Cl **45** *SC* **45.2.1.126a** *P* **51** *L* **27** # 102

Slavick, Jeff Broadcom

Comment Type **E** *Comment Status* **A** *bucket*

First paragraph of 45.2.1.126a could use some word-smithing. All registers use same mapping (not similar) and reduce the laundry list text to just be a bunch of "see" references

SuggestedRemedy

Changed "The assignment of bits in the RS-FEC codeword error bin 1 register is shown in Table 45–100a. The assignment of bits in the other RS-FEC codeword error bin registers is done similarly. The RS FEC codeword error bin counter registers apply to the codeword-interleaved RS-FEC defined in Clause 161. See 161.6.23 for a definition of these registers. There are fifteen of these 32-bit registers, which increment depending upon the error signature of a corrected codeword. Their bits are reset to all zeros when the register is read by the management function or upon reset, and held at all ones in the case of overflow."
To "The assignment of bits in the RS-FEC codeword error bin 1 register is shown in Table 45–100a. The assignment of bits for the other RS-FEC codeword error bin registers are identical to that of bin 1. The RS-FEC codeword error bin registers increment depending upon the error signature of a corrected codeword (see 161.6.23). Their bits are reset to all zeros when the register is read by the management function or upon reset, and held at all ones in the case of overflow."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.186aa** *P* **62** *L* **13** # 98

Slavick, Jeff Broadcom

Comment Type **E** *Comment Status* **A** *bucket*

Capitalization issue

SuggestedRemedy

Lowercase the E in Enable in the Name column

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy.

Also make same change in Table 45-88.

Cl **80** *SC* **80.1.4** *P* **76** *L* **5** # 67

Lusted, Kent Intel Corporation

Comment Type **T** *Comment Status* **A** *bucket*

The nomenclature for "100GBSSE-P" in the base document (IEEE Std. 802.3-2018, Section Six, page 84, line 12ish) does not list the Clause 161 RS-FEC-Int as a valid layer even though the new RS-FEC-Int was added for 100GBASE-P PHY types.

SuggestedRemedy

Change the last sentence of the sixth paragraph in IEEE Std. 802.3-2018 Clause 80.1.4 to be "Some 100GBASE-P Physical Layer devices also use the transcoding and FEC of Clause 91 and some may also use the RS-FEC-Int of Clause 161."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the last sentence of the sixth paragraph in IEEE Std. 802.3-2018 Clause 80.1.4 to be "Some 100GBASE-P Physical Layer devices also use the transcoding and FEC of Clause 91 or Clause 161."

Cl **91** *SC* **91.6.2f** *P* **88** *L* **7** # 100

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **A** *bucket*

Enable usually means it's active when set to a 1. However the 100G_RS_FEC_enable bit is written have the clause active when the bit is a 1.

SuggestedRemedy

Either: a) Change 100G_RS_FEC_enable to 100G_RS_FEC_bypass in Table 91-2, 91.6.2f (heading and 2 places in text), 45.2.1.110 and in 45.2.110aa
or b) Change zero to one in 3rd sentenece of 91.6.2f and one to a zero in the 4th sentence

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #4.

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 **93A** *SC* **93A.1.2.4** *P* **199** *L* **4** # 160

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

A graphic representation of the network with annotation of the various S's would be very helpful.

SuggestedRemedy

Add a figure, perhaps based on slide 6 of http://www.ieee802.org/3/ck/public/18_11/benartsi_3ck_01_1118.pdf and/or slide 3 of http://www.ieee802.org/3/ck/public/adhoc/jun12_19/healey_3ck_adhoc_01_061219.pdf .

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

Cl **116** *SC* **116.2** *P* **95** *L* **12** # 65

Lusted, Kent Intel Corporation

Comment Type **TR** *Comment Status* **A** *bucket*

The 200 Gb/s and 400 Gb/s subclause does not have a reference to the Clause 73 Auto-Negotiationfunction that similarly present in Clause 80 Introduction to 40 Gb/s and 100 Gb/s networks

SuggestedRemedy

Insert a new subclause before existing clause 116.2.6 "Management interface (MDIO/MDC)". Renumber existing clauses 116.2.6 and 116.2.7 as appropriate.
The new clause 116.2.6 "Auto-Negotiation" will have the following text:
"Auto-Negotiation provides a linked device with the capability to detect the abilities (modes of operation) supported by the device at the other end of the link, determine common abilities, and configure for joint
operation.
Clause 73 Auto-Negotiation is used by the 200 Gb/s and 400 Gb/s backplane PHYs (200GBASE-KR4, 200GBASE-KR2, and 400GBASE-KR4) and the 200 Gb/s and 400 Gb/s copper PHYs (200GBASE-CR4, 200GBASE-CR2 and 400GBASE-CR4)."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Insert a new subclause before existing clause 116.2.6 "Management interface (MDIO/MDC)".

In the new subclause clause 116.2.5a "Auto-Negotiation" include the following text:
"Auto-Negotiation provides a linked device with the capability to detect the abilities (modes of operation) supported by the device at the other end of the link, determine common abilities, and configure for joint operation.
Clause 73 Auto-Negotiation is used by the 200 Gb/s and 400 Gb/s backplane PHYs (200GBASE-KR4, 200GBASE-KR2, and 400GBASE-KR4) and the 200 Gb/s and 400 Gb/s copper PHYs (200GBASE-CR4, 200GBASE-CR2 and 400GBASE-CR4)."

Cl **120A** *SC* **120A.5** *P* **201** *L* **20** # 161

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

duplicated label "MMD8" in the figure.

SuggestedRemedy

delete one copy.

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.3.1** *P* **204** *L* **48** # 134

Hidaka, Yasuo — Credo Semiconductor

Comment Type **T** *Comment Status* **A** *bucket*

53GHz bandwidth is unnecessarily high and inconsistent with Annex 120G.3.1, Annex 120G.3.2, Clause 162.9.3 and Clause 163.9.1.

SuggestedRemedy

Change 53 GHz to 40 GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy.

See comment #162.

Cl **120F** *SC* **120F.3.1** *P* **204** *L* **48** # 162

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A** *bucket*

"53 GHz 3 dB bandwidth" only here. In clauses 162 and 163 it is 40 GHz. I assume this is an oversight.

SuggestedRemedy

Change "53 GHz" to "40 GHz".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #134.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **10** # 36

Ben Artsi, Liav — Marvell Technology

Comment Type **T** *Comment Status* **A** *bucket2*

TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.

SuggestedRemedy

Follow the same remedy as for 163.9.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **13** # 29

Wu, Mau-Lin — Mediatek

Comment Type **T** *Comment Status* **R** *bucket3*

The 'AC common-mode RMS voltage (max.)' is 30 mV, which is the same as that in 802.3cd. By combining this spec with P/N skew mismatch of backplane channel, it will induce crosstalk to differential signal at receiver. From 50G to 100G, it's difficult to improve the P/N skew mismatch to half. Based on that, we shall modify AC common-mode RMS voltage. We shall align this spec to that in C2M (120G).

SuggestedRemedy

Change 30 mV to 17.5 mV.

Response *Response Status* **C**

REJECT.

Resolve using the response to comment #28.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **19** # 163

Ran, Adee — Intel

Comment Type **E** *Comment Status* **A** *bucket*

For consistency with the rest of the document, "Steady state" should be "Steady-state".

SuggestedRemedy

Add hyphens (twice).

Response *Response Status* **C**

ACCEPT.

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* **20** # 11070

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **D** *TX vfmin*

[Comment resubmitted from Draft 1.1. 120F.3.1, P203, L30]

C2C, KR, and CR devices may be the same ports on chips. Align Av, Afe, and Ane with Vf in table 163-5

SuggestedRemedy

Replace with Vfmin=0.413

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **20** # 164

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

In this table there are occurrences of "min" and "max" both with and without a period.

This should be standardized at least on a per-clause basis, and preferably across the draft.

SuggestedRemedy

Since these are abbreviations, it is suggested to include a period. Preferably change globally in the draft.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change occurrences of "min." and "max." (with period) to "min" and "max" (without period), as appropriate, throughout the draft.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **20** # 11

Wu, Mau-Lin Mediatek

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

Steady state voltage v_f (min) is TBD

SuggestedRemedy

Change v_f (min) value from TBD to 0.5

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **20** # 59

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *bucket2*

Vf(min) should align with Av in COM table 120F-6 since Nv=200

SuggestedRemedy

Replace TBD for Vf(min) with V(fmin)=0.413

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **21** # 166

Ran, Adee Intel

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

The reference for linear fit pulse peak is 120D.3.1.4, which uses Nv=13. This is inadequate for the higher loss in this project.

Also, 120D.3.1.4 includes control of the 3-tap equalizer, but here we have 5 taps.

SuggestedRemedy

Change reference for linear fit pulse peak to 162.9.3.1.2.

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **21** # 12

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket2*

Linear fit pulse peak (min) is 'TBD x v_f'

SuggestedRemedy

Change Linear fit pulse peak (min) from 'TBD x v_f' to '0.55 x v_f'

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **22** # 167

Ran, Adee Intel

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

Minimum and maximum tap value and step sizes refer to 136.9.3.1.4, but in this project we have different specifications in clause 162 (an additional tap, and uniform step size limits).

SuggestedRemedy

Change references for step sizes and ranges to 162.9.3.1.4 and 162.9.3.1.5 respectively.

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **23** # 11144

Dawe, Piers Mellanox

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

[Comment resubmitted from Draft 1.1. 120F.3.1, P203, L32]

The third precursor has only minor value for "28 dB" channels, so I don't expect it will be worthwhile for "20 dB" channels, yet it adds complexity to the silicon and the tuning. This is not KR or CR, it should be done with simpler silicon, like C2M.

SuggestedRemedy

Remove the third precursor.

Response *Response Status* **C**

REJECT

The comment does not provide sufficient evidence to support the change.

The following presentation shows an improvement due to c(-3) of 0.1 to 0.8 dB in COM for channels with COM near 3 dB.

Http://www.ieee802.org/3/ck/public/adhoc/mar04_20/sun_3ck_adhoc_01_030420.pdf

Removing the c(-3) would result in marginal channels failing.

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **23** # 183

Sun, Junqing Credo Semiconductor

Comment Type **TR** *Comment Status* **A**

TX FIR Range can be optimized for C2C applications

SuggestedRemedy

value at min. state for c(–3) (max.) = -0.05
value at max. state for c(–2) (min.) = 0.10
value at min. state for c(–1) (max.) = -0.28
value at min. state for c(1) (max.) = -0.1
see presentation sun_3ck_01_0720

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

Reviewed the following presentation:
http://www.ieee802.org/3/ck/public/20_07/sun_3ck_01_0720.pdf

For the TX characteristics, implement the tap range and step size on slide 9 of the presentation except:
c(-1) min value is -0.30
c(0) min value is 0.55

Cl **120F** *SC* **120F.3.1** *P* **205** *L* **27** # 11151

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *bucket*

[Comment resubmitted from Draft 1.1. 120F.3.1, P203, L38]

Footnote b to table 163-5 which updates the linear fit procedure for measuring SNDR should be applied to chip to chip as well as backplane.

SuggestedRemedy

Add the same footnote to the SNDR row in Table 120F-1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add the following footnote to the SNDR parameter in Table 120F-1:
"Measurement uses the method described in 120D.3.1.6 with the exception that the linear fit procedure in 162.9.3.1.1 is used."

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 **120F** *SC* **120F.3.1.1** *P* **205** *L* **39** # 224

Dudek, Mike — Marvell.

Comment Type **E** *Comment Status* **A** *bucket*

There can be better wording. "For parameters that do not appear in Table 120F–2, take values from Table 120F–6."

SuggestedRemedy

Replace with "Parameters that do not appear in Table 120F–2 take values from Table 120F–6. Also in a similar fashion on page 208 line 3, and page 213 line 28. Note that this wording is what is used in 120G.3.1.3

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license.

Cl **120F** *SC* **120F.3.1.1** *P* **205** *L* **40** # 13

Wu, Mau-Lin — Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The TX ERL (min) value of TP0a is specified both in Table 120F-1 as well as the following sentence here. "Transmitter ERL at TP0a shall be greater than or equal to TBD dB". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Transmitter ERL at TP0a shall be greater than or equal to the value of ERL (min.) specified in Table 120F-1.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:

http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to:"Transmitter ERL at TP0a shall be greater than or equal to ERL (min) specified in Table 120F-1."

Cl **120F** *SC* **120F.3.2.1** *P* **208** *L* **5** # 17

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The RX ERL (min) value at TP5a is specified both in Table 120F-3 as well as the following sentence here. "Receiver ERL at TP5a shall be greater than or equal to TBD dB". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Receiver ERL at TP5a shall be greater than or equal to the value of ERL (min.) specified in Table 120F-3.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to:"Receiver ERL at TP5a shall be greater than or equal to ERL (min) specified in Table 120F-3."

Cl **120F** *SC* **120F.3.2.3** *P* **208** *L* **53** # 170

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *bucket2*

Addressing TBD in test setup requirements.

"The return loss of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the
requirements of Equation (TBD)."

The test fixture can be considered as a channel that the transmitter is connected to. As such, it should meet the ERL requirements of the channel. There are no return loss requirements for a channel.

SuggestedRemedy

Change the quoted sentence to

"The effective return loss of the test setup in Figure 93C–4 measured at TP5 replica towards TPt meets the
requirements of 120F.4.3."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #11078.

Cl **120F** *SC* **120F.3.2.3** *P* **208** *L* **54** # 11078

Healey, Adam — Broadcom Inc.

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

[Comment resubmitted from Draft 1.1. 120F.3.2.3, P206, L48]

I believe the intent is for the return loss of the test setup to have "test fixture" grade performance.

SuggestedRemedy

In item b), change "Equation (TBD)" to "Equation (163-2)" (Test fixture reference return loss limit).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #170 proposes using ERL in 120F.4.3.
Comment #11078 proposes using DRL in 163.9.1.2 (KR test fixture specification).

There was general agreeement that the return loss should be representation of test equipment grade in order to ensure reproducible measurements.

Replace Equation (TBD) and related text with "the return loss specifications in 163.9.1.2". Implement with editorial license.

Cl **120F** *SC* **120F.3.2.3** *P* **209** *L* **9** # 11156

Li, Mike — Intel

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

[Comment resubmitted from Draft 1.1. 120F.3.2.3, P207, L5]

Np TBD

SuggestedRemedy

Change it to 18 (length of TX pre-taps + RX DFE taps+main tap)

Response *Response Status* **C**

REJECT.

There is no consensus to implement the suggested remedy at this time.

Cl **120F** *SC* **120F.3.2.3** *P* **209** *L* **39** # 171

Ran, Adee — Intel

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

Addressing minimum RSS_DFE4 which is TBD.

The corresponding parameter in Table 163–8 is 0.05. This is a very mild requirement when the reference receiver in COM has large b_max. There is no reason not to use this value here too.

SuggestedRemedy

Change TBD to 0.05 twice.

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.3.2.4** *P* **210** *L* **29** # 11036

Ben Artsi, Liav — Marvell

Comment Type **T** *Comment Status* **A** *jitter tolerance [CC]*

[Comment resubmitted from Draft 1.1. SC120F.3.2.4, P207, L22]

Reciever jitter tolerance test is specified at specific frequency points with no specified extrapolation between frequency points. More specifically, 5UI at 40KHz, 0.15UI at 1.33MHz 0.05UI at 4-40MHz. Tx is measured when applying high pass filter on the jitter filtering out much of the low frequency jitter of a transmitter. A transmitter may still comply with the TX specifications and have much more than 0.15UI of jitter at frequecies which reside around a few handers of Hz. Since there is no Rx jitter tolerance requirement at these frequencies: A transmitter may have relatively high jitter at low frequencies and still be compliant. The Rx may not be able to tolerate this jitter while being compliant as well. The interoperability between these specified Tx and Rx is questionable.

SuggestedRemedy

Add a sentence that the reciever is expected to meet any frequency point between the specified in table 163-9 while jitter tolerance requirement is linearly extrapolated between any consecutive specified frequency points.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

Resolve using the response to comment #146.

Cl **120F** *SC* **120F.4.1** *P* **210** *L* **13** # 189

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

Bmax values are TBDs

SuggestedRemedy

Replace TBD with B1max=0.5 and B[2-5]max=0.1 ghiasi_3ck_02_0320.pdf

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120F** *SC* **120F.4.1** *P* **211** *L* **25** # 184

Sun, Junqing — Credo Semiconductor

Comment Type **TR** *Comment Status* **A**

TX FIR Range can be optimized for C2C applications

SuggestedRemedy

value at min. state for c(–3) (max.) = -0.04
value at max. state for c(–2) (min.) = 0.10
value at min. state for c(–1) (max.) = -0.28
value at min. state for c(0) (max.) = 0.6
value at min. state for c(1) (max.) = -0.1
see presentation sun_3ck_01_0720

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

Reviewed the following presentation:
http://www.ieee802.org/3/ck/public/20_07/sun_3ck_01_0720.pdf

For the COM parameters, implement the tap range and step size on slide 9 of the presentation.

Cl **120F** *SC* **120F.4.4** *P* **213** *L* **47** # 11034

Ben Artsi, Liav — Marvell

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

[Comment resubmitted from Draft 1.1. 120F.1, P201, L49]

C2C applications dictate external DC blocking cap even in cases when the Rx is capable of directly connecting to the Tx side

SuggestedRemedy

Add a sentence similar to the 802.3bj: Should the capacitor be implemented outside TP0 and TP5, it is the responsibility of implementors to consider any necessary modifications to common-mode and channel specifications required for interoperability as well as any impact on the verification of transmitter and receiver compliance.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **46** # 191

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *bucket3*

Near end EH are TBD.

SuggestedRemedy

Near end EH=40 mV, see ghiasi_3ck_02_0620

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: changed subclause/page/line from 120F.4.2/211/46]

Resolve using the response to comment #177.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **48** # 192

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *bucket3*

Far end eye height is TBD.

SuggestedRemedy

Far end EH=20 mV, see ghiasi_3ck_02_0620

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: change subclause/line/page from 120F.4.2/211/48.]

Resolve using the response to comment #177.

Cl **120G** *SC* **120G.3** *P* **222** *L* **2** # 209

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *RLCD*

Common mode to Differential conversion could be improved

SuggestedRemedy

New propose limit for RLDC=22 -20(f/25.78) up to 12.89 GHz and 12 dB from 12.89 to 50 GHz.
See ghiasi_03_0620

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Editor's note: change page/line from 221/52.]

Cl **120G** *SC* **120G.3.1** *P* **221** *L* **17** # 32

Wu, Mau-Lin — Mediatek

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

The ESMW (eye symmetry mask width) value in Table 120G-1 is still TBD

SuggestedRemedy

Change 'TBD' value to '0.1'

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.1** *P* **221** *L* **17** # 173

Ran, Adee — Intel

Comment Type **T** *Comment Status* **D** *bucket2*

Addressing EMSW which is TBD.

EMSW is not a meaningful measure for a receiver with DFE, since the eye's shape depends on the delay and the transfer function of DFE's feedback path. A DFE mathematical model can have arbitrary delay and transfer function so the value of EMSW (or any eye width parameter) is not well defined.

Furthermore, the DFE typically optimizes the eye height, but not necessarily the eye width (whihc requires equalizing the transitions). Trying to optimize for both EW and EH with a single DFE has been done in early versions of PCI express, it can be a futile exercise, and it is not what a real receiver will do anyway.

As the experience with COM has shown, for lossy channels and DFE receivers the equalized EH is a good enough figure of merit. Real receivers do not care about asymmetry caused by the DFE.

It is suggested to remove EMSW, at least until evidence of the need for it and a robust measurement method is presented.

SuggestedRemedy

Remove the EMSW specification in this subclause, and also in 120G.3.2 and Table 120G–5 and Table 120G–8.

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.1** *P* **221** *L* **22** # 42

Brown, Matt — Huawei Technologies Canada

Comment Type **E** *Comment Status* **A** *bucket*

Naming of return loss parameters is not consistent.

SuggestedRemedy

In Table 120G-1 (P221, L22) and 120G.3.1.2 (P222, L6) change "Common to differential mode return loss" to "Common-mode to differential return loss".
In Table 120G-3 (P224, L52) and Table 120G-7 (P230, L9) change "Common-mode to differential mode return loss" to "Common-mode to differential return loss".

Response *Response Status* **C**

ACCEPT.

Cl **120G** *SC* **120G.3.1** *P* **221** *L* **23** # 207

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

Unless one end of the link has common mode termination the 17.5 mV allowed common mode does not get absorbed

SuggestedRemedy

Add common mode return loss with following equation = 12 - 9*f/1e9 dB up to 1 GHz
3 dB from 1GHz to 50 GHz
See ghiasi_03_0620

Response *Response Status* **C**

REJECT.

[Editor's note: changed subclause from 120G.3.]

The following presentation was reviewed at an ad hoc meeting:
http://www.ieee802.org/3/ck/public/20_07/ghiasi_3ck_03_0720.pdf

There is no consensus to make the proposed changes at this time.

Cl **120G** *SC* **120G.3.1.2** *P* **222** *L* **1** # 174

Ran, Adee — Intel

Comment Type **E** *Comment Status* **D** *RLCD*

In another comment (against clause 162) I am suggesting a CD return loss equation which is equivalent to equation 120G-1, but uses a parameter F_N for better readability.

It is suggested to apply a similar change in this equation. Alternatively, have a single equation and multiple references to it.

SuggestedRemedy

Per comment. Apply in 162.11.7, in 163.10, and in 120F.4.1.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.1.2** *P* **222** *L* **2** # 11119

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.1.2, P222, L2]

RLCD return loss can be improved

SuggestedRemedy

RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
RLCD=15 dB 12.89 to 53 GHz
See ghiasi_3ck_03_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.1.3** *P* **222** *L* **40** # 20

Wu, Mau-Lin — Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The host output ERL (min) value at TP1a is specified both in Table 120G-1 as well as the following sentence here. "Host output ERL at TP1a shall be greater than TBD". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Host output ERL at TP1a shall be greater than or equal to the value of ERL (min.) specified in Table 120G-1.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

For task force review.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **21** # 190

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

To keep C2C power low need to limit max loss including package/filter

SuggestedRemedy

Add new line to table 120F-5, Total IL_wpkgs_wTr (max)=28 dB

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **29** # 175

Ran, Adee
Intel

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

Unlike a host transmitter, which has a fixed known channel and can be tuned to optimize the signal at the receiver input, the module has no knowledge of the channel. A fixed signal setting (swing and equalization) can be optimized for a high loss channel but will be inappropriate for a low loss channel, and vice versa.

To enable host management to choose the appropriate signal swing and equalization for the host channel in use, the module output should have more than one setting, and a control method to choose between them.

Discussions at this point indicate that it is desired to have no more than two settings. The suggested remedy is based on that. Future proposal may refine this idea.

SuggestedRemedy

Define two separate tests for the module output, near-end and far-end.

In the near-end test, only the near-end specifications are measured, with an MCB only. In the far-end test, only the far-end specifications are measured, with an MCB and a frequency dependent attenuator (specified strcitly to create the effect of a maximum-loss host channel).

The module shall have a 2-valued control variable (mapped to an MDIO register, although actual interface may be different) to select between two settings of its ouput. One setting will be tested in the near-end test and another will be tested in the far-end test.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Adopt a near end and a far end setting with an MDIO register bit to select between the setting as discussed in slide 9 of ran_3ck_01b_0720. Implement with editorial license.

Strawpoll #8 (decision)
I support closing comment 175 with: Adopt a near end and a far end setting with an MDIO register bit to select between the setting as discussed in slide 9 of ran_3ck_01b_0720. Implement with editorial license.
Yes: 37
No: 10

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **37** # 194

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *bucket3*

Far VEC is TBD.

SuggestedRemedy

Far end VEC=7.5 dB, see ghiasi_3ck_02_0620

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: SC/page/line changed from 120F.4.2/211/48.]

Resolve using the response to comment #177.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **37** # 193

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *bucket3*

Near VEC is TBD.

SuggestedRemedy

Near end VEC=7.5 dB, see ghiasi_3ck_02_0620

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: changed subclause/page/line from 120F.4.2/211/48.]

Resolve using the response to comment #177.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **42** # 176

Ran, Adee — Intel

Comment Type **T** *Comment Status* **R**

the Differential peak-to-peak output voltage is way too large, and if it is implemented it can overwhelm the host receiver.

With a long host channel, pre-equalization will be required and will attenuate low frequencies, while the channel attenuates high frequencies, creating a lower PtP signal at the host Rx.

With a short host channel, there will be lower attenuation by the channel, and equalization may not be required. in that case the full swing will create a large signal at the host Rx input.

A hosts receiver that can function with a smaller swing over a lossy channel doesn't need this large signal (which may be bad for it). Reduced swing in the module output may be necessary in some channels.

SuggestedRemedy

Change the differential peak-to-peak output maximum specification to 400 mV PtP, both for the near-end test and the far-end test. Clarify that different module output settings may be used in the tests.

Change the input tolerance reuqiremement in Table 120G–4 accordingly.

Response *Response Status* **C**

REJECT.

Straw poll #6, indicated most support for adopting the values for far-end and near-end differential peak to peak voltage (max.) as proposed on slide 9 of ran_3ck_01b_0720.

The closed response to comment #175 adopted two equalization settings for module transmitter.

Based on strawpoll #9, there is no consensus to close to the comment with the proposed values.

Strawpoll #9 (decision)
I would support closing comment 176 setting far-end and near-end differential peak to peak voltage (max) to 600 mV as proposed on slide 9 of ran_3ck_01b_0720.
Yes: 19
No: 20

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **43** # 11060

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *bucket3*

[Comment resubmitted from Draft 1.1. 120G.3.2, P224, L37]

Signal swing and Tx equalization are important in PAM4 since the receiver has a limited linear range. A large swing at the host input may prevent linear operation and detection of PAM4. Attenuation has been used in past Rx designs, but it is becoming harder to implement with the large bandwidth requirements for 100G.

The current module output specifications have limited information about output swing and ISI (only implicitly through far-end eye height and far-end precursor ISI ratio, which are defined with a single channel), and do not mention any control of the Tx setting. With the large range of C2M host channels, it is unlikely that a fixed Tx setting will be usable for all hosts.

Actual modules even in 50G have some control of equalization and swing. There are indications that this control is required for actual operation.

If we ignore this capability in the specifications, some hosts may not be able to operate with the settings used for module output compliance; this means the module compliance specs are useless and measuring them is a waste of time.

The standard should at least mention the module's Tx control capabilities (with reference to external documents) and preferably define requirements for them, with management variables and control registers. It will be beneficial if the Tx specifications include these capabilities.

SuggestedRemedy

A presentation is planned with further details.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force at a previous task force meeting:
http://www.ieee802.org/3/ck/public/adhoc/may27_20/ran_3ck_adhoc_01_052720.pdf

The closed response to comment #175 adopts two module output (transmitter) settings, which addresses the configuration of the module output.

According to the closed response to comment #176, there is no consensus at this time to change the module output differential peak to peak voltage specification.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **44** # 11097

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.2, P224, L44]

Near end ESMW is TBD

SuggestedRemedy

Replace TBD with 0.175 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **45** # 177

Ran, Adee Intel

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

Addressing Near-end eye height, differential (min) and Far-end eye height, differential (min) which are TBDs.

The host output is now specified in terms of VEC. There is no reason that the module output should not use this specification method.

The proposed limit values are based on host output specification, and are the same for near-end and for far-end, at this time. The limit values may be adjusted in future drafts. The module can use different settings to meet the near-end and far-end requirements.

SuggestedRemedy

Change the minimum NEEH and FEEH values in Table 120G–3 to 15 mV. Add rows for Near-end VEC and Far-end VEC, both with maximum value of 9 dB. Clarify that different module output settings may be used in the tests.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

For NE EH…
#177 proposes 15 mV
#135 proposes 50 mV
#191 proposes 40 mV

For FE EH…
#177 proposes 15 mV
#192 proposes 20 mV
#107 proposes 24 mV

For NE VEC…
#177 proposes 9 dB
#108 proposes 7.5 dB

For FE VEC…
#177 proposes 9 dB
#109 proposes 7 dB

The following presentations were reviewed:
http://www.ieee802.org/3/ck/public/20_07/ghiasi_3ck_02_0720.pdf
http://www.ieee802.org/3/ck/public/20_07/hidaka_3ck_01_0720.pdf
http://www.ieee802.org/3/ck/public/20_07/ran_3ck_01b_0720.pdf

Straw polls #4 and #5, indicated strong support for adopting the values for far-end and near-end VEC and EH as proposed on slide 9 of ran_3ck_01b_0720.

The closed response to comment #175 adopted two equalization settings for module transmitter.

Set far-end VEC (max) to 7.5 dB
Set near-end VEC (max) to 7.5 dB
Set far-end EH (min) to 24 mV
Set near-end EH (min) to 24 mV

[Editor's note added after the comment was closed:
The URL for second listed presentation should be the following…
http://www.ieee802.org/3/ck/public/20_07/hidaka_3ck_01d_0720.pdf
]

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **45** # 135

Hidaka, Yasuo Credo Semiconductor

Comment Type **TR** *Comment Status* **A** *bucket3*

Near-end eye height, differential (min) is TBD.
See hidaka_3ck_01_0720, slide 7.

SuggestedRemedy

Change TBD to 50.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #177.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **46** # 198

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

Near-end eye height is TBD

SuggestedRemedy

Replace TBD with 50 mV see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** SC **120G.3.2** P **224** L **46** # 11098

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.2, P224, L46]

Near-end eye height is TBD

SuggestedRemedy

Replae TBD with 50 mV see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** SC **120G.3.2** P **224** L **47** # 11099

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.2, P224, L47]

Far end ESMW is TBD

SuggestedRemedy

Replace TBD with 0.175 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** SC **120G.3.2** P **224** L **48** # 108

Hidaka, Yasuo — Credo Semiconductor

Comment Type **TR** *Comment Status* **A** *bucket3*

Near-end VEC (max) should be specified.
See hidaka_3ck_01_0720, slide 6.

SuggestedRemedy

To table 120G-3, add a row of "Near-end vertical eye closure (max)" with a value of 7.5 dB and a reference to 120G.3.2.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #177.

Cl **120G** SC **120G.3.2** P **224** L **48** # 11100

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.2, P224, L44]

Far-end eye height is TBD

SuggestedRemedy

Replace TBD with 20 mV see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** SC **120G.3.2** P **224** L **49** # 107

Hidaka, Yasuo — Credo Semiconductor

Comment Type **TR** *Comment Status* **A** *bucket3*

Far-end eye heigh, differential (min) is TBD.
See hidaka_3ck_01_0720, slide 7.

SuggestedRemedy

Change TBD to 24.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #177.

Cl **120G** SC **120G.3.2** P **224** L **51** # 109

Hidaka, Yasuo — Credo Semiconductor

Comment Type **TR** *Comment Status* **A** *bucket3*

Far-end VEC (max) should be specified.
See hidaka_3ck_01_0720, slide 6.

SuggestedRemedy

To table 120G-3, add a row of "Far-end vertical eye closure (max)" with a value of 7.0 dB and a reference to 120G.3.2.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #177.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **52** # 210

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D**

Common mode to Differential conversion could be improved

SuggestedRemedy

New propose limit for RLDC=22 -20(f/25.78) up to 12.89 GHz and 12 dB from 12.89 to 50 GHz.
See ghiasi_03_0620

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Editor's note: Changed line from 25.]

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **52** # 208

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

Unless one end of the link has common mode termination the 17.5 mV allowed common mode does not get absorbed

SuggestedRemedy

Add common mode return loss with following equation = 12 - 9*f/1e9 dB up to 1 GHz
3 dB from 1GHz to 50 GHz
See ghiasi_03_0620

Response *Response Status* **C**

REJECT.

[Editor's note: changed line from 23.]

The following presentation was reviewed at an ad hoc meeting:
http://www.ieee802.org/3/ck/public/20_07/ghiasi_3ck_03_0720.pdf

There is no consensus to make the proposed changes at this time.

Cl **120G** *SC* **120G.3.2** *P* **224** *L* **52** # 11125

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.2, P224, L52]

RLCD return loss can be improved

SuggestedRemedy

RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
RLCD=15 dB 12.89 to 53 GHz
See ghiasi_3ck_03_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.2.2** *P* **226** *L* **34** # 22

Wu, Mau-Lin — Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The module output ERL (min) value at TP4 is specified both in Table 120G-3 as well as the following sentence here. "Module output ERL at TP4 shall be greater than TBD". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Module output ERL at TP4 shall be greater than or equal to the value of ERL (min.) specified in Table 120G-3.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to:
Module output ERL at TP4 shall be greater than or equal to ERL (min) specified in Table 120G-3.

Cl **120G** *SC* **120G.3.3.1** *P* **227** *L* **33** # 25

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The host input ERL (min) value TP4a is specified both in Table 120G-4 as well as the following sentence here. "Host input ERL at TP4a shall be greater than TBD". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Host input ERL at TP4a shall be greater than or equal to the value of ERL (min.) specified in Table 120G-4.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:

http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to:
Host input ERL at TP4a shall be greater than or equal to ERL (min) specified in Table 120G-4.

Cl **120G** *SC* **120G.3.3.2** *P* **227** *L* **45** # 11101

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.3.2, P227, L15]

Farend ESMW is TBD

SuggestedRemedy

Replace TBD with 0.175 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.3.2** *P* **227** *L* **46** # 11102

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.3.2, P227, L16]

Farend EW is TBD

SuggestedRemedy

Replace TBD with 0.175 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.3.2** *P* **227** *L* **49** # 11103

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.3.2, P227, L19]

Far-end eye height is TBD

SuggestedRemedy

Replace TBD with 20 mV see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.3.2.1** *P* **228** *L* **6** # 229

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

"The reference receiver includes a reference receiver as specified in 120G.5.2"

SuggestedRemedy

Change to
"The reference receiver is specified in 120G.5.2"

Response *Response Status* **C**

ACCEPT.

Cl **120G** *SC* **120G.3.4** *P* **230** *L* **9** # 11124

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D**

[Comment resubmitted from Draft 1.1. 120G.3.4, P229, L15]

RLCD return loss can be improved

SuggestedRemedy

RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
RLCD=15 dB 12.89 to 53 GHz
See ghiasi_3ck_03_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.4.1** *P* **230** *L* **34** # 11104

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.4.1, P229, L40]

ESMW is TBD

SuggestedRemedy

Replace TBD with 0.12 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.4.1** *P* **230** *L* **38** # 11106

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.4.1, P229, L44]

Eye width is TBD

SuggestedRemedy

Replace TBD with 0.12 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.4.1** *P* **230** *L* **38** # 11105

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.3.4.1, P229, L46]

Eye height is TBD

SuggestedRemedy

Replae TBD with 15 mV see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.4.1** *P* **230** *L* **47** # 199

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

Far end ESMW is TBD

SuggestedRemedy

Replace TBD with 0.175 UI see ghiasi_3ck_01_0320

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.3.4.2** *P* **232** *L* **49** # 27

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The module input ERL (min) value at TP1 is specified both in Table 120G-7 as well as the following sentence here. "Module input ERL at TP1 shall be greater than TBD". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Module input ERL at TP1 shall be greater than or equal to the value of ERL (min.) specified in Table 120G-7.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to:Module input ERL at TP1 shall be greater than or equal to ERL (min) specified in Table 120G-7.

Cl **120G** *SC* **120G.5.2** *P* **235** *L* **1** # 11117

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.4.2, P232, L9]

TP5 need its own reference receiver table

SuggestedRemedy

Create a new table that references table of gDC/gDC2 for TP4. In the new table DFE normalized coefficent b1max=0.3, b[2-4]max=0.08 and n0=8.37e-9

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.5.2** *P* **234** *L* **8** # 245

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **A** *bucket*

"The following procedure should be used": no, there is no need to follow the procedure, only to make the product good enough. This is not a standard for testing. I know this is wrong in 120E.4.2 too, but it's easy to fix here.

SuggestedRemedy

Change "The following procedure should be used to obtain the eye height eye width, and vertical eye closure parameters, as illustrated by Figure 120E-13." to "Eye height, eye width, and vertical eye closure parameters, as illustrated by Figure 120E-13, are defined by the following procedure."

Response *Response Status* **C**

ACCEPT.

Cl **120G** *SC* **120G.5.2** *P* **235** *L* **1** # 11116

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *withdrawn*

[Comment resubmitted from Draft 1.1. 120G.4.2, P232, L9]

TP4 need its own reference receiver table

SuggestedRemedy

Create a new table that references table of gDC/gDC2 for TP4. In the new table DFE normalized coefficent b1max=0.15, b[2-4]max=0.05 and n0=8.37e-9

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.5.2** *P* **235** *L* **48** # 11142

Dawe, Piers Mellanox

Comment Type **TR** *Comment Status* **D** *Scope noise*

[Comment resubmitted from Draft 1.1. 120G.4.2, P232, L39]

Should account for scope noise as TDECQ does.

SuggestedRemedy

Allow RSSing out the scope noise (as done in TDECQ) if it's significant.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **120G** *SC* **120G.5.2** *P* **235** *L* **48** # 226

Dudek, Mike — Marvell.

Comment Type **E** *Comment Status* **R** *bucket*

The wording of this paragraph could be improved.

SuggestedRemedy

Change "Capture the PRBS13Q signal y1(k) with the effect of low-pass response equivalent to the specified receiver noise filter with associated parameter fr in Table 120G–9, and using a clock recovery unit with a corner frequency of 4 MHz and slope of 20 dB/decade." to Capture the PRBS13Q signal y1(k) with the effect of low-pass response equivalent to the specified receiver noise filter with associated parameter fr in Table 120G–9, using a clock recovery unit with a corner frequency of 4 MHz and slope of 20 dB/decade."

Response *Response Status* **C**

REJECT.

The LPF and CRU are two distinct processes so use of the word "and" is appropriate.

Cl **120G** *SC* **120G.5.2** *P* **236** *L* **9** # 231

Ran, Adee — Intel

Comment Type **T** *Comment Status* **R**

This subclause specifies measurement of "eye opening parameters eye height, eye width, and vertical eye closure".

Item e here:
"e) Compute the receiver input signal yrx(k) by applying the effect of the DFE to y2(k) using the
sampling phase ts"

May cause ambiguity in the resulting eye diagram, which can yield different EW and ESMW results.

The reason is that it does not fully specify how the sampling phase ts is used. To create a "nice" eye diagram, the DFE feedback is typicallly applied after some delay relative to ts. The time when the DFE feedback is applied will affect the eye shape, width and ESMW (though not the eye height at ts, which is maximized by the DFE coefficients).

Note that this delay is not necessarily what a real receiver will have, and the eye may not correspond to the performance of real receivers.

In another comment I suggest to remove the ESMW specification. Following the statements above, The EW specification may also be worth removing. EH (which does not depend on the DFE feedback timing) should be enough.

Without EW, jitter measurement and calibration should be done using other means. Jitter injected in host stressed input test is already calibrated using C2C methods. Jitter for host and module outputs can be specified using C2C methods too.

SuggestedRemedy

Remove all EW specifications and change the text in this subclause to omit EW.

(Alternatively. if ESMW and/or EW are retained, then the application of the DFE feedback should be specified explicitly. I would suggest specifying that the DFE feedback effect starts 1/2 UI after ts.)

Add jitter specifications J4U, JRMS, and EOJ, for host output and module output, using references to 120F.3.1 (same values as in Table 120F–1).

Response *Response Status* **C**

REJECT.

Note that comment #173 proposes to drop ESMW as well.

A straw poll taken at the July 24 ad hoc meeting indicated strong support to remove the ESMW and EW parameters.

Strawpoll #7 (decision)
I support removing the EW and ESMW parameters and replacing with jitter specifications as proposed in the suggested remedy of comment #231.
Yes: 11
No: 22

Although there was interest expressed in removing the EW/ESMW parameters, an appropriate alternate constraint may be necessary. Further work and consensus building is necessary.

There is no consensus to implement the suggested remedy.

Cl **135** *SC* **135.1.4** *P* **109** *L* **23** # 2

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **A** *bucket*

Change 100GMII to CGMII in Figure 135-2

SuggestedRemedy

Change to CGMII in two places

Response *Response Status* **C**

ACCEPT.

Cl **152** *SC* **152.5.2a** *P* **115** *L* **31** # 97

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **A** *bucket*

Enable usually means it's active when set to a 1. However the IFEC_enable bit is written have the clause active when the bit is a 1.

SuggestedRemedy

Either: a) Change IFEC_enable to IFEC_bypass in Table 152-1, 156.6.2a (heading and 2 places in text), and in 45.2.1.186aa
or b) Change zero to one in 3rd sentenece of 152.6.2a and one to a zero in the 4th sentence

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #3.

Cl **161** *SC* **161.5.22** *P* **131** *L* **31** # 99

Slavick, Jeff — Broadcom

Comment Type **E** *Comment Status* **A** *bucket*

FEC_cw_counter font seems off in the first sentenece

SuggestedRemedy

Check font setting

Response *Response Status* **C**

ACCEPT.

Cl **161** *SC* **161.6.22** *P* **131** *L* **31** # 101

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **A** *FEC*

RS-FEC codewords arrive every 51.2ns for 100G operations. A 32b codeword counter will saturate in about 3.5 minutes. A 40b counter would saturate in about 15.5 hours at 100G. A 48b counter would saturate in 166 days at 100G.

SuggestedRemedy

Increase the size of the cw_counter to 48b to provide long term testing without constant polling of the system (especially if these counters were extended to be available for 400G or 800G operations)

Response *Response Status* **C**

ACCEPT

Cl **161** *SC* **161.6.23** *P* **131** *L* **36** # 106

Nicholl, Shawn — Xilinx

Comment Type **ER** *Comment Status* **A** *bucket*

Variable "i" is not italicized in two places.

SuggestedRemedy

In the text "where i=1 to 15", propose to italicize the "i".
In the text "exactly i correctable", propose to italicize the "i".

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.5** *P* **140** *L* **18** # 11164

Palkert, Tom — Molex

Comment Type **T** *Comment Status* **R** *Medium delay*

[Comment resubmitted from Draft 1.1. 162.5, P135, L18]

One way delay thru medium of 14ns is insufficient for DAC delay times.

SuggestedRemedy

Change value back to 20 ns

Response *Response Status* **C**

REJECT

The commenter is encouraged to provide more in depth analysis to support the proposed remedy.

Cl **162** *SC* **162.7** *P* **142** *L* **45** # 11007

Marris, Arthur — Cadence Design Systems

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

[Comment resubmitted from Draft 1.1. 162.7, P137, L6]

Many of the control and status variables in Tables 162-5 and 162-6 are not described or referenced in Clause 162.

SuggestedRemedy

Remove rows from Table 162-5 and 162-6 that refer to variables that are not mentioned in Clause 162

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.8.11** *P* **147** *L* **27** # 103

Healey, Adam — Broadcom Inc.

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

An expand set of predefined equalizer settings would be useful. The ability to select an initial condition closer to the target settings can be expected to improve robustness and decrease training time (due to a reduction in the number of iterative updates).

SuggestedRemedy

Add bit 11 of the control field (currently reserved) to "Initial condition request" to enable the definition of up to 7 presets with encoding 000 being "Individual coefficient control". The equalizer settings corresponding to each preset will be specified in 162.9.3.1.3 as already stated.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

Implement with editorial license the updates provided on slide 5 of the following presentation.
http://www.ieee802.org/3/ck/public/20_07/heck_3ck_03_0720.pdf

Cl **162** *SC* **162.9.3** *P* **148** *L* **4** # 136

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A** *bucket*

The rule here says "all transmitter measurements are made(…) using a test system with a fourth-order Bessel-Thomson low-pass response with 40 GHz 3 dB bandwidth". Some transmitter specifications require measurement of s-parameters, which should not include this filter.

In 163.9.1 and 120F.3.1, the similar rule refers to "all transmitter signal measurements", and in 120G.3.1 it is "output signal measurements". This phrasing would be better.

SuggestedRemedy

Change the text here to align with 163.9.1 and especially refer to signal measurements.

Response *Response Status* **C**

ACCEPT.

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* **21** # 256

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **A** *bucket*

"ic_req" appears without explanation. I can see that it may be mapped to an MDIO register, but those registers follow the hardware, they don't define it. The reader doesn't know it's in Figure 136-9 because you haven't told him, and anyway that's too arcane.

SuggestedRemedy

Explain what it is, with appropriate references to 162.8.11 and 136.8.11.something.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a reference to 136.8.11.7.1 with editorial license.

Cl **162** *SC* **162.9.3.1.3** *P* **151** *L* **30** # 104

Healey, Adam Broadcom Inc.

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

In Table 162-10, the coefficient initial conditions for presets 2 and onward are TBD.

SuggestedRemedy

Define the coefficient initial conditions (presentation with proposed values to be provided).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

The following presentations were reviewed:
http://www.ieee802.org/3/ck/public/20_07/healey_3ck_01_0720.pdf
http://www.ieee802.org/3/ck/public/20_07/heck_3ck_03_0720.pdf

Update the coefficient initial conditions according to slide 6 of heck_3ck_03_0720.

Implement with editorial license.

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* **162.9.3.1.3** *P* **151** *L* **30** # 142

Ran, Adee
Intel

Comment Type **T** *Comment Status* **D** *Tx electrical*

Cross-clause

The OUT_OF_SYNC setting is the initial setting used when bringing up a link. It is likely not the optimal setting in many cases, and may not be a good starting point, which can cause long link-up times.

In cases where the channel and link partner are known (typical in backplane or C2C), another initial setting may be preferable.

To enable fast link up in such cases, it is proposed that the coefficients in OUT_OF_SYNC state be taken from MDIO registers instead of being fixed. The default values of the registers will create the current preset 1 settings [0 0 0 1 0], so that when the channel is unknown the behavior is unchanged from D1.2.

SuggestedRemedy

Two new sets of R/W registers should be allocated. Each set corresponds to the 5 coefficient values, one register each.
"Initial coefficient vector" hold the values that will be set in OUT_OF_SYNC.
"Current coefficient vector" holds the current coefficients.

The encoding of these registers is implementation dependent, but is consistent between the sets.

Presentation with more details is planned.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.9.3.1.3** *P* **151** *L* **33** # 143

Ran, Adee
Intel

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

(cross-clause)
Transmitter presets 2 and 3 are currently TBDs.

It is proposed to use these presets as starting points for high-loss and low-loss channels.

Preset 2 in the suggested remedy is based on COM simulations of 2 m cable + 2*110 mm host board, and 1.5 m cable + 2*55 host board, and several backplane channels (results are quite similar).

Preset 3 for in the suggested remedy is aimed at short reach channels (more relevant for backplane/C2C), has minimum c(0) assumed in COM and no equalization, for channels that may need reduced swing. Even if equalization is required, this can be used as a convenient starting point of an optimization algorithm.

Presets are based on the maximum allowed step size of 2.5% and should have a tolerance of one step.

Clause 163 and Annex 120F do not have explicit settings but are going to be affected by this change.

SuggestedRemedy

Change the TBD values in the table as follows:

Preset 2: -0.025, 0.075, -0.25, 0.65, 0
Preset 3: 0, 0, 0, 0.525, 0

Set tolerance of +/- 0.025 for all presets (including preset 1 and OUT_OF_SYNC).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

Resolve using the response to comment #104.

Cl **162** *SC* **162.9.3.1.5** *P* **152** *L* **3** # 258

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **A** *bucket*

There seem to be rules here to ensure that c(-3), c(-2), c(-1) and c(1) can be moved over defined ranges, but not for c(0).

SuggestedRemedy

What is the intention? What should attempting to adjust c(0) be able to achieve and what is out of bounds?
Write down whatever information is missing in Table 162-9 and here. If it isn't missing, put it in in Table 162-9 and cross-reference it from this section.
Adjust Clause 163 consistent with this.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #144.

Cl **162** *SC* **162.9.3.1.5** *P* **152** *L* **19** # 144

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A** *bucket*

(cross-clause)

There is no requirement in the transmitter characteristics for the range of c(0).

While the maximum is 1 by definition of the measurement method, the minimum is only implied by the minimum value of c(-1) and an assumption that the sum of absolute coefficients is capped at 1 (which may not be true in all implementations).

Even assuming that the sum is not larger than 1, the implied minimum of c(0) is 0.66, while the COM search range assumes 0.54 is possible.

SuggestedRemedy

Add the following paragraph before the NOTE:

Having received sufficient "decrement" requests so that it is at its minimum value, c(0) shall be less than or equal to 0.54.

Add a row in table 162-9: "value at minimum state for c(0) (max.)" with reference to this subclause and value 0.54.

Add similar rows in table 163-5 and table 120F-1.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.3.2** *P* **152** *L* **24** # 40

Brown, Matt — Huawei Technologies Canada

Comment Type **E** *Comment Status* **A** *bucket*

This subclause specifies a recommended insertion loss for the host. It seems this would be more appropriately located in Annex 162A along with other informative specifications relating to the channel.

SuggestedRemedy

Move the specification in 162.9.3.2 to Annex 162A then add a reference in 162.9.3.2 pointing to Annex 162A.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

Cl **162** *SC* **162.9.4.3** *P* **154** *L* **3** # 11037

Ben Artsi, Liav — Marvell

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

[Comment resubmitted from Draft 1.1. 162.9.4.3, P152, L38]

Receiver characteristics lacks the definition of capability to tollerate common mode noise at the reciever input

SuggestedRemedy

Add the required capability of Rx common mode broadband noise tolerance and set it at TBD at least for now

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.9.4.3.3** *P* **154** *L* **49** # 220

Dudek, Mike — Marvell.

Comment Type **T** *Comment Status* **A** *bucket*

The name has changed S(HOSP) is no longer defined in 162.11.7.1.1

SuggestedRemedy

Change S(HOSP) to S(HOSPR) in two places. Also on page 162 lines 28, 37, 42 and 49. Also on page 163 line 1.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.4.3.3** *P* **155** *L* **33** # 185

Sekel, Steve — Keysight Technologies

Comment Type **TR** *Comment Status* **D** *withdrawn*

The swtich from J4u to J3u in equation 162-8 results in the math failing (SQRT of negative result) with some of the legal values of parameters in the test setup. Refer to calvin_0ck1a_0612

SuggestedRemedy

Either change back to using J4u for this parameter, or add a limit to the term under the square root to be >= 0.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.9.4.3.4** *P* **155** *L* **47** # 259

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **A** *bucket*

"800 mV peak-to-peak differential when measured on an alternating 0-3 pattern": we don't have unnatural test patterns, but there are suitable sequences in the usual mixed-frequency signals such as PRBS13Q.
Notice that 163.9.2.3 has a different definition: "The test transmitter is constrained such that for any transmitter equalizer setting the differential peak-to-peak voltage (see 93.8.1.3) is less than or equal to 800 mV." 93.8.1.3 doesn't define a pattern or sequence and is for PAM2 anyway.

SuggestedRemedy

Change "pattern" to "sequence". Reconcile 163.9.2.3.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.4.4.2** *P* **156** *L* **50** # 146

Ran, Adee — Intel

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

Comment #33 against D1.1 suggested jitter tolerance requirements at additional frequencies between the measurement points of Table 120D–7, but only addressed clause 163. The same argument also holds in 162 (which currently points to Table 120D–7) and in 120F (which has Table 120F–5, identical to Table 163–9).

SuggestedRemedy

To address the concern of comment #33 in all 3 places together:

1. Add another column in Table 120F–5, with frequency 0.4 and amplitude 0.5, changing the labels in the first row as necessary.
2. Change the reference in 162.9.4.4.2 from Table 120D–7 to Table 120F–5.
3. In 163.9.2.4, either delete Table 163–9 and refer to Table 120F–5 instead, or apply similar changes to Table 163–9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

In Table 163-9, add another column with frequency 0.4 and amplitude 0.5, changing the labels in the first row as necessary.

Move Table 163-9 to Clause 162 in place of reference to Table 120D-7.

Refer to this table from the jitter tolerance subclauses in Clause 163 and Annex 120F.

Implement with editorial license.

Cl **162** *SC* **162.9.4.5** *P* **157** *L* **11** # 11163

Palkert, Tom — Molex

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

[Comment resubmitted from Draft 1.1. 162.9.4.5, P156, L14]

ERL measurement should not be required for high values of COM

SuggestedRemedy

Add sentence 'If COM is greater than 4 dB the ERL limit does not apply

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.11** *P* **158** *L* **15** # 71

Haser, Alex Molex

Comment Type **T** *Comment Status* **R**

Fill in TBD for differential to common-mode return loss

SuggestedRemedy

Presentation to follow

Response *Response Status* **C**

REJECT.

The following presentation was reviewed at a previous ad hoc meeting:
http://www.ieee802.org/3/ck/public/adhoc/jun17_20/haser_3ck_adhoc_02_061720.pdf

Resolve with comment 181, 147, and 74

There is no consensus to make changes to this specification at this time.

Cl **162** *SC* **162.11** *P* **158** *L* **17** # 72

Haser, Alex Molex

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

Fill in TBD for differential to common-mode conversion loss

SuggestedRemedy

Presentation to follow

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.11** *P* **158** *L* **18** # 73

Haser, Alex Molex

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

Fill in TBD for common-mode to common-mode return loss

SuggestedRemedy

Presentation to follow

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed at a previous ad hoc meeting:
http://www.ieee802.org/3/ck/public/adhoc/jun17_20/haser_3ck_adhoc_02_061720.pdf

Implement the proposal on slide 7 of diminico_3ck_02d_0720.

Cl **162** *SC* **162.11.3** *P* **158** *L* **52** # 45

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A**

N = 7000 is requres a frequency step less than 10 Mhz. This is measurement burdon with no change over N=3500.

SuggestedRemedy

Set N=3500 as suggested in mellitz_3ck_adhoc_01_061020

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The referenced presentation is located here:
Http://www.ieee802.org/3/ck/public/adhoc/jun10_20/mellitz_3ck_adhoc_01a_061020.pdf

Adopt the values for Tr, Bx, Px, N, and Nbx in slide 6 of the following presentation:
http://www.ieee802.org/3/ck/public/20_07/kochuparambil_3ck_01a_0720.pdf

There was no consensus to adopt values for ERL (min).

Cl **162** *SC* **162.11.5** *P* **159** *L* **10** # 148

Ran, Adee
Intel

Comment Type **T** *Comment Status* **R**

Addressing D-C conversion (insertion) loss which is TBD.

In clause 92 the D-C conversion loss was specified relative to the differential insertion loss, with minimum of 10 dB flat from 10 MHz up to the Nyquist frequency, then decreasing linearly to 6.3 dB at 15.7 GHz, and a flat 6.3 dB up to 19 GHz (Equation 92-29).

Minimum mode conversion loss is important to control the differential noise into the receiver, with Tx allowed CM noise (up to 30 mV RMS) and possible additional noise from D-C return loss.

The difference from insertion loss is a good method assuming the common mode noise has a flat spectrum (similar to the victim signal). If the common mode noise is concentrated at low frequencies where the channel does not attenuate much, then it may only be reduced to 10 mV RMS, which is a large amount of noise. We don't have reason to assume that, but it may be worth tightening the specs (future work required).

It is suggested to use a specification similar to clause 92 scaled to the new Nyquist frequency, and modified to extend the slope to 1.25*26.5625, where the equation creates a flat 10 dB line between 0.01-26.5625 GHz, a constant slope until 33.203125 GHz, and a flat 5.75 dB line between 33.203125-40 GHz.

If the numbers in the equation are not in consensus they can be replaced with TBDs.

SuggestedRemedy

Change the content of 162.11.5 to the following:

162.11.5 Cable assembly differential to common-mode conversion loss

Conversion between differential and common-mode signals can result in degradation of the signal at the receiver, and in introduction of differential noise into the receiver. To limit these effects, the differential to common-mode mode conversion loss, relative to the insertion loss, has to be limited.

The difference between the cable assembly differential to common-mode conversion loss and the cable
assembly insertion loss shall meet Equation (162-new).

CDCL(f) - IL(f) ≥
10, 0.01 ≤ f ≤ f_N
27-17*f/f_N, f_N < f ≤ 1.25*f_N
5.75, 1.25*f_N < f < 40
Where
f_N=26.5625 is the Nyquist frequency in GHz
f is the frequency in GHz
CDCL(f) is the common-mode to differential inversion loss in dB at frequency f
IL(f) is the differential insertion loss in dB at frequency f

Response *Response Status* **C**

REJECT.

See also 181, 71, and 74.

There is no consensus to address the TBD at this time.

Cl **162** *SC* **162.11.5** *P* **159** *L* **10** # 75

Haser, Alex
Molex

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

Fill in TBD for differential to common-mode conversion loss

SuggestedRemedy

Presentation to follow

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.11.7** *P* **159** *L* **20** # 149

Ran, Adee Intel

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

(cross-clause)
Addressing the value of T_r used in COM, which is currently TBD.

Tr is not mesurable, but it implicitly affects the transmitter specification peak/Vf which is measurable, and is also TBD in 162, 163 and 120F.

The proposed value for Tr (as used in COM, prior to the device package model) is 7.5 ps. This values matches results of feasible transmitter devices and will enable reasonble values of peak/Vf.

Note that the value 6.16 ps has been used in prior analysis, but has never been adopted. This latter value is overly aggressive and does not enable feasible design of transmitters. The proposed value has only a mild effect on COM results in comparison.

A presentation supporting this value and possible values for peak/Vf at Tp0 or TP0a (possibly informative) will be provided.

SuggestedRemedy

Change TBD to 7.5 ps in 162.11.7, in 163.10, and in 120F.4.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

A related presentation was not submitted.

Implement the suggested remedy.

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* **159** *L* **41** # 151

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

(cross clause)
For a consistent notation of the numeric values of capacitances , change text of Cb to 3e-5 nF. Alternatively use exponent of -6 everywhere and set Cd=120e-6, Cb=30e-6, Cp=87e-6

SuggestedRemedy

Per comment. Apply in 162.11.7, in 163.10, and in 120F.4.1.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.7** *P* **160** *L* **43** # 37

Ben Artsi, Liav — Marvell Technology

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

Transmitter signal-to-noise ratio is TBD

SuggestedRemedy

In benartsi_3ck_01a_0919 it was shown that an optimized break-out section cross-talk degrades SNR by at least 0.5dB.
This degradation is not represented in the "include PCB" section and should be accounted for in setting a proper value of SNR_Tx in section 162. In Table 163–10 SNR_Tx is specified to be 33dB and very likely same devices will be used for both sections. For comparison, in section 163 the break-out area crosstalk is included in the interconnect supplied to COM.
According to all of the above, set 162 section's SNR_Tx COM value to be 32.5dB (to account for host board break-out section crosstalk which is not included in the "include PCB" specification). This value correlates to 163 section's SNR_Tx of 33dB and allows traces and conector crosstalk degradation of an additional 1dB up to TP2 resulting in the 31.5dB already specified in table 162–9 (SNDR = 31.5dB)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The referenced presentation is here:
http://www.ieee802.org/3/ck/public/19_09/benartsi_3ck_01a_0919.pdf

Comments #70, #77, #152, #11162 also address SNR_TX.

Set SNR_TX to 32.5 dB.

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 **162** *SC* **162.11.7.1.1** *P* **162** *L* **14** # 129

Hidaka, Yasuo — Credo Semiconductor

Comment Type **E** *Comment Status* **A** *bucket*

There is meaning less "or".

SuggestedRemedy

Change "transmitter or" to "transmitter".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #217.

Cl **162** *SC* **162.11.7.1.1** *P* **162** *L* **14** # 217

Dudek, Mike — Marvell.

Comment Type **T** *Comment Status* **A** *bucket*

S(HOSPT) definition isn't good.

SuggestedRemedy

Change to "is the host transmitter PCB signal path"

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.7.1.1** *P* **162** *L* **15** # 230

Ran, Adee — Intel

Comment Type **E** *Comment Status* **A** *bucket*

"S(HOSPT) is the host transmitter or PCB signal path" and then "S(HOSPR) is the host (transmitter or receiver) PCB signal path"

Text does not make sense.

SuggestedRemedy

Change to
"S(HOSPT) is the transmitter's host PCB signal path"
"S(HOSPR) is the receiver's host PCB signal path"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #217 and #218.

Cl **162** *SC* **162.11.7.1.1** *P* **162** *L* **16** # 124

Hidaka, Yasuo — Credo Semiconductor

Comment Type **T** *Comment Status* **A** *bucket*

"(transmitter or receiver)" is confusing and not correct.

SuggestedRemedy

Change "host (transmitter or receiver) PCB signal path" to "host receiver PCB signal path".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #218.

Cl **162** *SC* **162.11.7.1.1** *P* **162** *L* **16** # 218

Dudek, Mike — Marvell.

Comment Type **T** *Comment Status* **A** *bucket*

S(HOSPR) definition isn't related to the transmitter PCB signal path.

SuggestedRemedy

Change to "is the host receiver PCB signal path"

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.7.1.2** *P* **162** *L* **28** # 125

Hidaka, Yasuo — Credo Semiconductor

Comment Type **T** *Comment Status* **A** *bucket*

S^(HOSP) is not the host receiver PCB signal path in this clause.

SuggestedRemedy

Change "S^(HOSP)" to "S^(HOSPR)" in Equation (162-13) and on line 28 and line 42.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.7.1.2** *P* **162** *L* **49** # 221

Dudek, Mike — Marvell.

Comment Type **T** *Comment Status* **A** *bucket*

S(HOTxSP) is not defined.

SuggestedRemedy

Change S(HOTxSP) to S(HOSPT)

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.7.1.2** *P* **163** *L* **1** # 126

Hidaka, Yasuo — Credo Semiconductor

Comment Type **T** *Comment Status* **A** *bucket*

S^(HOSP) is not the host receiver PCB signal path in this clause.

SuggestedRemedy

Change "S^(HOSP)" to "S^(HOSPR)" in Equation (162-14) in page 162 and on line 1 in page 163.

Response *Response Status* **C**

ACCEPT.

Cl **162A** *SC* **162A** *P* **243** *L* **34** # 182

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Proposals for 162A Annex 162A
TP0 and TP5 test point parameters and channel characteristics TBDs

SuggestedRemedy

162A.4 recommended maximum and minimum printed circuit board trace insertion losses TBDs
162A.5 Channel insertion loss
ILMaxHost(f) TBD
ILCamin(f) TBD
See diminico_3ck_01_0720.pdf

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: changed clause from 162.]

The following was not reviewed. A later presentation (diminico_3ck_02d_0720) superceded it.

http://www.ieee802.org/3/ck/public/20_07/diminico_3ck_01_0720.pdf

There is no consensus to adopt the proposed specification for maximum PCB insertion loss.

For the minimum PCB insertion loss, adopt the specification on slide 10 of diminico_3ck_02d_0720. Implement with editorial license.

Cl **162A** *SC* **162A.5** *P* **245** *L* **26** # 260

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **A** *bucket*

Please help the reader understand the equivalence of some loss items in this figure by aligning the mated test fixtures with TP1 and TP2 Compare Figure 92A-2.

SuggestedRemedy

Please move the mated test fixtures to the left to:
Align TP1 and the end of the MCB.
Align TP2 and the end of the HCB.

Response *Response Status* **C**

ACCEPT.

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

Cl **162C** *SC* **162C.1** *P* **259** *L* **11** # 1

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **A**

The MDI connector contact mapping for the OSFP connector is incorrect. Many of the contact mappings have incorrect polarity and there are several GND mappings that were missed as well

SuggestedRemedy

Update Table 162C-3 with the correct contact mapping. See presentation submitted to Task Force.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the contact mapping per the following presentation:
http://www.ieee802.org/3/ck/public/20_07/lusted_3ck_01_0720.pdf

Cl **163** *SC* **163.9.1** *P* **177** *L* **26** # 33

Ben Artsi, Liav — Marvell Technology

Comment Type **T** *Comment Status* **A** *TP0v*

TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.

SuggestedRemedy

Measurement to be done at a newly defined TP0v which may vary according to implementation.
A presentation will be provided with details, parameters values and method.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

The following presentations were reviewed:
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf
http://www.ieee802.org/3/ck/public/20_07/heck_3ck_01a_0720.pdf

Strawpoll #1.
I support use of the TP0v methodology as proposed in benartsi_3ck_01_0720.
A: Yes
B: No
C: Need more information
Choose one.
A: 16 B: 1 C: 21

Implement using the contents of heck_3ck_01a_0720 with editorial license, with the following exceptions:
- on slide 9, in value column change 0 to TBD (3 times)
- use different annex, e.g., 163A

Cl **163** *SC* **163.9.1** *P* **177** *L* **38** # 28

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **R** *common mode noise*

The 'AC common-mode RMS voltage (max.)' is 30 mV, which is the same as that in 802.3cd. By combining this spec with P/N skew mismatch of backplane channel, it will induce crosstalk to differential signal at receiver. From 50G to 100G, it's difficult to improve the P/N skew mismatch to half. Based on that, we shall modify AC common-mode RMS voltage. We shall align this spec to that in C2M (120G).

SuggestedRemedy

Change 30 mV to 17.5 mV.

Response *Response Status* **C**

REJECT.

Note that comment #205 and #54 request the same change.

The suggested remedy does not provide sufficient evidence that the proposed threshold is feasible and necessary. Further evidence and consensus building is encouraged.

This applies to both KR and C2C.

Cl **163** *SC* **163.9.1** *P* **177** *L* **38** # 205

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *bucket3*

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.

[Editor's note: changed page from 148.]

Resolve using the response to comment #28.

Cl **163** *SC* **163.9.1** *P* **177** *L* **38** # 54

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *bucket3*

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.

Resolve using the response to comment #28.

Cl **163** *SC* **163.9.1** *P* **177** *L* **41** # 56

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **D** *common mode spec*

need spec form common mode return loss.

SuggestedRemedy

Change to integrated common mode return loss so it may be used to compute the effect of common mode noise and remove reference to 93.8.1.4

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **163** *SC* **163.9.1** *P* **177** *L* **42** # 58

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *bucket2*

Vf(min) should align with Av in COM table 163-10 since Nv=200

SuggestedRemedy

Replace 0.4 with 0.413

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: Change page from 148.]

Resolve using the response to comment #33.

Cl **163** *SC* **163.9.1** *P* **177** *L* **45** # 30

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket2*

The "Linear fit pulse peak (min.)" in Table 163-5 is still 'TBD x v_f'.

SuggestedRemedy

Propose to change 'TBD x v_f' to '0.65 x v_f'.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #33.

Cl **163** *SC* **163.9.1** *P* **178** *L* **5** # 222

Dudek, Mike Marvell.

Comment Type **T** *Comment Status* **A** *TX FIR*

It would be good to add the same recommendation for equal step sizes for backplane as has been added for copper cable.

SuggestedRemedy

Add the footnote "Implementations are recommended to use the same step size for all coefficients." to the transmitter output waveform

Response *Response Status* **C**

ACCEPT

Cl **163** *SC* **163.9.1.1** *P* **178** *L* **29** # 223

Dudek, Mike Marvell.

Comment Type **E** *Comment Status* **A** *bucket*

Duplicate period at the end of the paragraph

SuggestedRemedy

delete one.

Response *Response Status* **C**

ACCEPT.

Cl **163** *SC* **163.9.1.1** *P* **178** *L* **45** # 7

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The TX ERL (min) value is specified both in Table 163-5 as well as the following sentence here. "Transmitter ERL at TP0a shall be greater than or equal to TBD dB". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Transmitter ERL at TP0a shall be greater than or equal to the value of ERL (min.) specified in Table 163-5.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to "Transmitter ERL at TP0a shall be greater than or equal to ERL (min) specified in Table 163-5."

Cl **163** *SC* **163.9.1.2** *P* **178** *L* **47** # 34

Ben Artsi, Liav Marvell Technology

Comment Type **T** *Comment Status* **A** *TP0v*

A reference TP0 - TP0a test fixture is specified while its loss values are not practical.

SuggestedRemedy

Specify a more feasible reference TP0 to TP0a specification alongside informative parameters for reference in TP0a. Specify an additional test fixture range of TP0 - TP0v Loss at ~26.56GHz ≤ 5dB ; ILD ≤ 0.2dB ; ERL. A presentation is to be provided with the actual suggestion

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed:
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf

For the TP0 to TP0v test fixture for 163 and 120F specify the following:
IL @ 26.56 GHz <= 5 dB
ILD <= 0.2 dB

Cl **163** *SC* **163.9.1.2** *P* **178** *L* **52** # 153

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *bucket2*

(Cross-clause)
The test feature normative insertion loss requirements are not realistic for real devices, especially with multiple lanes.

Also, as presented in http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf, the variations allowed within the recommendations create significant variations in results of compliance parameters. This is obvisouly not a viable methodology anymore.

It is suggested to replace the test fixture requirements with an explicit equation describing s-parameters of a transmission line with 4 dB IL (using equation 93A–14 with appropriate parameters) such that TP0a is well-defined, and create informative specifications at this TP0a. Alternatively, informative specifications can be given at TP0.

Normaitve requirements should use a new methodology based on measued or extracted test fixture s-parameters.

Also applies to Annex 120F.

SuggestedRemedy

A presentation with more details will be provided.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This comment applies to both 163 and 120F.

The commenter is referring to the following presentation:
http://www.ieee802.org/3/ck/public/20_07/benartsi_3ck_01_0720.pdf

The new test point TP0v and related test fixture are adopted per the response to comment #33.

Retain the TP0a test point and test fixture specifications, but change to an informative specification.

Implement with editorial license.

Cl **163** *SC* **163.9.2** *P* **180** *L* **50** # 11038

Ben Artsi, Liav Marvell

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

[Comment resubmitted from Draft 1.1. 163.9.2, P178, L45]

Receiver characteristics lacks the definition of capability to tollerate common mode noise at the reciever input

SuggestedRemedy

Add the required capability of Rx common mode broadband noise tolerance and set it at TBD at least for now

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **163** *SC* **163.9.2.1** *P* **181** *L* **7** # 9

Wu, Mau-Lin Mediatek

Comment Type **T** *Comment Status* **A** *bucket*

The RX ERL (min) value is specified both in Table 163-7 as well as the following sentence here. "Receiver ERL at TP5a shall be greater than or equal to TBD dB". The value is the duplicated information & could be removed.

Please refer to details in wu_3ck_adhoc_01_061020.pdf

SuggestedRemedy

Change the sentence to
***
Receiver ERL at TP5a shall be greater than or equal to the value of ERL (min.) specified in Table 163-7.
***

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment refers to the following presentation:
http://www.ieee802.org/3/ck/public/adhoc/jun10_20/wu_3ck_adhoc_01_061020.pdf

Change the sentence to: "Receiver ERL at TP5a shall be greater than or equal to ERL (min) specified in Table 163-7."

Cl **163** *SC* **163.9.2.3** *P* **181** *L* **53** # 156

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *RITT*

The Rx test channel is calculated excluding the Rx device package model, and with a transition time filter with Tr=TBD. In 802.3cd this Tr was based on measurement at TP0, which may be after a package of a compliant device (this may be more representative than an instrument-grade transmitter).

The measured transition time at TP0 does not represent all the signal integrity effects of 100G packaged devices and test fixtures. Omitting a package model altogether and using only the transition time filter and ideal termination would not model internal reflections or reflection of signal returning from the test channel. This would lead to an optimistic COM result which may require addition of noise.

If the signal source does include a package or any other discontinuity then in practice there will be reflections and the signal will be worse than what COM (without package) predicts, resulting in overstressed test.

In the test method of annex 93C, this issue has been addressed by the statement "… the transmitter package model is included only if a compliant transmitter with a similar termination is used. If a transmitter with high quality termination is used... the termination is modeled as ideal and a Gaussian low pass filter is added". But later KR clauses (starting at 111) removed this condition and required using only a transition time filter, with value calculated from a measurement at TP0a. This may not be justifiable anymore with 100G devices.

If the signal source used in a test is a device which has known internal discontinuities modeled as s-parameters (e.g. from extraction, s-parameter measurement, or calculation from measured Tx output) then these s-parameters should be included in the calculated test channel.

SuggestedRemedy

Replace item d with the following:

d) In the calculation of COM (list item 7 in 93A.2), if the transmitter is a device with known s-parameters and transition time, these parameters should be used instead of the transmitter package model in 93A.1.2. If the transmitter is a packaged device with unknown parameters, then the package model in 93A.1.2 is used, with zp of test 1 in Table 163–10 and Tr as specified in 163.10. If a calibrated instrument-grade transmitter is used, the transmitter termination is modeled as ideal and a Gaussian low pass filter is added as defined in 93A.2.

Similar changes may also be required for clause 162 and annex 120F, with possible modifications as necessary.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #38 discusses the same topic.

Change bullet d) to:
d) In the calculation of COM, if the transmitter is a device with known sparameters and transition time Tr, these parameters should be used
instead of the transmitter package model in 93A.1.2. If a calibrated instrument-grade transmitter is used, The transmitter device package model S(tp) is omitted from Equation (93A–3) in the calculation of COM. The filtered voltage transfer function H(k)(f) calculated in Equation (93A–19) uses the filter Ht(f) defined by Equation (93A–46), where Tr is calculated as Tr = 1.09*Trm-4.32 ps and Trm is the measured 20% to 80% transition time of the signal at TP0a. Trm is measured using the method in 120E.3.1.5. Trm is measured with transmitter equalizer turned off.Apply the change to 120F.

Cl **163** *SC* **163.9.2.3** *P* **181** *L* **53** # 38

Ben Artsi, Liav Marvell Technology

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

Stating that the transmitter device package model S(tp) is omitted from Equation (93A–3) in the calculation of COM practically penalizes cases which use "golden device" as the transmitter for interference tolerance testing

SuggestedRemedy

Change the sentence to:
"It is the test implementor's responsibility to adjust Tx package parameters to best match the actual driver package used for testing alongside parameters which will calibrate tx waveform to match the one supplied at TP0v, orelse transmitter device package model S(tp) should be omitted from Equation (93A–3) in the calculation of COM

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **163** *SC* **163.9.2.3** *P* **182** *L* **6** # 155

Ran, Adee Intel

Comment Type **T** *Comment Status* **R** *TX SNDR Parameter*

(cross-clause)
Addressing Np in SNDR calculation for receiver interference tolerance testing, which is TBD.

The corresponding test in clause 162 sets Np to 15 UI . This value may be debated, but there seems to be no reason to have a different value here.

Note that linear fit is done with Nv=200 for the vf measurement. A smaller number can create lower SNDR, by converting the tail of the pulse to noise. Using this SNDR as SNR_TX, lower SNR_TX results in lower COM, so less noise should be injected to reach the COM target. This may favor the DUT in the RITT measurement.

Also applies in 120F.3.2.3.

SuggestedRemedy

Change TBD to 15 in both places.

Response *Response Status* **C**

REJECT.

[Editor's note: Changed page from 181.]

There is no consensus to make a change at this time.

Cl **163** *SC* **163.9.2.3** *P* **182** *L* **26** # 186

Sekel, Steve Keysight Technologies

Comment Type **TR** *Comment Status* **D** *withdrawn*

(same problem as in equation 162-8 described above)
The swtich from J4u to J3u in equation 163-3 results in the math failing (SQRT of negative result) with some of the legal values of parameters in the test setup. Refer to calvin_0ck1a_0612

SuggestedRemedy

Either change back to using J4u for this parameter, or add a limit to the term under the square root to be >= 0.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **163** *SC* **163.9.2.4** *P* **183** *L* **23** # 11033

Ben Artsi, Liav Marvell

Comment Type **T** *Comment Status* **A** *jitter tolerance [CC]*

[Comment resubmitted from Draft 1.1. 163.9.2.4, P180, L47]

Reciever jitter tolerance test is specified at specific frequency points with no specified extrapolation between frequency points. More specifically, 5UI at 40KHz, 0.15UI at 1.33MHz 0.05UI at 4-40MHz. Tx is measured when applying high pass filter on the jitter filtering out much of the low frequency jitter of a transmitter. A transmitter may still comply with the TX specifications and have much more than 0.15UI of jitter at frequecies which reside around a few handers of Hz. Since there is no Rx jitter tolerance requirement at these frequencies: A transmitter may have relatively high jitter at low frequencies and still be compliant. The Rx may not be able to tolerate this jitter while being compliant as well. The interoperability between these specified Tx and Rx is questionable.

SuggestedRemedy

Add a sentence that the reciever is expected to meet any frequency point between the specified in table 163-9 while jitter tolerance requirement is linearly extrapolated between any consecutive specified frequency points.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE

Resolve using the response to comment #146.

Cl **163** *SC* **163.9.3** *P* **148** *L* **30** # 57

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **D**

need spec form common mode return loss.

SuggestedRemedy

Change to integrated common mode return loss so it may be used to compute the effect of common mode noise and remove reference to 92.8.3.4

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Editor's note: changed subclause from 162.9.3.]

Cl **163** *SC* **163.10** *P* **184** *L* **1** # 11039

Ben Artsi, Liav Marvell

Comment Type **T** *Comment Status* **A** *channel RLDC*

[Comment resubmitted from Draft 1.1. 163.10, P181, L26]

Differential to common mode conversion loss is not defined for a TP0 to TP5 interconnect channel characteristics

SuggestedRemedy

Specify that the differential to common mode conversion loss of TP0 to TP5 shall be [TBD] and correlated to the capability defined in 162.11.5 when measured with an MCB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add differential to common mode conversion loss of TP0 to TP5 with the specification TBD.

Cl **163** *SC* **163.10** *P* **184** *L* **4** # 53

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **A** *package parameter*

Much work has been done on 100G package model. Parameters in table 163-10 were based on package transmission line losses different the specified in table 93A-3. The table 93A-3 values were suggested in benartsi_3ck_adhoc_01_121218 and benartsi_3ck_01_0119.

SuggestedRemedy

Add line: The package transmission line, s^(l)(f), uses table 93A-3 but replaces values for a_1 and a_2 with 0.0009909 and 0.0002772 respectively.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy with editorial license.

Cl **163** *SC* **163.10** *P* **184** *L* **14** # 206

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *COM parameter*

COM receiver reference model does not excite common mode and model is fully symmetrical between P/N. Unless COM reference model has common mode excitation only differential aspect of the S4P exercised.

SuggestedRemedy

Non-idealities in COM can be introduced by following:
-Termination mismatch P/N 3%
- Package P +/- 10%
-Package N +/- 10%
But the total RLM should still be 95%.

Response *Response Status* **C**

REJECT

COM mode impairment is indeed not fully considered in COM. However the suggested remedy does not provide clear information to implement.

There is no consensus to implement the suggested remedy at this time. More empirical evidence and consensus building is required.

Cl **163** *SC* **163.10** *P* **185** *L* **33** # 262

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *COM parameter*

The analysis that led to the equalizer length choice needs to be revisited with the new COM.

SuggestedRemedy

If there is a significant improvement with the latest COM, remove positions 25-40 and define positions 13-24 as the tail, with 2 or 3 floating groups of 3 taps and an RSS limit.

Response *Response Status* **C**

REJECT

This comment does not provide sufficient evidence the suggested remedy will not disqualify channels the task force has agreed to pass.

Cl **163** *SC* **163.10** *P* **185** *L* **34** # 263

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *COM parameter*

The spec allows a channel to have its COM calculated with 9 taps in the range 13 to 24 clipped at +/-0.05 - which means that the channel's pulse response could be a little worse than +/-0.05 for these taps. That's a very bad channel! We don't need to provide all the receiver power and complexity to cope with it.

SuggestedRemedy

Use another DFE root-sum-of-squares limit for positions 13-24.

Response *Response Status* **C**

REJECT

The suggested remedy does not provide clear information to implement. Sufficient evidence has not been provided to justify the proposed change. More empirical evidence and consensus building is required.

Cl **163** *SC* **163.10** *P* **185** *L* **36** # 264

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *COM parameter*

As the effect of exceeding the DFE floating tap tail root-sum-of-squares limit increases parabolically as the channel exceeds the limit, the limit must be set a little lower than the worst channel we wish to allow to have an effect at the right point. OAch4 with COM 2.75 gave an unconstrained RSS_tail of 0.022. Setting the limit 0.01 lower than that might affect its COM by 0.1 dB (vs. no limit) which seems like a gentle effect. However, it seems that the latest COM gives a more optimistic result anyway; this channel may not need the tail taps at all.

SuggestedRemedy

If there is no improvement with the latest COM, change the DFE floating tap tail root-sum-of-squares limit to 0.012.
If there is a small improvement with the latest COM, further reduce the limit accordingly.
If there is a significant improvement with the latest COM, remove taps 25-40 and apply a tail tap RSS limit to positions 13-24.

Response *Response Status* **C**

REJECT

The simulations to make the determinations in the suggested remedy are not available.

There is no consensus to implement the suggested remedy at this time. More empirical evidence and consensus building is required.

Cl **163** *SC* **163.13.4.3** *P* **192** *L* **13** # 158

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

Wrong cross-reference.

SuggestedRemedy

Change 120D.3.1.4 (external reference) to 162.9.3.1.2 (internal reference).

Response *Response Status* **C**

ACCEPT.