Cl **120G** *SC* **120G.3.3.3** *P* **244** *L* **45** # 28

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *host input jitter*

Reports of high VEC measurements were reported in calvin_3ck_02_1020 suggest 50 nUI of Sj is a strong factor. The value of Sj seems to be inherited from older specification. Hence there does not seem to be a tie between Tx jitter measured and Rx jitter injected.

SuggestedRemedy

Based on extrapolation from J3u in 162 and 163 add to table 120G-6
Jitter (max)
Jrms = 0.23 UI refer to 120F.3.1.3
J4u = 0.129 UI refer to 120F.3.1.3
Even-odd jitter, pk-pk = 0.023 UI refer to 120F.3.1.3

Response *Response Status* **U**

REJECT.
[Editor's note: Change subclause, page, and line from 120G.3.3/243/24 to 120G.3.3.3/244/45.]
The commenter intended to refer to Table 120G-8 "Host stressed input parameters". Including these jitter parameters to Table 120G-8 could be interpreted as being the intended end result of the calibration rather than a starting point per the methodology that references these parameters.
The comment does not provide sufficient evidence for the suggested changes.

Cl **120G** *SC* **120G.3.4.1** *P* **247** *L* **43** # 29

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *module input jitter*

Reports of high VEC measurements were reported in calvin_3ck_02_1020 suggest 50 nUI of Sj is a strong factor. The value of Sj seems to be inherited from older specification. Hence there does not seem to be a tie between Tx jitter measured and Rx jitter injected.

SuggestedRemedy

Based on extrapolation from J3u in 162 and 163 add to table 120G-10
Jitter (max)
Jrms = 0.23 UI refer to 120F.3.1.3
J4u = 0.129 UI refer to 120F.3.1.3
Even-odd jitter, pk-pk = 0.023 UI refer to 120F.3.1.3

Response *Response Status* **U**

REJECT.
[Editor's note: Changed subclause from 120G.3.2 to 120G.3.4.1 and line from 21 to 43]
The commenter intended to refer to Table 120G-11 "Module stressed input parameters". Including these jitter parameters to Table 120G-1 could be interpreted as being the intended end result of the calibration rather than a starting point per the methodology that references these parameters.

Cl **120G** *SC* **120G.3.3.3.1** *P* **245** *L* **49** # 30

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *host input jitter*

There is more than a few dB VEC difference between simulations using the COM computation script using 0.025 UI of Add and measurements using 50 mUI of Sj for a 16 dB channel. The measured VEC with 50 mUI of Sj approaches 15.7 dB,
The actual jitter injected during the a receiver compliance test may introduce a degree of instrument and test set up jitter uncertainty or amplification at the receiver test point.

SuggestedRemedy

Change p245 line 49
Random jitter and bounded uncorrelated jitter are added such that the output of the pattern generator approximates the output jitter profile given by maximum JRMS and maximum J4u, and complies with the even-odd jitter specification, in Table 120F–1.
To
Random jitter and bounded uncorrelated jitter are added such that the input to the host approximates the output jitter profile given by maximum JRMS and maximum J4u, and complies with the even-odd jitter specification, in Table 120G-6.
Other solutions are possible like lowering injected Sj to 20 mUI.

Response *Response Status* **U**

REJECT.
The intent of this comment is to update the text relating to the parameters proposed in comment #28.
Resolve using the response to comment #28.

Cl **120G** *SC* **120G.3.4.1.1** *P* **248** *L* **12** # 31

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **R** *module input jitter*

There is more than a few dB VEC difference between simulations using the COM computation script using 0.025 UI of Add and measurements using 50 mUI of Sj for a 16 dB channel. The measured VEC with 50 mUI of Sj approaches 15.7 dB.
The actual jitter injected during the a receiver compliance test may introduce a degree of instrument and test set up jitter uncertainty or amplification at the receiver test point.

SuggestedRemedy

Change p245 line 49
Random jitter and bounded uncorrelated jitter are added such that the output of the pattern generator approximates the output jitter profile given by maximum JRMS and maximum J4u, and complies with the even-odd jitter specification, in Table 120F–1.
To
Random jitter and bounded uncorrelated jitter are added such that the input to the host approximates the output jitter profile given by maximum JRMS and maximum J4u, and complies with the even-odd jitter specification, in Table 120G-10.
Other solutions are possible like lowering injected Sj to 20 mUI.

Response *Response Status* **U**

REJECT.
The intent of this comment is to update the text relating to the parameters proposed in comment #29.
Resolve using the response to comment #29.

Cl **162** *SC* **162.9.3.4** *P* **158** *L* **39** # 32

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *EOJ CRU BW*

"Meeting even-odd jitter requriement with only one CRU bandwidth is sufficient" is not clear

SuggestedRemedy

What is the intention of only one CRU bandwidth, please make it clear.

Response *Response Status* **U**

REJECT.

The suggested remedy does not provide sufficient detail to implement.

There was some agreement that further clarification would be helpful. However, complete proposal is required.

Cl **120G** *SC* **120G.3.2** *P* **240** *L* **10** # 34

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *TP4 EH*

Given that now we have AUI-S/L far end eye would be AUI-S min eye opening

SuggestedRemedy

The eye opening with 50 mUI rectangular window for AUI-L is VEO=11 mV, see ghiasi_3ck_01_0121

Response *Response Status* **U**

REJECT.

Slide 9 of the following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ghiasi_3ck_adhoc_01a_042121.pdf

There was no consensus to make the proposed changes.

[Editor's note: Changed page/line from 164/13 to 240/10.]

Cl **162** *SC* **162.9.4.4.2** *P* **164** *L* **25** # 35

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **ER** *Comment Status* **R** *jitter tolerance*

Receiver jitter tolerance test point B to F test frequencies are ~2.5x but test point A and B are a decade apart

SuggestedRemedy

Please add additional test frequency between A and B at 133 KHz with amplitude of 1.5 UI

Response *Response Status* **U**

REJECT.
The comment does not provide sufficient justification to support the suggested remedy.

[Editor's note: Changed page from 234 to 164.]

Cl **162** *SC* **162.11.7.2** *P* **174** *L* **8** # 36

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *MDI nomenclature (bucket1)*

Table 162-20 should be updated with MDI supporting 112G

SuggestedRemedy

Please replace SFP+ with SFP112
SFP-DD with SFP-DD112
QSFP+ with QSFP112

Response *Response Status* **U**

REJECT.
Resolve using the response to comment #45.
[Editor's note: CC: 162, 162C]

Cl **163** *SC* **163.10.7** *P* **198** *L* **31** # 37

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *AC coupling*

Given that we have increased Baudrate it is logical to increase 3 dB cutoff by factor 2

SuggestedRemedy

Please increase 3 dB cutoff from 50 KHz to 100 KHz given that this standard is operating at 2x Baudrate of 802.3cd. It is well understood that if one needs to support 50G PAM4 then DC block corner frequency will be 50 KHz, but keeping 50 KHz for 100G PAM4 it just will force 200G gets force to 50 KHz assuming one generation support

Response *Response Status* **U**

REJECT.
There is insufficient justification that the suggested remedy does not degrade performance.
[Editor's note: CC: 162, 163]

Cl **162** *SC* **162.11** *P* **165** *L* **43** # 38

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *AC coupling*

Given that we have increased Baudrate it is logical to increase 3 dB cutoff by factor 2

SuggestedRemedy

Please increase 3 dB cutoff from 50 KHz to 100 KHz given that this standard is operating at 2x Baudrate of 802.3cd. It is well understood that if one needs to support 50G PAM4 then DC block corner frequency will be 50 KHz, but keeping 50 KHz for 100G PAM4 it just will force 200G gets force to 50 KHz assuming one generation support

Response *Response Status* **U**

REJECT.
The AC-coupling specification is used throughout 802.3ck and applied to predictive models as well as implemented in 802.3cd cable assemblies. The comment does not provide sufficient justification to support proposed change.
[Editor's note: CC: 162, 163]

Cl **120G** *SC* **120G.3.1** *P* **237** *L* **17** # 39

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *TP1 EH/VEC*

VEC limit of 12 dB and VEO limit of 10 mV results in well constructed host to fail, this was not the case prior to adding timing window of +/-50 mUI.

SuggestedRemedy

The agreement was not to shift the burden for host or module when we defined new values for VEC and VEO based on timing window ts=+/- 50 mUI. Unfortuntatly the VEC and VEO limits result in host that passed now will fail.
Propose new limits for VEO=8 mV and VEC=13.5 dB and see ghiasi_3ck_01_0421

Response *Response Status* **U**

REJECT.

Slide 3 to 9 of the following presentation were reviewed by the task force:
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ghiasi_3ck_adhoc_01a_042121.pdf

There is no consensus to change the VEC (max) or EH (min) values.

Cl **120G** *SC* **120G.3.2.1** *P* **240** *L* **37** # 40

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *reference (bucket3)*

Table 120G-4 defines AUI short and long but with proper reference

SuggestedRemedy

Please reference table 120G-5

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Short and long modes are defined in the first paragraph of 120G.3.2.1. Table 120G-5 provides parameters for the measurement of EH and VEC at the module output when configured for short or long mode. However, the reference to 120G.3.2.2 should be a reference to 120G.3.2.2.1.

Change "see 120G.3.2.2" to "see 120G.3.2.2.1".

Cl **120G** *SC* **120G.3.4.1** *P* **247** *L* **17** # 42

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *TP4a SIT EH/VEC*

VEC limit of 12 dB and VEO limit of 10 mV results in well constructed host to fail, this was not the case prior to adding timing window of +/-50 mUI.

SuggestedRemedy

The agreement was not to shift the burden for host or module when we defined new values for VEC and VEO based on timing window ts=+/- 50 mUI. Unfortuntatly the VEC and VEO limits result in host that passed now will fail.
Propose new limits for VEO=8 mV and VEC=13.25 to 13.75 dB and see ghiasi_3ck_01_0421

Response *Response Status* **U**

REJECT.
[Editor's note: Changed page from 233 to 247 and subclause from 120G.3.1.5 to 120G.3.4.1]

Comment #39 proposed complementary changes to host output EH and VEC. However, the proposal in comment #39 was not adopted so no changes to the module input EH and VEC should be made.

See comment #39.

Cl **162C** *SC* **162C.1** *P* **277** *L* **20** # 45

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *MDI nomenclature (bucket1)*

Table 162C-1 should be updated with MDI supporting 112G

SuggestedRemedy

Please replace SFP+ with SFP112
SFP-DD with SFP-DD112
QSFP+ with QSFP112

Response *Response Status* **U**

REJECT.
MDI names align with 1.3 normative references in 802.3ck and the base standard.

Cl **120G** *SC* **120G.5.2** *P* **253** *L* **27** # 47

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *EH/VEC method*

The new C2M test procedure no longer require eye opening measurement with introduction of timing window tx=+/- 50 mUI, given the amount f change it will be very confusing for the reader to follow the procedure!

SuggestedRemedy

Please include a figure and full procedure in CL120G instead of referencing 120E

Response *Response Status* **U**

REJECT.
The methodology in this subclause leverages the methodology already documented in 802.3-2018 Annex 120E. There are only a small number of clear exceptions. Replicating the entire methodology is not warranted. Also, it is helpful to refer to existing test methodology familiar to test implementers. The relationship between TCmid (in Figure 120E-13) and t_s can be easily inferred from the exception {the CDF of the signal voltage is accumulated over the time interval ts ± 0.05 UI instead of “within 0.025 UI of time Tcmid"}.

Cl **162B** *SC* **162B.1.3.1** *P* **269** *L* **36** # 88

Tracy, Nathan — TE Connectivity

Comment Type **TR** *Comment Status* **A** *MTF FOMILD*

FOM_ILD limit of 0.13 dBdoes not allow for manufacturing variations of mated test boards

SuggestedRemedy

change limit to 0.18dB

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed subclause from 162B.1.3 to 162B.1.3.1.]
Resolve using the response to comment #142.

Cl **120G** *SC* **120G.3.3.3.1** *P* **245** *L* **42** # 121

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **R** *TP4 SIT CM noise*

The host stressed eye does not include any common-mode noise, even though a module output is allowed to have some common-mode AC content.

In a real system, the common-mode AC content of the module can be converted to differential noise at the host's receiver, via the S21DC of the host input channel, which is not specified at all. This will not be detected in the host test without common-mode content, and may not be addressed in host channel design - but it can cause compliant hosts to fail with real modules.

The common mode noise stress should be a sinusoid at any frequency up to the Nyquist frequency, and should be calibrated at TP4 to have the RMS value allowed for the module output in Table 120G–3.

SuggestedRemedy

In another comment I am suggesting to add a wideband noise source to the diagram in Figure 120G–9, between the pattern generator and the HCB.

If the other comment is accepted, an addition for this comment would be to make the noise source also have a common mode component. otherwise, add a common mode noise source in the same location instead.

Add the necessary text for calibrating the common mode output at TP4.

Editorial license is suggested, but if necessary for accepting the comment I can provide candidate text before comment resolution.

Response *Response Status* **U**

REJECT.

Resolve in conjunction with comment #124.

The suggested remedy does not provide sufficient detail to implement. A detailed proposal justifying the nature of the stress signal and details how to generate and apply it are required.

Further work on this subject and a consensus proposal are encouraged.

Cl **120G** *SC* **120G.3.4.1.1** *P* **248** *L* **1** # 123

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **R** *TP2 additive noise*

In the module input stressed eye calibration procedure, "The stressed signal is generated by adding sinusoidal jitter, random jitter, and bounded uncorrelated jitter to a clean pattern, followed by frequency-dependent attenuation".

This signal does not necessarily represent a real host output, in which the EH and VEC can also be affected by additive noise (which is quite different from jitter in its effect on a receiver). Stressing the module with a high level of bounded uncorrelated jitter (which is not fully specified, and may create different stress for different DUTs) does not test its ability to operate with a noisy host.

Note that in a host transmitter it is often easier to control clock jitter than to reduce additive noise coupling from multiple sources in an ASIC.

Adjusting the VEC using additive noise, as done in the CR/KR/C2C tolerance tests, should at least be allowed instead of using "bounded uncorrelated jitter"; it may be preferable in some setups. For the time being, it is suggested as an alternative.

SuggestedRemedy

Add a wideband noise source to the diagram in Figure 120G–10, between the pattern generator and the frequency-dependent attenuator.

Add a description of the noise source to the text, with reference to 93C.1 (where noise source specification is defined) and setting f_NSD1 to 1 GHz, as in 163.9.3.4.

Add that calibrating the noise source level is an alternative method to adding BUJ for calibrating the EH and VEC.

Editorial license is suggested, but if necessary for accepting the comment I can provide candidate text before comment resolution.

Response *Response Status* **U**

REJECT.
Resolve using the response to comment #119.

Cl **120G** *SC* **120G.3.4.1.1** *P* **248** *L* **1** # 124

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **R** *TP2 SIT CM noise*

The module stressed eye does not include any common-mode noise, even though a host output is allowed to have some common-mode AC content.

In a real system, the common-mode AC content of the host can degrade the module's (electrical) receiver performance, via the module's allowed termination mismatch or by circuit sensitivity. This will not be detected in the module test without common-mode content, and may not be addressed in design - but it can cause compliant modules to fail with real hosts.

For uncorrelated common mode noise, a sinusoidal source should be used. However, for the host output it is likely that common-mode content is generated by conversion from a differential signal and is therefore correlated to it. In this test, it is suggested that p/n skew is the preferred way to create the allowed common-mode RMS level.

SuggestedRemedy

In another comment I am suggesting to add a wideband noise source to the diagram in Figure 120G–10, between the pattern generator and the frequency-dependent attenuator.

For adding correlated common-mode noise, a skew between the p and n components of the frequency-dependent attenuator should be added and calibrated to create the allowed common-mode RMS level. Alternatively, a sinusoidal common-mode signal can be added, at any frequency up to the Nyquist frequency.

Add the necessary text for calibrating the common mode output at TP1a.

Editorial license is suggested, but if necessary for accepting the comment I can provide candidate text before comment resolution.

Response *Response Status* **U**

REJECT.
Resolve using the response to comment #121.

Cl **162B** *SC* **162B.1.3.1** *P* **269** *L* **36** # 142

Champion, Bruce TE Connectivity

Comment Type **TR** *Comment Status* **A** *MTF FOMILD*

FOM_ILD is set at 0.13 dB and is too stringent for the various form factors and MTF manufacturing variation

SuggestedRemedy

It is recommended to update this value to 0.18 dB

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

The following presentations were reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/champion_3ck_01_0521.pdf
https://www.ieee802.org/3/ck/public/adhoc/jan13_21/kocsis_3ck_adhoc_01_011321.pdf (slides 11)
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ghiasi_3ck_adhoc_01a_042121.pdf (slides 7 and 10)

Several comments propose changes in FOMILD from 0.13 dB to:
#142 0.18 dB (see champion_3ck_01_0521)
#48 0.075 dB (see ghiasi_3ck_adhoc_01a_042121)
#218 0.18 dB (see kocsis_3ck_adhoc_01_011321)
#88 0.18 dB

Per strawpolls #12 to #15 there is consensus to change MTF FOMILD (max) to 0.15 dB.

Change MTF FOMILD (max) to 0.15 dB.

Strawpoll #12 (chicago rules)
Strawpoll #13 (pick one)
I would support changing MTF FOMILD (max) as follows:
A: leave as 0.13 dB
B: change to 0.14 dB
C: change to 0.15 dB
D: change to 0.18 dB
Strawpoll #12 (chicago rules)
A: 18 B: 12 C: 20 D: 13
Strawpoll #13 (pick one)
A: 10 B: 5 C: 11 D: 10

Strawpoll #14 (decision)
I support increasing MTF FOMILD (max) from 0.13 dB:
Yes: 16
No: 14

Strawpoll #15 (decision)
I support changing MTF FOMILD (max) to:

A: 0.15 dB
B: 0.18 dB
A: 25 B: 10

Cl **162** *SC* **162.9.3** *P* **154** *L* **21** # 166

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *CR port type*

The draft loss budget wastes over 3 dB in nearly every case.
The recommended maximum insertion loss allocation for the host traces plus BGA footprint and host connector footprint, of 6.875 dB, compares very poorly with C2M's host insertion loss up to 11.9 dB, making passive copper expensive and unattractive for a switch, while a full range of NICs can be made within only 3.75 dB. Server-switch links will get made with an asymmetric loss budget, so it would be better for the standard to regularise what will happen anyway. By the way, many server-switch links will be asymmetric anyway (different form factors at server and switch ends), and that's already allowed in this draft.
This change would also benefit CR switch-switch links because the shortest ports would get credit for their low loss.

SuggestedRemedy

As we have done for C2M, create two kinds of CR ports. Host loss allocations of 3.75 dB and 10 dB. Short can connect to short or long with same cable as today; long to long is not supported. Add entries in Clause 73 Auto-Negotiation to advertise short and long to the other end.
In Table 162-10, provide separate limits for Linear fit pulse peak (min).
In Table 162-14, provide separate rows for Test channel insertion loss: for testing the short host input the values for Test 2 are 10-6.875 = 3.125 dB higher (26.75 dB and 27.75 dB), while for the long host input the values for Test 2 are 6.875-3.75 = 3.125 dB lower (20.5 dB and 21.5 dB). No change needed for Test 1.
In 162A.4, provide two equations for each of IL_PCBmax and for ILHostMax and show them in Fig 162A-1 and 2. In 162A.5, provide two Value columns in Table 162A-1. Adjust figures 162A-3 and 4.

For discussion: should a "long" cable, 19.75+2*(6.875-3.75) = 19.75+6.25 = 26 dB max (maybe 3 m) be defined? A CR link could have no more than one of the three host, cable, and host being "long".

We could choose other names than "short" and "long" for the ports, possibly "short" and "medium" (as a C2M host can be "longer"), or A and B, somewhat like USB.

In 162.11.7.1.1, zp, representing the extra loss a host has above an MCB, could be made asymmetric but I believe that would not bring an improvement in accuracy.
There could be a third kind of CR port with 6.875 dB but this would not be useful for server-switch links, would be useful for only a subset of switch-switch links, for which passive copper is a subset anyway, so it doesn't seem worthwhile.

Response *Response Status* **U**

REJECT.

The following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/adhoc/apr28_21/dawe_3ck_adhoc_01_042821.pdf

The suggested remedy would require two or three different CR port types.

The assymetric-port approach was discussed early in this project.
Straw Poll #1 from the July 2018 Task Force meeting indicated strongest support for the current specification.
https://www.ieee802.org/3/ck/public/18_07/minutes_3ck_0718_approved.pdf

Based on discussion and straw poll 6 and 7, there is interest in exploring this proposal further. However, the proposal is not sufficiently complete at this time. A complete proposal and consensus is required.

Straw poll #6 (direction, chicago rule)
Straw poll #7 (direction, pick one)
I would support a new pair of CR port types with reduced host insertion loss limit on one end (e.g., NIC) and increased host loss limit on the other end (e.g., switch) similar to slide 7 of dawe_3ck_adhoc_01_042821.

Strawpoll #6
A: Yes 27
B: No 13
C: Need more information 29
D: Abstain 7

Straw poll #7
A: Yes 22
B: No 11
C: Need more information 11
D: Abstain 6

Cl **120G** *SC* **120G.3.2** *P* **240** *L* **9** # 171

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *TP3 EH*

For a reasonably clean module (or test equipment in a host stressed eye test), the driver swing has to be aggressively reduced to deliver only 15 mV at near end, short mode. 120E has 70 mV, and the previous draft had 24 mV. Yet a host designer knows whether the host wants the short or long setting, and can usefully optimise for e.g. different crosstalk or noise or BER if given a reasonable signal strength. There is room to increase this weak signal without overloading the receiver.

SuggestedRemedy

Increase the eye height, short mode, from 15 mV to 18 mV

Response *Response Status* **U**

REJECT.

The resolution of comments #187 and #206 result in the differential peak-to-peak output voltage (max) value reduced from 900 mV to 600 mV for the short mode. There was no consensus to make the proposed change for this comment.

Cl **120G** *SC* **120G.3.1.2** *P* **238** *L* **41** # 174

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **A** *TP1 ERL Tfx*

This fixed time value of time-gated propagation delay Tfx is unworkable because the HCB is defined by its loss not its transit time. While HCBs for connectors with few lanes such as SFP+ may be constructed from PCB, those for connectors with many lanes such as QSFP-DD are challenged by fanout and therefore may use a cabled construction with the same loss and a much greater delay than a PCB. The discontinuity at cable-PCB interface should be windowed out just like the coax connector, but would reasonably be much more than 0.2/2 ns (or ~20 mm?) from the coax connector. The HCB transit time is known well enough, just as its loss is, so we can use that in the windowing. Notice that in 163 and 120F, "The value of Tfx is twice the delay from TP5v to TP5", so it's known there.

SuggestedRemedy

Change 0.2 ns to twice 0.8 times the delay between the test fixture test connector and the near side of the test fixture host-facing connector on the HCB. Make a similar change in 162.9.3.5 (HCB for CR). Although there may be less pressure to use a cabled technique for MCBs, for consistency, make similar changes in 120G.3.2.3 and 162.11.3 (MCB).

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

Resolve using the responses to comments #184 and #185.

Cl **162** *SC* **162.11.6** *P* **169** *L* **27** # 177

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *CA CM RL*

Relaxing the already very loose CM RL spec from 2 dB to 1.8 dB at all frequencies isn't justified. This spec becomes useless at the frequency when the MCB loss is 0.9 dB!

SuggestedRemedy

Restore it to 2 dB or use a frequency-dependent mask e.g. 1.8 + 0.01f

Response *Response Status* **U**

REJECT.

The basis for the change to the cable assmbly CM-to-CM RL spec from 2 dB to 1.8 dB was given in the following presentation.
https://www.ieee802.org/3/ck/public/21_01/champion_3ck_01a_0121.pdf

The commenter has not provided sufficient justification for the suggested remedy.

Cl **120G** *SC* **120G.5.2** *P* **252** *L* **25** # 178

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *RR CTLE*

As a lot of the channel for TP4 far-end is known exactly, one would expect that a known subset of gDC, gDC2 combinations would be the only candidates to try. As for TP1a, I believe the strongest gDC and gDC2 should add to a constant.

SuggestedRemedy

For Continuous time filter, DC gain for TP4 far-end (gDC), change to a set of limits that depend on gDC2 in the same style as for TP1a, with the strongest gDC and gDC2 adding to a constant. The allowed values should be a subset of those for TP1a.

Response *Response Status* **U**

REJECT.

The comment does not provide sufficient justification to support any changes and the suggested remedy does not provide sufficient detail to implement.

Cl **120G** *SC* **120G.5.2** *P* **252** *L* **12** # 179

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *RR CTLE*

By allowing stronger gDC with stronger gDC2, we can have up to 12 dB of peaking for gCD2 = -1 but up to 16 dB for gDC2 = -3 - yet we don't expect the maximum channel loss to vary like that.

SuggestedRemedy

For TP1a, change the second -12 to -11, and -13 to -10 (so the strongest "CTLE peaking" is 13).

Response *Response Status* **U**

REJECT.

The comment does not provide sufficient justification for the proposed change. It is not clear that the current specifications are harmful nor is there evidence that the proposed changes won't be harmful.

Cl **120G** *SC* **120G.5.2** *P* **253** *L* **23** # 180

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *EH/VEC method*

This draft has a primitive rectangular eye mask (H = either EHmin or EA/VECmax), although it is described as a histogram. It's an inefficient/inaccurate way of measuring a signal quality vertically and provides weak and uncertain protection against too much jitter. This is worse with the higher VEC limit in the latest draft that allows worse and more varied signals, and is a particular concern for very short host channels (see Mike Dudek's work) that can have faster edges than higher loss ones.

SuggestedRemedy

Change from a 4-cornered mask with corners at t = ts+/-0.05, V = k +/-H/2 to a 10-cornered mask with corners at t = ts+/-0.05, ts+/-1/16, ts+/-3/32, V = k +/-H/2, k +/-H*0.4, k. k is VCmid, VCupp or VClow.
In case it's not clear, H is either EHmin or Eye Amplitude * 10^(-VECmax/20).
This simple scalable method can remain as the EH and VEC limits are revised. Scopes have been measuring with 10-sided masks for many years, it's not more difficult than a rectangular mask.

Response *Response Status* **U**

REJECT.
The currently methodology was chosen over an eye mask method like that being proposed in this comment.
See slide 3 of the following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_01/brown_3ck_04_0121.pdf
The comment does not provide sufficient justification to support the proposed changes.

Cl **120G** *SC* **120G.5.2** *P* **252** *L* **16** # 183

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *RR CTLE*

The limits for TP4 gDC, gDC2 should not be the same for short and long output modes.

SuggestedRemedy

Create separate limits for TP4 short and long output modes.

Response *Response Status* **U**

REJECT.

The comment does not provide sufficient justification to support any changes and the suggested remedy does not provide sufficient detail to implement.

Cl **163** *SC* **163.9.2** *P* **187** *L* **45** # 189

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **R** *TX dERL (CC)*

The allowed value of dERL of -3dB allows complinat transmitters with substantially worse reflections than the reference transmitter used in COM. I expect to have a presentation showing this.

SuggestedRemedy

Change dERLmin to -1dB also for C2C in Table 120F-1

Response *Response Status* **U**

REJECT.

The following presentations were reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/dudek_3ck_01_0521.pdf
https://www.ieee802.org/3/ck/public/21_05/wu_3ck_02_0521.pdf

Based on the results of straw polls #2 and #3 there is no consensus to change the value of dERL (min).

[Editor's note: CC: 163, 120F]

Straw poll #2 pick one
Straw poll #3 chicago rules
For KR and C2C TX dERL (min) value, I support the following:
A: no change, -3 dB
B: change to -1 dB
C: need more information
A: 22 B: 11 C: 9
A: 27 B: 14 C: 26

Cl **162** *SC* **162.11.5** *P* **168** *L* **41** # 201

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **R** *CL-IL difference*

The differential to common mode conversion loss specification is very relaxed particularly at higher frequencies. As an example at 25GHz this specification is only approx 6dB more than the insertion loss. There is no specifiction for the common mode to common mode return loss of the Rx so all this common mode energy can be reflected back to the cable where through common mode to differential conversion it then becomes a differential signal interferer. Assuming this common mode to differential mode has approximately the same value as the differential to common mode conversion of approx 12.5dB this unwanted interferer is only 18.5dB below the wanted signal and will severely degrade the BER.

SuggestedRemedy

Add 10dB to this equation

Response *Response Status* **U**

REJECT.
The basis for a 10 dB tightening of the limit is not obvious in the stated comment and the correlation to the degradation of the BER is not provided.

Cl **120G** *SC* **120G.3.4.1.1** *P* **249** *L* **8** # 224

Wu, Mau-Lin MediaTek Inc.

Comment Type **TR** *Comment Status* **R** *module input SIT*

The frequency-dependent attenuation added from output of the pattern generator to TP1a is 18.2 dB, which is 16 dB channl loss with 2.2 dB for host transmitter package loss. However, 2.2 dB is too small a value for host transmitter package loss with 31 mm package trace length.

SuggestedRemedy

By leveraging what adopted in OIF CEI-112G-VSR-PAM4, propose to adopt the 19.5 dB value to replace 18.2 dB, where 3.5 dB representing host transmitter package loss is reasonable.

Response *Response Status* **U**

REJECT.

The comment does not provide sufficient evidence to make the proposed change.

Further work and a consensus proposal on this topic is encouraged.

Cl **120G** *SC* **120G.1** *P* **235** *L* **38** # 234

Dawe, Piers Nvidia

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

Up to now, the optical PMD channels have not needed a very strong DFE, and the C2M loss (10 dB for C2M CAUI-4, 10.2 for 200GAUI-4 C2M, 16 for 400GAUI-4) is low enough that CR and KR PMDs don't need a very strong DFE when used as C2M. Therefore, we never have precoding on C2M at 50G/lane - simple. At 100G/lane, links such as active copper cables will benefit from a very strong DFE in the receiver in the cable end that's receiving from a higher loss in the cable. 802.3 enables such active cables via the C2M specs; up until now there was nothing more to say, so they don't get a mention in 802.3. Adding precoding after the signal has been serialised is best avoided, so it should be added in the host, so for the first time, there is something that 802.3 should do specifically about active cables.

SuggestedRemedy

Allow optional precoding abilities in 100G/lane C2M transmitters and receivers in the host. Add MDIO registers to advertise these abilities and to enable them.

Response *Response Status* **U**

REJECT.

Precoding if used is added and removed by the PMA at each end of a physical link as necessary. Similarly, an active cable can add precoding at the transmitter at one end and remove the precoding at the other end.
Precoding must be enabled (or disabled) on both Tx and Rx in the same direction; this is coordinated using training for CR/KR or by station management for C2C. Applying precoding internally within an active cable is still possible.

There is no consensus to implement the proposed.

Cl **162** *SC* **162.11.7** *P* **171** *L* **31** # 235

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **R** *CA COM DFE*

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 all these 9 taps. That's a very bad cable! and not likely to get made. 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. Similarly in 163, but as 163 specifies the complete channel while 162 uses clean synthetic host traces, the limit might differ.

Response *Response Status* **U**

REJECT.
The suggested remedy does not provide sufficient evidence that this is an issue and that the proposed change would not cause new issues.