compensate for the loss of the transmitter package and TP0 to TP0a test fixture" similar to Table 163-5.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.9.3** *P* **148** *L* **24** # 203

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *AC CM*

30 mV AC common mode has significant amount of penalty given that RLCD ~RLDC or 12 dB depending on the loss of the channel the penalty can be 1-3 mV RMS

SuggestedRemedy

Consider reducing 30 mV RMS to 17.5 mV RMS

Response *Response Status* **C**

REJECT.

There is no consensus to change the TX AC CM noise values at this time.

Resolve using the response to comment #28.

Cl **162** *SC* **162.9.3** *P* **148** *L* **24** # 55

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R**

30 mv of AC common-mode RMS voltage is too severe. Little work has been to justify this.

SuggestedRemedy

Set AC common-mode RMS voltage to TBD. Add a line to the table called AC common-mode deterministic voltage which essentially represents skew.

Response *Response Status* **C**

REJECT.

[Editor's note: Change clause/subclause from 163/163.9.3]

There is no consensus to change the TX AC CM noise values at this time.

Resolve using the response to comment #28.

Cl **162** *SC* **162.9.3** *P* **148** *L* **28** # 138

Ran, Adee Intel

Comment Type **T** *Comment Status* **R** *Tx electrical*

(cross-clause)
Clause 162 has a common-mode to differential return loss specification for both Tx and Rx. Clause 163 and annex 120F have this specification only for Rx.

Is this an oversight, or maybe a Tx specification is not required in clause 162 either? (discussion may be required)

SuggestedRemedy

If a C-D RL specification is not required for the Tx, it should be removed from Table 163–5, and the specification (subject of another comment) should be a subclause of 162.9.4 instead of 162.9.3.

If it is required, references to the specification subclause (subject of another comment) should be added in Table 163–5 and in Table 120F–1.

If there is a reason to have a specification for CR but not for KR/C2C, there should be an informative NOTE in clause 162 that explains it. (I don't know of a reason at the time of writing)

Response *Response Status* **C**

REJECT.

There is no consensus to change the TX RLCD specification at this time.

Strawpoll #13 (direction)
I support resolving comment #138 as follows:
A: keep TX RLCD per Draft 1.2
B: modify TX RLCD per comment 138 suggested remedy
C: remove TX RLCD specification

Strawpoll #13
(chicago rules)
A: 12 B: 11 C: 13

Cl **162** *SC* **162.9.3** *P* **148** *L* **45** # 140

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *Tx electrical*

(Cross-clause)
Footnote d of table 162-9 states "J3u, JRMS, and even-odd jitter measurements are made with a single transmit equalizer setting selected to compensate for the loss of the host channel".

This is a significant change compared to the method of 120D.3.1.8 (referenced for two of the jitter parameters), which states that "The J4u, JRMS, and Even-odd jitter specifications shall be met regardless of the transmit equalization setting".

Furthermore, 162.9.3.3 defines J3u jitter with a reference to 120D.3.1.8.1 (which implies being required at all equalization settings) without mention of the exception in the footnote.

Furthermore, "selected to compensate for the loss" can be interpreted in different ways.

Similar text exists in clause 136 and has caused confusion about jitter measurement requirements.

Applies also to clause 163 (which has similar footnote and J3u subclause) and to annex 120F (which simply refers to annex 120D).

SuggestedRemedy

1. Change title of 162.9.3.3 from "J3u jitter" to "Output jitter".
2. Change 162.9.3.3 to include the following:
"Output jitter is characterized by three parameters, J3u, JRMS, and Even-odd jitter. These parameters are calculated from measurements with a single transmit equalizer setting to compensate for the loss of the transmitter package and host channel. The equalizer setting is chosen to minimize any or all of the jitter parameters.

J3u and JRMS are calculated from a jitter measurement specified in 120D.3.1.8.1. J3u is defined as the time interval that includes all but 10^–3 of fJ(t), from the 0.05th to the 99.95th percentile of fJ(t) .

Even-odd jitter is calculated from a jitter measurement as specified in 120D.3.1.8.2."
3. Change the references from 120D.3.1.8 to 162.9.3.3 in the table and in the PICS (TC12).
4. Delete footnote d.

In clause 163, apply similar changes to the table, referring to 162.9.3.3.

In Annex 120F, apply similar changes including a new subclause, but change "host channel" to "test fixture", and omit the definition of J3u.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

Cl **162** *SC* **162.9.3.1.1** *P* **150** *L* **15** # 255

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **R** *Tx electrical*

Back in Clause 85, the DFE has 14 taps (Nb), the linear fit pulse length Np is 8 and the equalizer length Nw is 7. So the SNDR measurement doesn't forgive reflections in the transmitted waveform that the DFE can't equalise. Here, we have a DFE with up to 40 UI, Np is 200, Nv is 200? Or do we still use Nw of 7 from Clause 85?

SuggestedRemedy

Is Nv meant to be Nw?
I wonder if 200 (for something) is far too long.

Response *Response Status* **C**

REJECT.

Per discussion, Nv is not the same as Nw.

There is general agreement that the value for Nv must be properly defined, but there is no consensus on a value to use.

Cl **162** *SC* **162.9.3.1.2** *P* **151** *L* **10** # 141

Ran, Adee Intel

Comment Type **E** *Comment Status* **D** *Tx electrical*

"The steady-state voltage vf is defined in 136.9.3.1.2, and is determined using Nv=200"

The definition in 136.9.3.1.2 is concise, and includes yet another reference to clause 85. The value of Nv is significantly different. It would help readers if we reduce the depth of references.

SuggestedRemedy

Change this sentence to the following (in a separate paragraph):

"The steady-state voltage vf is defined to be the sum of the linear fit pulse response p(1) through p(M×Nv) divided by M
(refer to 85.8.3.3 step 3)" where Nv=200 is the length of the pulse response in UI."

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.9.3.1.3** *P* **151** *L* **30** # 257

Dawe, Piers
Nvidia

Comment Type **T** *Comment Status* **A** *Tx electrical*

Starting the transmitter up with maximum swing seems bad for two reasons: it suddenly adds a lot of crosstalk to neighbouring links, before this link has established that the high swing is needed or desirable; and it may stress the linearity of the receiver. It would be better to start at a low to medium swing, and the receiver ask to turn it up if it wishes.

SuggestedRemedy

Reduce c(0) in one or both of OUT_OF_SYNC and NEW_IC preset 1. If necessary, create another row for the traditional neutral at max setting used for testing - but as it seems that may never be useful in practice, maybe we should avoid that.
Also, in 162.9.4.3.4, reduce the starting amplitude for the training phase in RITT (presently 800 mV peak-to-peak differential "on an alternating 0-3 pattern").
Similarly in 163 as appropriate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comments #103 and #104.

Cl **162** *SC* **162.11.7** *P* **159** *L* **20** # 150

Ran, Adee
Intel

Comment Type **T** *Comment Status* **A** *COM*

(cross-clause)

The transmission line parameters in the package model in COM have been the same since 802.3, and are hard-coded in Table 93A–3.

In the COM spreadsheets used in this project there are somewhat different values for these parameters (presented in http://www.ieee802.org/3/ck/public/19_01/benartsi_3ck_01_0119.pdf, but not explicitly adopted into any of the drafts).

Validation of a proposed package model has been presented at the same meeting (http://www.ieee802.org/3/ck/public/19_01/heck_3ck_01_0119.pdf), but with the old TL parameters. So it is not clear if the modified parameters are in consensus.

SuggestedRemedy

If there is consensus that the parameters should change, then a new table should be created for the new values and used in 162,163, and 120F, and possibly a provision should be made in Annex 93A to use differnt parameters if supplied.

Otherwise, the COM spreadsheets should rever to use the existing values (out of scope of the editorial team...)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy for 162, 163, and 120F with editorial license using the parameters in similar comment #53 which was accepted for Clause 163 only.

The referenced presentations are here:
http://www.ieee802.org/3/ck/public/19_01/benartsi_3ck_01_0119.pdf
http://www.ieee802.org/3/ck/public/19_01/heck_3ck_01_0119.pdf

Cl **162** *SC* **162.11.7** *P* **160** *L* **48** # 247

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **A** *CA COM*

It isn't reasonable to expect a real receiver to provide a DFE tap strength of -0.85. Therefore, the channel should not be specified as if the receiver can do that. Further, there is an advantage in knowing that the sign of a tap can't change.
kasapi_3ck_01_1119 slide 7 shows the first DFE tap >0.42 for the critical channels. Another analysis showed the same for 27 backplane channels. Slide 6 of heck_3ck_01_0919 (107 channels) shows that the DFE taps are 2 and 3 are always strongly positive, and no taps <-0.045, yet the draft would allow such untypical/hypothetical channels.
We wanted to check that low loss channels would not do something surprising before adopting sensible limits that don't burden real channels. See new Heck presentation.
Remember that channels that go a little outside a tap weight pay a very small increase in COM for the excess ISI noise that they cause (see another comment), so the limits for the smaller taps should be set a bit tighter than the worst channel we want to pass.
Cable channels are smoother than backplane channels but can have higher loss:

SuggestedRemedy

Add minimum tap weight limits:
Tap 1: min +0.3
Tap 2: min +0.05
All other taps: min -0.03 (tighter than for KR).
Turn the existing "Normalized DFE coefficient magnitude limit"s into "Normalized DFE coefficient limit"s.
Update definition of COM in 93A.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Referenced presentation is here:
http://www.ieee802.org/3/ck/public/adhoc/jun17_20/heck_3ck_adhoc_01_061720.pdf

Implement the suggested remedy with editorial license.

Cl **162** *SC* **162.11.7** *P* **161** *L* **14** # 69

Champion, Bruce — TE Connectivity

Comment Type **T** *Comment Status* **A** *CA COM*

One-sided noise spectral density set at 1.0e-8 contrary to lim_3ck_01a_1119 and mellitz_3ck_03a_1119 recommendations. This makes a large impact on cable assembly COM and the ability to achieve 2m copper reach

SuggestedRemedy

One-sided noise spectral density should be set to 9e-9 as recommended by lim_3ck_01a_1119 and mellitz_3ck_03a_1119, see presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_07/champion_3ck_02_0720.pdf

The current value was adopted based on the results of Straw Polls #10 and #11 at the 01/2020 interim meeting. The comment provides evidence that some channels fail COM. However, having an interoperable link requires both passing cables and receivers, and both need to be addressed.

Based on strawpoll #12 consensus, change the value of eta0 to 9E-9.

Strawpoll #12 (decision)
I would support changing the value of eta0 to 9E-9 V^2/GHz?
Y: 25
N: 19

Cl **162B** *SC* **162B.1.3.6** *P* **253** *L* **54** # 91

Haser, Alex
Molex

Comment Type **TR** *Comment Status* **R**

The frequency range for ICN calculation is not clearly defined.

SuggestedRemedy

Add "Integrated crosstalk RMS noise voltages are measured over N uniformly-spaced frequencies f_n spanning the frequency range 50 MHz to 40 GHz with a minimum spacing of 10 MHz." to the end of this section.

Response *Response Status* **C**

REJECT.

The following presentation was reviewed at a previous ad hoc meeting:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/haser_3ck_adhoc_01b_061020.pdf

Comment is pivot for frequency range comments: 79, 80, 81, 82, 84, 85, 87, 89, 90.

There is no consensus to change the frequency range at this time.

Strawpoll #10
I would support the upper limit of the frequency range for MTF specifications other than ICN to be:
A: 40GHz
B: 50GHz (currently in 1.2)
C: A compromise; such as 50GHz with some relaxation after 40GHz
(chicago rules)
A: 9 B: 35 C: 14

Strawpoll #11
I believe that a change should be made on the frequency upper limit for MTF specifications at this time?
Y: 16
N: 28
A: 8