Cl **163A** *SC* **163A.3.1.3** *P* **308** *L* **43** # 1

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

extra closing parenthesis "Tr(ref))"

SuggestedRemedy

remove extra closing parenthesis

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.1.5** *P* **80** *L* **45** # 2

Brown, Matt Huawei

Comment Type **T** *Comment Status* **X**

In Table 80-4a, 100GAUI-1 C2C and C2M have been added to several PHY types, but the physical layer tables in the corresponding PMD clauses have not been updated.

SuggestedRemedy

Amend the 100 Gb/s physical layer tables in clauses 138 and 140 to include 100GAUI-1 C2C and C2M sublayers.

Proposed Response *Response Status* **O**

Cl **116** *SC* **116.1.4** *P* **98** *L* **18** # 3

Brown, Matt Huawei

Comment Type **T** *Comment Status* **X**

In Table 116-3, 200GAUI-2 C2C and C2M have been added to several 200 Gb/s PHY types, but the physical layer tables in the corresponding PMD clauses have not been updated.

SuggestedRemedy

Amend the 200 Gb/s physical layer tables in clauses 121 and 122 to include 200GAUI-2 C2C and C2M sublayers.

Proposed Response *Response Status* **O**

Cl **116** *SC* **116.1.4** *P* **99** *L* **18** # 4

Brown, Matt Huawei

Comment Type **T** *Comment Status* **X**

In Table 116-4, 400GAUI-4 C2C and C2M have been added to several 400 Gb/s PHY types, but the physical layer tables in the corresponding PMD clauses have not been updated.

SuggestedRemedy

Amend the 400 Gb/s physical layer tables in clauses 122, 123, 124, 138, 150, and 151 to include 400GAUI-4 C2C and C2M sublayers.

Proposed Response *Response Status* **O**

Cl **00** *SC* **0** *P* **0** *L* **0** # 5

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

802.3ck will not be incorporated into the next amendment (802.3dc) so it will be amendment to that revision.

SuggestedRemedy

Convert draft to be an amendment of new revision (802.3dc) rather than an amendment of 802.3-2018.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.3.3** *P* **172** *L* **25** # 6

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

Transition time is referred to here as "20% to 80% transition time". It is defined explicitly in 120E.3.1.5. Transition time is usually referred to elsewhere in draft as just "transition time". Align terminology.

SuggestedRemedy

Change "20% to 80% transition time" to "transition time"

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **204** *L* **39** # 7

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

Transition time is presumably per the method in 120E.3.1.5 for all instances in this subclause. Also, given that transition time is fully defined in 120E.3.1.5 and the common term used in the draft is simply "transition time", "20% to 80% transition time" should be "transition time".

SuggestedRemedy

On page 204 line 39, change "transition time" (first instance) to "transition time (see 120E.3.1.5)".
On page 204 line 45 change "20% to 80% transition time" to "transition time (see 120E.3.1.5)".
Consider adding text in one place specifying that transition time is per 120E.3.1.5 so this does not have to be repeated multiple times.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.5** *P* **252** *L* **15** # 8

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

Reference to transition time methodology.

SuggestedRemedy

Change "transition time" to "transition time (see 120G.3.1.4)".
Repeat at:
page 254, line 13
page 258, lines 43/44
page 262, lines 10/11

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4.2.2** *P* **262** *L* **26** # 9

Brown, Matt Huawei

Comment Type **T** *Comment Status* **X**

This step g) has criteria for VEC which might be interpreted as conflicting.
"The pattern generator random
... are adjusted so that ... VEC is within the limits in Table 120G–10."
"The pattern generator pre-emphasis and
reference receiver settings that minimize VEC are used."
I believe the the latter criteria was intended to specify that for each pattern generator output jitter/voltage the pre-emphasis is adjusted to minimize VEC.

SuggestedRemedy

Change: "The pattern generator pre-emphasis and reference receiver settings that minimize VEC are used."
To: "For any jitter and voltage setting, the pattern generator pre-emphasis and reference receiver settings that minimize VEC are used."

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **265** *L* **51** # 10

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

Method should start at step "a)" not "h)"

SuggestedRemedy

Reformat list to start at "a)".

Proposed Response *Response Status* **O**

Cl **162A** *SC* **162A.5** *P* **277** *L* **30** # 11

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

The acronym "IL" is often used to represent "insertion loss" in text, but is never formally introduced.

SuggestedRemedy

Either introduce it properly, e.g., "insertion loss (IL)" or expand it everywhere.

Proposed Response *Response Status* **O**

Cl **162B** *SC* **162B.1.2.1** *P* **280** *L* **41** # 12

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

Ilcatf and f should be italic.

SuggestedRemedy

Format as italic.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.B.1.3.3** *P* **283** *L* **33** # 13

Brown, Matt Huawei

Comment Type **ER** *Comment Status* **X**

Throughout 802.3cd, the terminology for insertion loss and conversion loss parameters is inconsistent. In this subclause alone two terms are used.

SuggestedRemedy

Select and use common terminology throughout the draft. A summary presentation will be provided.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.B.1.3.3** *P* **283** *L* **37** # 14

Brown, Matt Huawei

Comment Type **ER** *Comment Status* **X**

Throughout 802.3ck, the variable names used to describe insertion loss and conversion loss are inconsistent. In D2.1, the return loss variables were updated so that they were common throughout the draft. A similar convention is encouraged for IL and CL.

SuggestedRemedy

Select and use common variable names throughout the draft. A summary presentation will be provided.

Proposed Response *Response Status* **O**

Cl **162B** *SC* **162B.1.3.5** *P* **286** *L* **43** # 15

Brown, Matt Huawei

Comment Type **T** *Comment Status* **X**

Measurement method for transition times is never specified. I assume it is the same as for PMD specifications per 120E.3.1.5. To be consistent with other clauses and annexes should be "transition time" not "rise and fall timers". Given explicit methodology in 120E.3.1.5 and to be common with other clauses can delete "20% to 80%" since this is helpful but not complete.

SuggestedRemedy

With editorial license specify that the transition time is measured according to 120E.3.1.5. Throughout 162B, change "20% to 80% rise and fall times" to "transition time".

Proposed Response *Response Status* **O**

Cl **120** *SC* **120.5.1** *P* **108** *L* **46** # 16

Sun, Junqing Credo Semiconductor

Comment Type **TR** *Comment Status* **X**

SSPRQ usually causes confusion in the field to be used as receive pattern. A note in the spec will help to clarify.

SuggestedRemedy

Add "and SSPRQ" after "square wave" in the second paragraph of 120.5.1. This paragraph will be "Test patterns that are intended for transmitter testing, such as square wave for SSPRQ, may not be correctly recovered by an adjacent PMA."

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2** *P* **200** *L* **12** # 17

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

For the SNDR specification in Table 163-5, footnote d is redundant. The reference column points to 162.9.3.3 which provides the exact same information as footnote a.

SuggestedRemedy

Delete footnote a.

Proposed Response *Response Status* **O**

Cl **161** *SC* **161.5.2.8** *P* **134** *L* **3** # 18

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

To address the editor's note a simple change to 161.5.2.9 can address the main concern of D2.1 Comment #163. The terms "FEC encode" and "Reed-Solomon" encoded should be reconciled. All other references in Clause 161 to encoding are preceded by "Reed-Solomon" not "FEC". The same holds for decoder except for one instance.
Reed-Solomon encoder 3x
Reed-Solomon encoding 1x
Reed-Solomon encoded 2x
Reed-Solomon encode 2x
FEC encoded 1x
Reed-Solomon decode 1x
Reed-Solomon decoding 1x
Reed-Solomon decoder 9x
decoder 1x

SuggestedRemedy

In 161.5.2.9, change "FEC encoded" to "Reed-Solomon" encoded.
In 161.5.3.3 (page 136, line 31), change "decoder" to "Reed-Solomon decoder"

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2** *P* **200** *L* **5** # 19

Brown, Matt Huawei

Comment Type **T** *Comment Status* **X**

Table 163-5 is a normative table, but footnote c relating to transmitter waveform is a recommendation.

SuggestedRemedy

Convert footnote c to a table note (see style manual 16.4) or delete footnote c.

Proposed Response *Response Status* **O**

Cl **00** *SC* **0** *P* **0** *L* **0** # 20

Brown, Matt Huawei

Comment Type **E** *Comment Status* **X**

According to the style manual subclause 16.4, table notes should be placed as follows: "A table note should be set immediately following the table to which it belongs, enclosed within the boxed table, above the bottom border of the table."
Several table notes were added to several tables in recent drafts but not placed according to this guidance.

SuggestedRemedy

Fix the table note at the following page/line: 169/24, 179/21, 251/46, 255/25, 283/28

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.3** *P* **308** *L* **18** # 21

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **X**

A measurement filter of BT filter is already included, because the step response is derived from the pulse response h(t) that uses the BT filter.

Figure 163A-3 is not correct, because the effect of BT filter is included.

SuggestedRemedy

Remove Editor's note in page 308.

Change Figure 163A-3 as follows:
Add H_BT(f) in the same way as Figure 163A-2.
Append a block of "Equation (163A-5)" followed by "Stepresponse u(t)" at the end after "Pulse response h(t)".

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.3** *P* **308** *L* **25** # 22

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **T** *Comment Status* **X**

f_r is also a parameter specified by the clause that invokes this method but missing in the list.

SuggestedRemedy

Change "A_t and T_b" with "A_t, T_b and f_r" in page 308 line 25.
Apply the same change to page 307 line 13.

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.3** *P* **308** *L* **52** # 23

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **T** *Comment Status* **X**

There may be more than two sets of reference package parameters. Also, this should be taken from the transmitter package parameter.

SuggestedRemedy

Change "the longer package trace length" with "the longest transmitter package trace length".

Apply the same change to page 307 line 36.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.4** *P* **168** *L* **22** # 24

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **E** *Comment Status* **X**

164 on the row F10 and the column of index of last symbol is a typo.

SuggestedRemedy

Change 164 with 264.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **205** *L* **31** # 25

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **E** *Comment Status* **X**

Symbol Q3 remains in NOTE 1.

SuggestedRemedy

Change Q(Q3) with Q(Q3d).

Proposed Response *Response Status* **O**

Cl **FM** *SC* **FM** *P* **1** *L* **31** # 26

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

802.3cv is published.

SuggestedRemedy

Change "IEEE Std 802.3cv-20xx" to "IEEE Std 802.3cv-2021", here and on page 16.

Proposed Response *Response Status* **O**

Cl **161** *SC* **161.5.2.9** *P* **134** *L* **3** # 27

Ran, Adee Cisco systems

Comment Type **T** *Comment Status* **X**

The text can be made more precise to avoid possible confusion of "FEC encoded" vs. "Reed-Solomon encoded" and to clarify where the codewords come from and what is being distributed.

SuggestedRemedy

Change "Once the data has been FEC encoded, two FEC codewords" to "Once the data has been encoded per 161.5.2.8, two resulting codewords"

On line 16, change "Once the data has been Reed-Solomon encoded and interleaved, it shall be distributed" to "tx_out<1087:0> shall be distributed".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3** *P* **163** *L* **5** # 28

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

In Table 162–10 the first parameter is "Signaling rate, each (nominal)" - but the value is 53.125 ± 50 ppm so this label is incorrect (nominal is 53.125).

This label is inconsistent: in Table 163-5 it is just "Signaling rate", in Table 120F-1 and Table 120G-1 it is "Signaling rate, each lane (range)".

The "(range)" seems correct. The words "each lane" are unnecessary - all parameters in these tables are per-lane.

Make the label consistent across the similar tables.

SuggestedRemedy

Change the label to "Signaling rate (range)" in all 4 tables.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.1.1** *P* **165** *L* **5** # 29

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

Here it is stated that Np takes the value 29, but this value is only effective for calculation of SNDR. Other invocations of this procedure, for vf and vpeak, use Nv=200 instead. Nv appears several times and looks like a parameter, but it is not - it is a value that replaces Np; this is not stated anywhere.

In the remaining use of the linear fit, for calculation of the equalizer coefficients used in 162.9.3.1.3, 162.9.3.1.4, and 162.9.3.1.5, it does not matter whether 29 or 200 UI are used. So Np=29 is important only for SNDR, which is the exception.

Having two parameters instead of one parameter which takes two values is unnecessary and confusing.

SuggestedRemedy

In 162.9.3.1.1, change "Np=29" to "Np=200".

In 162.9.3.3 (Output SNDR) change "with the exception that the linear fit procedure in 162.9.3.1.1 is used" to "with the exception that the linear fit procedure in 162.9.3.1.1 is used with Np=29 instead of 200".

In 162.9.3.1.2 (Steady-state voltage and linear fit pulse peak) delete "using Nv=200".

In 163.9.2.3 (Difference steady state voltage) delete "with Nv = 200".

In 163A.3.1.1 (Steady-state voltage and pulse peak reference values) change "Nv" to "Np" (3 times).

In 163B.2 (Characteristics) delete "With Nv = 200".

With editorial license, change any remaining occurrence of Nv to Np.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.1.2** *P* **166** *L* **4** # 30

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

"The steady-state voltage vf is defined in 136.9.3.1.2, and is determined using Nv=200 and the linear fit pulse peak ratio calculated by the procedure in 162.9.3.1.1"

It is determined _from_ the linear fit pulse, and the _peak ratio_ is irrelevant here.

Also, 162.9.3.1.1 does not use the parameter Nv - it has Np which is 13. This is the subject of another comment.

SuggestedRemedy

Change this sentence to
"The steady-state voltage vf is defined in 136.9.3.1.2, and is determined from the linear fit pulse peak ratio calculated by the procedure in 162.9.3.1.1 with the exception that Np is replaced by Nv=200" or "with Np=200".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.4** *P* **168** *L* **1** # 31

Ran, Adee Cisco systems

Comment Type **ER** *Comment Status* **X**

120D.3.1.2 is not the correct reference for the pattern symbols and thresholds.

SuggestedRemedy

Change 120D.3.1.2 to Table 120D–4.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **170** *L* **39** # 32

Ran, Adee Cisco systems

Comment Type **ER** *Comment Status* **X**

The receiver specifications tables the signaling rate parameter has inconsistent name across tables. In Table 162–14 it is "Signaling rate", in Table 163–8 "Receiver signaling rate", in Table 120F–4, Table 120G–7, and Table 120G–9 "Signaling rate, each lane (range)".

The word "(range)" seems correct. The words "each lane" are unnecessary - all parameters in these tables are per-lane. Similarly "Receiver" is unnecessary.

Make the label consistent across the similar tables.

SuggestedRemedy

Change the label to "Signaling rate (range)" in all 4 tables.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.1** *P* **171** *L* **4** # 33

Ran, Adee Cisco systems

Comment Type **T** *Comment Status* **X**

"This translates to a nominal unit interval of 18.82353 ps" - even with 5 digits after the decimal, this is not the nominal unit interval but an approximation.

In fact, 4 digits (0.1 fs resolution) result in about 1 ppm error, which is sufficient for any practical purpose.

SuggestedRemedy

Change "18.82353" to "approximately 18.8235".

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.1** *P* **202** *L* **37** # 34

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

It is preferable to refer to the value in table 163-8 than to repeat it. (The NOTE can stay as it is).

SuggestedRemedy

Change "for any signaling rate in the range
53.125 GBd ± 100 ppm" to "for any signaling rate in the range specified in Table 163-8".

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **204** *L* **51** # 35

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

"with the transmitter equalizer turned off" - preferably be consistent with most other places in this draft which use the wording "set to preset 1 (no equalization)".

Also is 162.9.4.3.3 with a variation on the wording - preferably change that one too.

SuggestedRemedy

Use the term "preset 1 (no equalization)" in all places.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4.2.1** *P* **261** *L* **4** # 36

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

The test setup includes "Frequency-dependent attenuation representing the host channel" but the frequency dependence is not defined. The only requirement is given in step f of 120G.3.4.2.2 as 18.2 dB at 26.56 GHz - a single frequency. This can be implemented by a notch filter - obviously not what we intend.

The attenuator should be specified across a wide frequency range. The suggested remedy is to use a reference PCB model. Alternatively, a frequency mask can be used.

SuggestedRemedy

With editorial license, define the frequency-dependent attenuation based on the PCB model of 162.11.7.1 (as in Annex 163B) with zp=461 mm (value scaled from Annex 163B to create 18.2 dB at 26.5625).

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.1** *P* **264** *L* **31** # 37

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

This clause is referred to in Table 120G-1 and Table 120G-3 for the parameter differential PtP output voltage (max), among others.

The content is only a reference back to 120E.3.1.2: "The signal levels are as defined in 120E.3.1.2". 120E.3.1.2 does have a definition of differential signal but also states that "Unless otherwise noted, differential and common-mode signal voltages are measured with a PRBS13Q test pattern".

But PRBS13Q is not an appropriate signal for measurement of the PtP output voltage, because it has a maximum run length of 7 symbols and does not have any spectral content below 3 MHz. Much longer runs are possible in real data. Measurement with PRBS13Q over a lossy channel between the transmitter and the measurement point, without sufficient equalization, can thus yield peak-to-peak value lower than the value that real data would create.

Since there is no way to control the transmitter's swing or equalization, this may cause events of higher signal levels than the receiver expects, and cause periods of high BER, which can span many FEC symbols and cause uncorrectable codewords.

It is proposed to define the differential PtP explicitly as a requirement for any data pattern, and recommend to measure it using a pattern that contains low-frequency content, such as PRBS31Q or SSPRQ.

The definition of signal levels measurement using PRBS13Q also applies for CR/KR/C2C but in these cases the transmitter can be controlled to reduce the signal to an adequate level for the receiver, so it is less of an issue.

SuggestedRemedy

Replace the content of 120G.5.1 with the following:

"The definition of differential and common-mode signals can be found in 120E.3.1.2. The signal levels specifications for host and module outputs hold for any data pattern. It is recommended to measure differential peak to peak signal levels with PRBS31Q or SSPRQ test pattern."

Consider applying similar changes in 162, 163, and 120F, with editorial license.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **265** *L* **51** # 38

Ran, Adee Cisco systems

Comment Type **ER** *Comment Status* **X**

The list in this subclause starts at h) instead of a).

SuggestedRemedy

Change the list format to start at a).

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **266** *L* **25** # 39

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

As has been reported in calvin_3ck_adhoc_01_063021, the authors have been "unable to reliably close the calibration loop on TP1a at 12.5dB VEC with precision lab equipment" for insertion loss of 16.4 dB. This suggests that the VEC specification may be unfeasible.

Allowing a higher (worse) VEC for transmitters (host/module outputs) might pass bad receivers with very closed eyes, which will put more burden on receivers (even if the signal in stressed input test does not change, receivers will have to work with transmitters that have the same VEC due to other reasons, e.g. a "rectangular eye" closed by high noise that can't be equalized, rather than ISI).

Instead of lowering the VEC bar for transmitters, we should look at the definition of VEC and make it more suitable to the expected eye shape of good transmitters after processing with the reference receiver (this shape is not rectangular), taking into account the expected behavior of real receivers.

The calculation of VEC and EH from a CDF accumulated over ts ± 0.05 UI gives the same weight to all phases. This makes sense if the receiver's phase is distributed uniformly in this window; it supposedly makes sense it we don't know where the receiver will sample within this region and account for sampling error. But the eye is not independent of the receiver - it is shaped by the receiver's equalization, and in the reference receiver we assume a certain behavior.

A receiver is expected to optimize its equalization (CTLE+DFE or equivalent) at the sampling point ts - this is part of the measurement procedure (currently steps k and l) - which would result in the maximum vertical opening being at ts. We should assume the average sampling phase is then ts; any difference between the optimized phase and the average phase is an implementation penalty that should be covered by the minimum EH.

A real receiver's CDR does not have a uniform phase distribution around its mean; the probability of sampling at either -0.05 UI or +0.05 UI from ts is smaller than the probability of sampling closer to ts. The rare events where the sample is taken far from ts contribute less to the average BER, so they should be weighted down in the calculation of the CDFs. Having equal weights as in the current method is overly pessimistic in both EH and VEC.

It is therefore proposed to apply a weighting function to the sampled data based on the phase.

SuggestedRemedy

A detailed proposal will be provided in a presentation.

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.1** *P* **307** *L* **13** # 40

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

"Obtain the output pulse response, h(t), using Equation (93A–23) and Equation (93A–24) with H(0)(f) from Equation (163A–2), where At and Tb are specified by the clause that invokes this method"

Clause 163 and annex 120F which invoke this method do not specify At and Tb - the invoking text refers to the COM tables, which include the parameters Av and fb instead. The reader may be left wondering what At and Tb are.

This can be remedied by pointing to 93A.1.5 instead of equations (93A–23) and (93A–24). 93A.1.5 includes the equations and the definition of Tb based on fb, and At is defined as Av.

Also applies to 163A.3.1.3, P308 L23.

SuggestedRemedy

Change the quoted sentence to:

"Obtain the output pulse response, h(t), as defined in 93A.1.5, with H(0)(f) from Equation (163A–2), where Av and fb are specified by the clause that invokes this method."

Apply also in 163A.3.1.3.

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.2** *P* **309** *L* **3** # 41

Ran, Adee Cisco systems

Comment Type **ER** *Comment Status* **X**

"In this subclause, difference parameters quantify the difference between measured values and reference values, and are used to determine whether a transmitter meets the pass/fail requirements for a given parameter"

This subclause _defines_ the difference parameters. The pass/fail requirements are not in this annex.

SuggestedRemedy

Change the subclause text to
"This subclause defines the parameters that quantify the difference between measured values and reference values".

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.2.1** *P* **309** *L* **9** # 42

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

This subclause points to 162.9.3.1.2 for the definition of v_f and to 162.9.3.1.1 for the procedure, but 162.9.3.1.2 does not define the method, it refers to 136.9.3.1.2 with exception parameters, and adds normative requirements which are irrelevant for 163A. The fact that v_f and v_peak are defined with PRESET0 is unclear (it is only part of the irrelevant normative statements) and the fact that measurements are at TP0v is not mentioned at all.

In addition, while v_peak definition refers to 162.9.3.1.1 (which itself refers to 85.8.3.3.4 and 85.8.3.3.5), the definition of v_f refers to 136.9.3.1.2 which then refers to 85.8.3.3 step 3, which does not point to the actual procedure (which is in 85.8.3.3.5). These are parallel and long paths of references with exceptions, which are very unfriendly to the reader.

Also, "Measure the transmitter output steady-state voltage… and the linear fit pulse response peak voltage..." is phrased as a test procedure. But this should be just a definition of the difference parameter.

The suggested remedy is a rewrite for clarity and for clarification that preset 0 is used and the measurement is at TP0v.

SuggestedRemedy

Change the first paragraph to the following:

The measured linear fit pulse peak v_peak(meas) and steady-state voltage v_f(meas) are calculated from a linear fit pulse response p(k) obtained from measurement at TP0v with the transmit equalizer set to preset 1 (no equalization) using the method defined in 162.9.3.1.1.

v_peak(meas) is the peak value of p(k). v_f(meas) is defined by equation (163A-x).

\Sigma{i=1}{M×Nv) p(i)/M
Where p(i) and M are defined in 162.9.3.1.1 and Nv is 200.

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.2.2** *P* **309** *L* **33** # 43

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

"Measure the ERL using the method defined in 93A.5" is phrased as a test procedure. But this should be just a definition of the difference parameter.

The reference to 93A.5 should be in the definition of ERL(meas).

SuggestedRemedy

Delete the quoted sentence.

Change "ERL(meas) is the measured ERL" to "ERL(meas) is the ERL calculated from measurement as defined in 93A.5)".

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **205** *L* **30** # 44

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

"Q3d" is formatted with inconsistent roman/italic font.

SuggestedRemedy

For consistency with clause 162, use italics for all occurrences of Q3d.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **205** *L* **31** # 45

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

In NOTE 1, "Q(Q3)" should be "Q(Q3d)".

SuggestedRemedy

Change per comment.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1** *P* **250** *L* **12** # 46

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

"AC common-mode RMS output voltage (max)" specification of 17.5 mV is not feasible for high-volume, multi-port products. The common-mode output may include a component correlated to the differential output, e.g. from mode conversion on the host channel. A module receiver is expected to be quite tolerant to a correlated common-mode signal.

As suggested in ran_3ck_adhoc_20210630, there are two reasonable alternatives:
a) increase the allowed RMS voltage to 30 mV (as is allowed for the CR transmitter measured on an HCB - likely the same point - and where the common-mode concern is greater due to conversion in the cable assembly).
b) Keep the 17.5 mV specification but only for the component uncorrelated to the differential signal; use the linear fitted pulse response method (which is already referred to in 120G.5.2) to calculate the linear fitted pulse response characteristics of the common-mode output, and define the AC common-mode noise as the RSS of sigma_n and sigma_v.

Note: This comment is only about the host output; module output is more controlled and modules can be designed to have low mode conversion so the correlated component is expected to be small. Modules should not be allowed to generate 30 mV RMS, so if option a is chosen, the module output specification should not be changed.

SuggestedRemedy

Preferably implement option a in the comment.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.5** *P* **252** *L* **20** # 47

Ran, Adee Cisco systems

Comment Type **ER** *Comment Status* **X**

Figure 120G–6 should be edited to correctly show the plugging of the HCB into either the MCB or the host under test, and the locations of test points, similarly to the updated Figure 120G–9.

Similarly for Figure 120G–7 for plugging into the MCB.

SuggestedRemedy

Update the figures with editorial license.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **1** # 48

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

"Table 120G–3—Module output characteristics (at TP4)" - Parentheses are inconsistent with other similar tables (Host output in this annex, and Transmitter characteristics elsewhere).

SuggestedRemedy

Change title to "Module output characteristics at TP4"

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **20** # 49

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

footnote b says "Specification includes effects of ground offset voltage." - what does it mean?

It is unclear why the module needs a specification of DC common-mode voltage at all, given that its output is AC coupled (per 120G.1). Without AC coupling in the module, the limits given in this table are not reasonable.

SuggestedRemedy

Clarify what the quoted sentence mean, or delete it.

Consider removing the DC common mode voltage specification.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **22** # 50

Ran, Adee Cisco systems

Comment Type **ER** *Comment Status* **X**

"DC common-mode voltage (max)" - assuming this specification is not removed, it should refer to footnote b, not footnote a.

SuggestedRemedy

change footnote reference from a to b.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3** *P* **255** *L* **34** # 51

Ran, Adee Cisco systems

Comment Type **TR** *Comment Status* **X**

The host should tolerate the AC common mode output allowed for the module output. Even if this is not included in the stressed input test, this expectation should be part of the host input specification.

SuggestedRemedy

Add a row to Table 120G–7 with parameter "AC common-mode input voltage tolerance (RMS)" and value based on Table 120G–3.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.1** *P* **256** *L* **4** # 52

Ran, Adee Cisco systems

Comment Type **E** *Comment Status* **X**

It is preferable to refer to the value in table 120G-7 than to repeat it.

SuggestedRemedy

Change "for any signaling rate in the range
53.125 GBd ± 100 ppm" to "for any signaling rate in the range specified in Table 120G-7".

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **33** # 53

Ran, Adee Cisco systems

Comment Type **T** *Comment Status* **X**

Unlike the jitter levels in step c, the initial signal levels in the calibration procedure are not defined. Using inappropriately low levels can result in bad jitter measurement in step c.

To achieve good jitter measurement, the initial output levels should be as high as possible without exceeding the differential peak to peak specification.

Also applies in module stressed input test, 120G.3.4.2.2.

SuggestedRemedy

Add guidance to step a to use initial signal level as high as possible such that the differential peak-to-peak input voltage tolerance given in Table 120G–9 is not exceeded.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **36** # 54

Ran, Adee — Cisco systems

Comment Type **T** *Comment Status* **X**

The host stressed input calibration is performed with PRBS13Q and with SJ at 40 MHz (case F of table 162-16). This frequency is not coherent with the PRBS13Q cycle, so the combination of SJ and ISI can create different signal statistics depending on the alignment of the SJ cycle and the PRBS13Q cycle. This can create variability in eye metrics and may require repeated or long measurements.

If the calibration is done with an SJ whose frequency is coherent with the PRBS13Q cycle, data collection can be done with a period which has an integer number of PRBS13Q cycles and integer number of SJ cycles. This can reduce the variability of the calibration. The different frequency would not affect the test which is performed with much longer pattern anyway.

It would be preferable to use a frequency of f_b*6/8191 (approximately 38.915 MHz) instead of 40 MHz during calibration. This would enable more repeatable calibration if the data is collected from an integer multiple of 6 PRBS13Q cycles. The frequency difference should have little effect as the proposed frequency is still far out the reference CRU bandwidth.

Also applies to module stressed input calibration, 120G.3.4.2.2.

SuggestedRemedy

Change item b from "Sinusoidal jitter is applied with frequency and amplitude per case F in Table 162–16." to:

"Sinusoidal jitter is applied with a frequency of at least 38 MHz and pk-pk amplitude of 0.05 UI."

Add the following informative note after the list:
NOTE—It is recommended to use a sinusoidal jitter frequency which is coherent to the frequency of the PRBS13Q pattern, such as f_b*6/8191 where f_b is the signaling rate of the pattern generator (approximately 38.915 MHz) and calculate eye height and VEC from 6N full cycles of the sinusoidal jitter, where N is an integer.

Apply similar changes in 120G.3.4.2.2.

Implement with editorial license.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4** *P* **260** *L* **9** # 55

Ran, Adee — Cisco systems

Comment Type **TR** *Comment Status* **X**

The module should tolerate the AC common mode output allowed for the host output. Even if this is not included in the stressed input test, this expectation should be part of the module input specification.

SuggestedRemedy

Add a row to Table 120G–9 with parameter "AC common-mode input voltage tolerance (RMS)" and value based on Table 120G–1.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4.1** *P* **260** *L* **30** # 56

Ran, Adee — Cisco systems

Comment Type **E** *Comment Status* **X**

It is preferable to refer to the value in table 120G-9 than to repeat it.

SuggestedRemedy

Change "for any signaling rate in the range
53.125 GBd ± 100 ppm" to "for any signaling rate in the range specified in Table 120G-9".

Proposed Response *Response Status* **O**

Cl **162D** *SC* **162D.1** *P* **302** *L* **21** # 57

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

Table 162D-1, 162D-2, 162D-3, and 162D-4 should be updated with MDI that actually operate at 53.1 GBd, currenlty what is specified are MDIs that either operate at 10.3 GBd or 25.78 GBd

SuggestedRemedy

Please replace SFP+ with SFP112
http://sfp-dd.com
SFP-DD with SFP-DD112
http://sfp-dd.com
QSFP+ with QSFP112 for reference see
http://www.qsfp-dd.com/wp-content/uploads/2021/05/QSFP-DD-Hardware-Rev6.01.pdf

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1** *P* **250** *L* **25** # 58

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

Transition time host requesting short mode or long mode is for TP4

SuggestedRemedy

Please revert to 10 ps in draft D2.0, please move this parameter to TP4 table 120G-3

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **13** # 59

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

TP4 long VEO at max loss drops to 12 mV

SuggestedRemedy

Reduce TP4 high loss VEO=12 mV, see ghiasi_3ck_01_0721

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2.2** *P* **254** *L* **24** # 60

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **ER** *Comment Status* **X**

Figure 120G-7 could be improved with relation of module DUT, switch, and there is no need for DC blocks on the output of HCB

SuggestedRemedy

Please center MCB with HCB above and module DUT under to make it more clear that both are inserted into MCB, remove DC blocks from HCB, and improve the switch figure

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1** *P* **250** *L* **18** # 61

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

Data from Ghiasi page 7
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ghiasi_3ck_adhoc_01a_042121.pdf
and Calvin page 4
https://www.ieee802.org/3/ck/public/adhoc/jun30_21/calvin_3ck_adhoc_01_063021.pdf
indicate meeting current VEO/VEC at TP1a not feasible to meet

SuggestedRemedy

Considering that on a system all 32 ports plus lanes must meet the TP1a, the best in practice channels should have margin to pass not fail. This is an area that we need more measurement but given what we know at this point VEC should be increased to 13 dB and VEO reduced to 8.5 mV

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **12** # 62

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

TP4 VEC can be lowered from current 12 dB to 11 dB to allow additional penalty for real host channel and host ASIC

SuggestedRemedy

Reduce TP4 VEC=11 dB, see ghiasi_3ck_01_0721

Proposed Response *Response Status* **O**

Cl **162C** *SC* **162C.1** *P* **292** *L* **5** # 63

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

The pin map for Table 162C-3 is all messed up

SuggestedRemedy

I will include pin maps for all the MDI connectors in the ghiasi_3ck_02_0721

Proposed Response *Response Status* **O**

Cl **162C** *SC* **162C.1** *P* **290** *L* **20** # 64

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

Table 162C-1 should be updated with MDI that actually operate at 53.1 GBd, currenlty what is specified are MDIs that either operate at 10.3 GBd or 25.78 GBd

SuggestedRemedy

Please replace SFP+ with SFP112
http://sfp-dd.com
SFP-DD with SFP-DD112
http://sfp-dd.com
QSFP+ with QSFP112 for reference see
http://www.qsfp-dd.com/wp-content/uploads/2021/05/QSFP-DD-Hardware-Rev6.01.pdf

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.1** *P* **258** *L* **18** # 65

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **ER** *Comment Status* **X**

The figure can improve

SuggestedRemedy

Please consider following improvements:
- Make line to either stress or DUT solid and the other dotted
- The arrows in the Host under test are confusing

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.2** *P* **259** *L* **16** # 66

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

Host stress input VEC is too high and does not account for real host channel and ASIC packge and VEO can be as small as 12 mV

SuggestedRemedy

Reduce VEC=11-11.5 dB range and VEO to 12 mV, see ghiasi_3ck_01_0721

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4.2.1** *P* **261** *L* **18** # 67

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **ER** *Comment Status* **X**

The figure can improve

SuggestedRemedy

Please consider following improvements:
- Make line to either stress or DUT solid and the other dotted
- The arrows in the Host under test are confusing

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4.2.2** *P* **262** *L* **18** # 68

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **X**

Data from Ghiasi page 7
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ghiasi_3ck_adhoc_01a_042121.pdf
and Calvin page 4
https://www.ieee802.org/3/ck/public/adhoc/jun30_21/calvin_3ck_adhoc_01_063021.pdf
indicate meeting current VEO/VEC at TP1a not feasible to meet

SuggestedRemedy

This is an area that we need more measurement but given what we know at this point VEC should be increased to 13 to 13.5 dB and VEO reduced to 8.5 mV to support Lim Channels, see ghiasi_3ck_01_0721

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.5** *P* **252** *L* **28** # 69

Ben Artsi, Liav — Marvell Technology

Comment Type **E** *Comment Status* **X**

The location of TP4 label may be misleading. One may be confused to understand TP4 is located at the connector between the HCB and MCB and one may need to de-embed to get to that point

SuggestedRemedy

Take TP4 label closer to the calibration point at the output of the MCB, or change the scheme to one closer to what can be found in the OIF. In figure 120G–9 on page 258 it is clear

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2.2** *P* **254** *L* **23** # 70

Ben Artsi, Liav Marvell Technology

Comment Type **E** *Comment Status* **X**

The location of TP4 label may be misleading. One may be confused to understand TP4 is located at the connector between the HCB and MCB and one may need to de-embed to get to that point

SuggestedRemedy

Take TP4 label closer to the calibration point at the output of the MCB, or change the scheme to one closer to what can be found in the OIF. In figure 120G–9 on page 258 it is clear

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.2** *P* **259** *L* **4** # 71

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **X**

The pattern generator pre-emphasis should be optimized for the host stressed input just as it is for the module stressed input.

SuggestedRemedy

Add a sentence to the end of bullet g. "The pattern generator pre-emphasis and reference receiver settings that minimize VEC are used."

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **39** # 72

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **X**

The final values of jitter used in the test are unlikely to match these values of Jrms and J4u because crosstalk is added in step e and random jitter is adjusted in step g. It would be helpful to the reader to indicate this.

SuggestedRemedy

Add to the end of bullet c. "Note that these are initial jitter values. They will be modified by the addition of crosstalk in step e and adjustment of random jitter in step g" Add this to the end of bullet c on page 262 as well.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **204** *L* **45** # 73

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **X**

The filtered Ht(f) should be using the transition time of the signal generator, however the measured transition time might be interpreted as measured with the 40GHz 3dB bandwidth used for all Tx measurements. Also nothing is stated as to how the signal is measured at the transmitter output and what the Tx FFE is set to.

SuggestedRemedy

Change "where Tr is the same as the measured 20% to 80% transition time of the signal at the transmitter output" to "where Tr is the same as the measured transition time of the signal at the transmitter output corrected for the measurement bandwidth. The transition time is measured using the method in 120E.3.1.5 with a 40GHz 3dB bandwidth and the risetime is corrected to remove the effect of this measurement bandwidth.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3.5** *P* **204** *L* **50** # 74

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **X**

The method of measuring the transition time in 120E.3.1.5 uses a 33GHz measurement filter in the measurement which isn't appropriate for 100G PAM4 however bullet k states that the 40GHz 3dB bandwidth is used. The method in 163A.3.1.3 does not have any measurement filter. These need to be the same.

SuggestedRemedy

Change "is equal to the transmitter transition time measured at TP0v using the method in 120E.3.1.5 with the transmitter equalizer turned off." to "is equal to the transmitter transition time measured at TP0v with the transmitter equalizer turned off. The transition time is measured using the method in 120E.3.1.5 with a 40GHz 3dB bandwidth and the risetime is corrected to revmoe the effect of this measurement bandwidth.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2** *P* **199** *L* **12** # 75

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **X**

In dudek_3ck_01_0521 it was shown that with larger values of Cp it is possible to have transmitters that pass all the transmitter specifications but only provide 1.5dB COM on channels that pass the channel specifications. This was confirmed in li_3ck_adhoc_01_063021. In Li_3ck_adhoc_01_063021 it was also shown that a tightening of ERL specifications to fail these bad transmitters would also fail transmitters with varying values of Rd and other paramters that give 3.0dB COM on these same channels. Another Tx parameter is needed to fail the high Cp Tx's while still passing the Tx's with variable Rd. A presentation will be made in support of this comment.

SuggestedRemedy

Add an extra Tx specification "Residual ISI (max) value 0.027". Defined as the value of Sigma_e/Vpeak where sigma_e and Vpeak are as defined in 162.9.3.3 except that Np=11 is used instead of Np=29.

Proposed Response *Response Status* **O**

Cl **120F** *SC* **120F.3.1** *P* **232** *L* **32** # 76

Dudek, Mike Marvell

Comment Type **TR** *Comment Status* **X**

The value for SNDR is measured using the method in 162.9.3.3 which uses Np=29, however chip to chip reference receiver is only a 6 tap DFE. Transmitters with significant residual ISI beyond the length of the DFE will pass this Tx specification and will not work in the system.

SuggestedRemedy

Add an extra Tx specification "Residual ISI (max) value 0.027". Defined as the value of Sigma_e/Vpeak where sigma_e and Vpeak are as defined in 162.9.3.3 except that Np=11 is used instead of Np=29.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2** *P* **200** *L* **21** # 77

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **X**

Footnote d to table 163-5 just duplicates the information in the short section that this footnote refers to.

SuggestedRemedy

Delete the footnote.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.3** *P* **167** *L* **31** # 78

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **X**

The measurement method for SNDR in 120D.3.1.6 uses a 33MHz filter bandwidth, which would take precedence over the statement that for Transmitter electrical characteristics "A test system with a fourth-order Bessel-Thomson low-pass response with 40 GHz 3 dB bandwidth is to be used for all transmitter signal measurements, unless otherwise specified as it is "otherwise specified". This was probably not intended and there is potential ambiguity here that should be removed. However as the Rx is only expected to have approximately the Nyquist bandwidth measuring SNDR to 40GHz may be excessive and we should consider using a narrower bandwidth.

SuggestedRemedy

Add a sentence. A test system with a fourth-order Bessel-Thomson low-pass response with 40 GHz 3 dB bandwidth should be used.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.6** *P* **181** *L* **38** # 79

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **X**

As was pointed out in the unsatisfied comment # 177 against draft 2.0 the existing specification for common mode return loss limit effectively doesn't exist once the test fixture loss exceeds 0.9dB. The rejection however had a valid point that there is a potential issue up to 4GHz where the loss is low.

SuggestedRemedy

Change the limit to 1.8dB from 0 to 4GHz, 2.2-0.1*f from 4GHz to 40GHz.

Proposed Response *Response Status* **O**

Cl **120** *SC* **120.5.11.2.a** *P* **110** *L* **48** # 80

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **X**

120.5.7 should be a hot link

SuggestedRemedy

fix it

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.7.1** *P* **184** *L* **7** # 81

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **X**

93A.1.2.3, Equation 93A-13, 93A-14 and Table 162-19 should be hot links or green text.

SuggestedRemedy

fix them

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.1** *P* **149** *L* **15** # 82

Wu, Mau-Lin MediaTek Inc.

Comment Type **E** *Comment Status* **X**

The hyperlink of "Figure 162-1" is not correct. It is linked to Table 162-1.

SuggestedRemedy

Correct the hyperlink of "Figure 162-1".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3** *P* **162** *L* **12** # 83

Wu, Mau-Lin MediaTek Inc.

Comment Type **E** *Comment Status* **X**

There is no "hyperlink" to 162A.2.

SuggestedRemedy

The hyperlink ot 162A.2 shall be added in the sentence "The transmitter characteristics at TP0 are provided informatively in 162A.2."

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.2** *P* **171** *L* **12** # 84

Wu, Mau-Lin MediaTek Inc.

Comment Type **TR** *Comment Status* **X**

The peak-to-peak differential output voltage is defined in Table 162-10 footnote b, instead of "footnote a".

SuggestedRemedy

Change "Table 162-10 footnote a" to "Table 162-10 footnote b".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.4.2** *P* **175** *L* **18** # 85

Wu, Mau-Lin MediaTek Inc.

Comment Type **E** *Comment Status* **X**

The reference here is missed in D2.1. It's (see 162.9.4.3.4 in D2.0). No comments were accepted to change this in D2.0.

SuggestedRemedy

Change "(see)" to "(see 162.9.4.3.4)"

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.7.1** *P* **184** *L* **8** # 86

Wu, Mau-Lin MediaTek Inc.

Comment Type **E** *Comment Status* **X**

There is no "hyperlink" to Table 162-19.

SuggestedRemedy

Add hyperlink to Table 162-19

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.10** *P* **206** *L* **38** # 87

Wu, Mau-Lin MediaTek Inc.

Comment Type **TR** *Comment Status* **X**

Maximum AC-coupling 3 dB corner frequency shall be 50 kHz, instead of 50 Hz, based on 163.10.7

SuggestedRemedy

Change the "Unit" in Table 163-10 from "Hz" to "kHz"

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.10** *P* **206** *L* **40** # 88

Wu, Mau-Lin MediaTek Inc.

Comment Type **TR** *Comment Status* **X**

The note "a" here is specific for Cable assembly and shall be removed, due to this is KR Clause

SuggestedRemedy

Remove note a

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.1** *P* **257** *L* **31** # 89

Wu, Mau-Lin MediaTek Inc.

Comment Type **E** *Comment Status* **X**

"host reference channel" here means "reference host channel" in other places. It would be better to align with other places.

SuggestedRemedy

Change "host reference channel" to "reference host channel"

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.2** *P* **259** *L* **20** # 90

Wu, Mau-Lin MediaTek Inc.

Comment Type **TR** *Comment Status* **X**

The 'Value' for 'Crosstalk differential peak-to-peak voltage' is 870, which is without unit. Unit of voltage shall be included here as other items.

SuggestedRemedy

Change '870' to '870 mV'

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.1** *P* **307** *L* **33** # 91

Wu, Mau-Lin MediaTek Inc.

Comment Type **E** *Comment Status* **X**

For the definition of N_v here, it would be better to change it from "represents the number of symbols to include in the steady-state voltage calculation" to "represents the number of symbols to be included in the steady-state voltage calculation".

SuggestedRemedy

Change from "represents the number of symbols to include in the steady-state voltage calculation" to "represents the number of symbols to be included the steady-state voltage calculation"

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3** *P* **163** *L* **18** # 92

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

The draft CR loss budget wastes over 3 dB in nearly every case. The relative range of host losses, 6.875/2.3 = 3:1, is too small for switch layout yet not needed for NICs.
The recommendation for the host traces plus BGA footprint and host connector footprint, 6.875 dB, compares very poorly with C2M's host insertion loss up to 11.9 dB, making passive copper to this draft expensive and unattractive for a switch, yet a full range of NICs can be made with only 3.75 dB. Server-switch links are asymmetric in form factor (e.g. QSFP-DD to 2 x QSFP) and will get made with an asymmetric loss budget, so it would be better for the standard to regularise what will happen anyway. C2M already has short and long ports.
This change would also benefit CR switch-switch links because the shortest ports would get credit for their low loss.
The symmetric budget is used for some designs under way and may be useful in future for LOM, so it is kept here, and the better way added.

SuggestedRemedy

3 classes of CR ports, host loss allocations of A 10, B 6.875, C 3.75 dB. B is as D2.1.
A connects to C, B to B or C, C to A, B or C.
Use 2 bits in Clause 73 Auto-Negotiation Link codeword Base Page to advertise A, B or C to the other end. In the Priority Resolution function, an A port ignores a 100G/lane Technology Ability Field bit from an A or B port, a B port ignores a 100G/lane Technology Ability Field bit from an A port.
In Table 162-10, add limits A and C for linear fit pulse peak ratio (min). Change text in 162.9.3.1.2 to refer to the table.
In Table 162-14, add columns for Test 2 (high loss), A and C, with test channel insertion loss: A: 6.875-3.75 = 3.125 dB lower (20.5 dB to 21.5 dB), and C: 10-6.875 = 3.125 dB higher (26.75 dB to 27.75 dB). No change needed for Test 1.
In 162A.4, add equations for IL_PCBmax and ILHostMax A and B and show them in Fig 162A-1 and 2. In 162A.5, add Value columns A, C in Table 162A-1 (ILChmin and ILMaxHost differ). Adjust figures 162A-3 and 4.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11** *P* **177** *L* **29** # 93

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X**

The poor max cable loss makes CR unattractive, while all NICs and some ports on any switch have host loss going to waste. Enabling longer cables on a minority of links is needed.
In the remedy, each host knows the other host's loss class through AN and the cable's loss class from its I2C compliance code, so the situation is just like any other CR scenario, no extra management features needed in the spec for the long cable class.

SuggestedRemedy

2 classes of cable, which could be called "short" (19.75 dB, as today) and "long", 19.75+2*(6.875-3.75) = 19.75+6.25 = 26 dB max (achievable cable length 3 m). Long cables connect port types C (see another comment) at both ends, short cables connect a valid combination of A, B, C.
In 162.11.2, cable assembly insertion loss, change text to refer to Table 162-17.
In 162.11.7.1.1, add zp = 30.7 mm for the "short" cable.
In Table 162A-1, add a column for the A-short-A scenario (ILCamax differs).
Illustrate in Figure 162A-4.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.6** *P* **181** *L* **38** # 94

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

Relaxing the already very loose CM RL spec from 2 dB to 1.8 dB at all frequencies isn't justified. This draft spec becomes useless at the frequency when the MCB loss is 1.8/2 dB, which is only 8.5 GHz.

SuggestedRemedy

Use a frequency-dependent mask e.g. 1.6 + 0.01f. Similarly for Tx, Table 162-11, 162.9.3.6.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.7** *P* **183** *L* **39** # 95

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

The normalized DFE coefficient minimum limit bbmin for taps 3 to 12 is -0.03. It doesn't make sense that taps 13 to 40 could be worse, -0.05. If I have understood the data correctly, the example channels we have don't need this. (Remember, these are reference receiver limits not hard cable or channel limits anyway; a cable or channel can go beyond a tap limit if it makes up the COM another way, e.g. with acceptable crosstalk.)

SuggestedRemedy

Change bgmax 0.05 to bbgmax 0.05, bbgmax -0.03. Also in 163.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.7** *P* **183** *L* **40** # 96

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

The spec allows a cable (not even the whole 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 worse than +/-0.05 for all these 9 taps. That's a very bad cable! and not likely to get made: there won't be that many reflections in the same area. (Remember, these are reference receiver limits not hard cable limits anyway; a cable can go beyond a tap limit if it makes up the COM another way, e.g. with acceptable crosstalk.)
We don't need to provide all the receiver power and complexity to cope with unreasonably bad cables.

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 should be higher.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **11** # 97

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

The driver swing has to be aggressively reduced from 600 mV pk-pk to deliver only 15 mV at near end, short mode. 120E has 70 mV, and D1.4 had 24 mV, ghiasi_3ck_adhoc_01a_042121 shows 35 mV (before Vpkpk was reduced). Yet a host can usefully optimise for e.g. different crosstalk or noise if given a reasonable signal strength. A NIC has no high-loss ports so it can do this even if a switch won't. There is room to increase this weak signal without overloading the receiver. Also, making the limits more like reality encourages more consistent module setup across the industry.

SuggestedRemedy

Increase the eye height, short mode near end, by 1.1 dB from 15 mV to 17 mV

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2** *P* **253** *L* **11** # 98

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

If the eye height limit is the same at long near end as at long far end, there is huge margin at near end and the implementer is encouraged to optimise for far end or beyond, only limited by the NE VEC spec, while we want modules to be set up consistently, for the full range from near to far. EH is naturally larger at NE for a well set up output.

SuggestedRemedy

Increase the eye height, long mode near end, by 3 dB from 15 mV to 21 mV

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3** *P* **163** *L* **15** # 99

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X**

Now that we have established a consistent way of naming these return losses, let's make it easier for the reader to find them.

SuggestedRemedy

Please add "RLcc", "RLdc" and so on in the table rows as we do for ERL, VEC, vf and others, throughout the draft. Also in running text such as 162.9.3.6. Similarly Rpeak.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.2** *P* **251** *L* **41** # 100

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

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 may use cabled construction with the same loss and much greater delay than a PCB. The discontinuity at cable-PCB interface which is in the connector body, several inches from the coax connector and near the module connector, should be windowed out just like the coax connector itself, it's not part of the DUT. The HCB transit time is known, 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 0.3 ns to twice the delay between the test fixture test connector and the test fixture host-facing connection minus 0.2 ns, or 85% of the delay. This gives the cabled HCB designer the length of the module PCB less about 30 mm to position up to 16 coax-PCB transitions. Make a similar change in 162.9.3.5 (HCB for CR).
Make similar changes in 120G.3.2.3 and 162.11.3 (MCB).

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3** *P* **163** *L* **20** # 101

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X**

The units for a ratio should be spelled out so the reader knows which of V/V, W/W or A/A, is meant.

SuggestedRemedy

Change the long dash to V/V. This may be desirable for some other ratios also, and in 163.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.2.2.1** *P* **254** *L* **51** # 102

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

The near end and far end should be placed far enough apart so that the module implementer has little choice what emphasis to use, so that all modules are set up similarly. As short is easier than long, this means that far minus near (mm or dB) for short should be at least as much as far minus near for long. As real host channels are not exactly like the theoretical reference host channel, there should be a healthy overlap of short and long to give the host room for its implementation. D2.0's 160 mm delivered on both these criteria, D2.1's 133 mm doesn't.

SuggestedRemedy

Change 133 to 150, change 80 to 90

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **265** *L* **16** # 103

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

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, so 4 sets for TP4+, in the style of TP1a.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **265** *L* **25** # 104

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

As a lot of the channel for TP4 far-end is known exactly and the max loss to TP4 far end is less than to TP1a, the range of gDC, gDC2 combinations should be a subset of the TP1a ones. 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.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **265** *L* **12** # 105

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

When gDC2 is -2, we allow no more than -(-12-2) = 14 dB of peaking, yet when gDC2 is -3, we allow -(-13-3) = 16 dB, yet the channel loss should not be higher. This doesn't make sense.

SuggestedRemedy

For TP1a, change -12 -12 -13 to -12 -11 -10 or -12 -12 -11 (so the strongest CTLE peaking for the highest two gDC2 categories is the same).

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **266** *L* **23** # 106

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

This draft has a primitive rectangular eye mask spec with mask height = max(EHmin, EA/VECmax) and mask width = 0.1 UI, although it is described as a histogram. Measuring a diamond eye with a rectangular mask is an inefficient, inaccurate way of measuring signal quality and provides weak and uncertain protection against too much jitter. Its effective width is less than its actual because of the 1e-5 probability criterion and the inefficient shape.
De-weighting the sides of the histogram/mask would make this worse, equivalent to increasing the target BER by 10x or so. A higher VEC / smaller EH limit with the rectangular mask would allow more jittered and more varied signals, particularly for very short host channels (see Mike Dudek's work) that can have faster edges than higher loss ones. The target BER is not going to change.
We need an eye mask that's more eye shaped, so that a higher proportion of the samples are near the boundary and contribute to the measurement.

SuggestedRemedy

Change from a 4-cornered mask with corners at t = ts+/-0.05, V = y +/-H/2 to a 10-cornered mask with corners at t = ts+/-0.05, ts+/-1/16, ts+/-3/32, V = y +/-H/2, k +/-H*0.4, y. y is near VCmid, VCupp or VClow (vertically floating, as in D2.1).
H is max(EHmin, Eye Amplitude * 10^(-VECmax/20)). Eye Amplitude is AVupp, AVmid or AVlow, as in D2.1.
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 and gives better results.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.1.2** *P* **166** *L* **5** # 107

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X**

Redundantly stating normative requirements is bad practice. Table 162-10 is normative.

SuggestedRemedy

Change "The steady-state voltage shall be greater than or equal to 0.387 V and less than or equal to 0.6 V" to "The steady-state voltage shall be within the limits given in Table 162-10", "meet the requirements specified in Table 162-10", or similar.

Proposed Response *Response Status* **O**

Cl **162A** *SC* **162A.4** *P* **273** *L* **40** # 108

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X**

The recommended minimum insertion loss allocation for the transmitter or receiver differential controlled impedance PCBs, 2.3 dB, has been set the same as the 2.3 dB MCB PCB IL without evidence as to what happens with less loss. 2.3 dB is 1/3 of the maximum host trace loss (6.875 dB) which is too small a ratio to lay out a switch PCB. 92A.4 and 136A.4 use a ratio of 1/5.8 which allows more flexibility in host layout than 1/3 does. 120G has host insertion loss up to 11.9 dB (11.9/2.3 = 5.2/1, which is OK. If it wasn't wanted, the C2M max loss would not have been increased as it was).

SuggestedRemedy

Reduce the recommended minimum insertion loss allocation for the CR transmitter or receiver differential controlled impedance PCBs to whatever is justified. If the reasonable limit is a strong function of host package reflection, state whether the recommendation is for a "nominal worst" package, or what. If there is no justification, remove the recommendation.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3.4** *P* **167** *L* **47** # 109

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

Allowing 4 different ways to measure the same thing, admitting that they will give different results yet not ranking them, is too indecisive, and forces people to do all four tests in borderline cases. Worse, "lower than 4 MHz" is open-ended and introduces yet more uncertainty.

SuggestedRemedy

Pick one pattern and CRU corner as definitive, the others can be "if it passes/fails this it would have passed/failed".

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2** *P* **199** *L* **46** # 110

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X**

2 dB RLcc is very weak. We have such a lenient spec in C2M and CR because that's what front-panel connectors do; here, there is no connector in the DUT.

SuggestedRemedy

Change to 3 +0.01f dB or whatever is reasonable for an IC and package. The 0.01 can be expressed as a fraction of test fixture loss.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **170** *L* **29** # 111

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X**

The receiver specifications at TP5 are provided informatively in 162A.3: that's not what 162A.3 says.

SuggestedRemedy

The *recommended* receiver specifications at TP5 are... Also change the title of 162A.3, Receiver characteristics at TP5, to Recommended receiver characteristics at TP5.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.3.3** *P* **173** *L* **25** # 112

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

fhp is not defined.

SuggestedRemedy

Define fhp

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.3.3** *P* **173** *L* **38** # 113

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X**

"sigma_bn is the RMS broadband noise amplitude" means nothing because the text doesn't call it that.

SuggestedRemedy

Add "RMS broadband noise amplitude" to the text where sigma_bn is mentioned (step g).

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.3.4** *P* **174** *L* **8** # 114

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

These equations for spectral density mask are too obscure.

SuggestedRemedy

Add a graph

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.6** *P* **175** *L* **11** # 115

Dawe, Piers Nvidia

Comment Type **ER** *Comment Status* **X**

Don't waste the reader's time.

SuggestedRemedy

Combine the graphs for Transmitter common mode to differential return loss and Receiver differential to common-mode return loss.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.5** *P* **181** *L* **2** # 116

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X**

Follow the nomenclature we chose last round.

SuggestedRemedy

Change Conversion_loss(f) to ILcd(f), in 4 places

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.1.3** *P* **201** *L* **27** # 117

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

Test fixture common-mode to common-mode return loss should be way better than the worst module connector! And needs to be significantly better than the spec for the IC+TF.

SuggestedRemedy

Change 2 to something sensible

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1.6** *P* **225** *L* **15** # 118

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X**

The equation for b(n) is clumsy and hard to follow

SuggestedRemedy

b(n) = min(max(h.... , bbmin(n)), bbmax(n))

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.5** *P* **252** *L* **13** # 119

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

As this annex uses several test patterns like an optical PMD, it should have a table of test patterns giving the pattern number, which this draft lacks, and description, and reference for definition.

SuggestedRemedy

Copy Table 167-10, Test patterns, leaving out the rows that don't apply. Refer to the table from elsewhere in the annex to reduce clutter end repetition.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.5** *P* **252** *L* **16** # 120

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

"without the use of a reference receiver" which occurs several times, is misleading; the BT4 filter, which is the reference receiver response in so many clauses, applies.

SuggestedRemedy

Change to "observed through the Bessel-Thomson response of 120G.3.1 in place of the reference receiver of 120G.5.2" or similar. Several places.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1** *P* **250** *L* **12** # 121

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

As discussed, AC common-mode output voltage (max) 17.5 mV isn't reasonable at double the signalling rate of 120E with the same connectors and layout skew.

SuggestedRemedy

Increase to 25 mV, both host and module output.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4** *P* **256** *L* **50** # 122

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X**

While we are upturning this section, we might as well do it correctly. 802.3 is not a test spec. There is no requirement to test, only to comply.

SuggestedRemedy

Change "The host stressed input tolerance is tested using the test setup described in 120G.3.3.4.1 which is calibrated as described in 120G.3.3.4.2, and the test procedure in 120G.3.3.4.3." to "The host stressed input tolerance is defined by the test procedure in 120G.3.3.4.3 using the test setup described in 120G.3.3.4.1, which is calibrated as described in 120G.3.3.4.2." Similarly in 120G.3.4.2 Module stressed input test.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.3** *P* **163** *L* **10** # 123

Mellitz, Richard Samtec

Comment Type **TR** *Comment Status* **X**

Table 162-10 specifies AC common-mode RMS voltage, vcmi (max) note b just changes to a PRBS13Q with method described in 93.8.1.3. The problem is that coherent CM signal are included in differential measurements like SNDR, Jitter, and Linear fit pulse peak ratio. That means it is the coherent part if AC CM is double counted.

SuggestedRemedy

Add note to line 10 (vcmi) indicating that the CM mode measurement is only for the non-coherent CM part of the measurement.

This applies to Tables 163-5, 120F-1, 120G-1, and 120G-3

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.4.1** *P* **257** *L* **11** # 124

Dawe, Piers Nvidia

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

Before listing the impairments, this would be a good place to say that there is a pattern generator with adjustable amplitude, yet the four PAM4 levels are kept nominally (i.e. at low frequency) equally spaced.

SuggestedRemedy

Add sentence per comment. Similarly in 120G.3.3.4.1.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.1** *P* **257** *L* **21** # 125

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

This used to say "corner frequency between 150 MHz and 300 MHz. This value is kept below the upper frequency limit of the pattern generator external modulator input." because some pattern generators have jitter bandwidths around 100 MHz.

SuggestedRemedy

Before arbitrarily deleting technical content, I would like to hear from the PG companies and users if this is still a problem, and if it is, whether a tactic such as relying on the PG's own response with no extra filter is reasonable, or what to do.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.1** *P* **257** *L* **31** # 126

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

short or long mode far-end

SuggestedRemedy

short or long mode far-end test or long mode near-end test

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **46** # 127

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

This sentence used to say "The pattern may be changed to a valid 100GBASE-R, 200GBASE-R, or 400GBASE-R signal for amplitude calibration and the stressed input test". The same sentence was used for host stressed input calibration with target amplitude and transition time, and module stressed input calibration with target amplitude and slew time. It wasn't as clear as it could have been: crosstalk pattern or victim pattern? Amplitude calibration of crosstalk or victim? I believe it meant that the crosstalk pattern could be changed to a long one when calibrating the eye height of the victim. CEI 16.3.10.3.1 says "The crosstalk signal is calibrated at TP4 or TP1a using a QPRBS13-CEI pattern, then the pattern is changed to QPRBS31-CEI for the test".

SuggestedRemedy

Change "The pattern" to "The crosstalk pattern", change "amplitude calibration" to "stressed signal eye height and VEC calibration". Also in 120G.3.4.2.2 step e.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **49** # 128

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

This says "the host PCB in 120G.3.2.2.1" while 120G.3.2.2.1 says "reference host channel"

SuggestedRemedy

Use the same name in both subclauses, e.g. change "host PCB" to "reference host channel"

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **50** # 129

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

parameters in Table 120G–5 for far-end host channel type and the requested mode

SuggestedRemedy

parameters in Table 120G–5 for host channel type and the requested module output mode

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.2** *P* **259** *L* **20** # 130

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

Add the usual Units column, add units for 870

SuggestedRemedy

Per comment

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.3** *P* **259** *L* **30** # 131

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

This says that all the SJ cases are applied before the HCB is detached from the MCB, implying that all SJ cases are used together (as one might for a TV receiver that must receive one channel while all others are active).

SuggestedRemedy

After the stress has been calibrated, the pattern generator is set to generate PRBS31Q, scrambled idle, or another valid 100GBASE-R, 200GBASE-R, or 400GBASE-R sequence, and the HCB is detached/unplugged from the MCB and plugged into the host under test. The host electrical output is enabled on all lanes with any of the patterns above. The sinusoidal jitter is stepped through the six cases in Table 162-16.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.3** *P* **259** *L* **35** # 132

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

There's a problem with identifying which lanes are relevant. For "The host electrical output is enabled on all lanes with any of the patterns above", this is to include realistic crosstalk so it could include all 8 transmit lanes of a QSFP-DD, or maybe all the output lanes on the host if it makes a difference. While for "The host BER is the average of the BER of each of its lanes", only the lanes in the PMD under test (1, 2 or 4 lanes) are relevant. "Module BER" in 120G.3.4.2.3 is even more open to misinterpretation because we are so clear how many lanes a module has. But, terminology for this has been set up: the term "interface BER" occurs 19 times in section 6, and is defined in 86.8.2.1, 86.8.4.7, 86.8.4.8, 95.8.1.1...

SuggestedRemedy

The relevant BER is the interface BER, which is the average of the BER of each of the lanes in the PMD under test.
If the test is performed with PRBS31Q, the BER of a PMA lane may be calculated using the bit error counter in the PMA test pattern checker (see 120.5.11.2.2) as the number of bit errors divided by the number of received bits.
If the test is performed with scrambled idle or another valid 100GBASE-R, 200GBASE-R, or 400GBASE-R sequence, the interface BER may be calculated using the host FEC decoder error counters (see 91.6 and 119.3.1), as the number of FEC symbol errors divided by the number of received bits.
Similarly in 120G.3.4.2.3.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.3** *P* **259** *L* **44** # 133

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

"Methods of extracting the received bit pattern and counting errors other than the ones described above may be used if they generate equivalent results" - more wordy than needed for something that shouldn't need saying each time.

SuggestedRemedy

Other methods of extracting the received bit pattern and counting errors may be used if they generate equivalent results.
Also in 120G.3.4.2.3.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.2** *P* **258** *L* **35** # 134

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

"transition time ... at TP4a", "jitter profile of the signal at the pattern generator output". These are the same place apart from the DC block, and if that makes a difference it would be better to calibrate after it. Also 120G.3.4.2.2 says "at the output of the pattern generator"

SuggestedRemedy

Change "at the pattern generator output" to "at Tp4a".

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.4.2.2** *P* **262** *L* **2** # 135

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

"transition time ... at the input to the frequency-dependent attenuator", "jitter profile of the signal at the output of the pattern generator". These are the same place and the style guide says to use the same name for the same thing every time. Also the frequency-dependent attenuation/attenuator is not always present. By the way, 120G.3.3.4.2 says "at the pattern generator output".

SuggestedRemedy

Change "at the input to the frequency-dependent attenuator" to "at the output of the pattern generator (TP4a)".

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.3.4.2** *P* **259** *L* **2** # 136

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

If "differential peak-to-peak voltage" is supposed to convey the idea that the MSB and LSB are not adjusted separately as in the previous draft, it doesn't do it. Also, differential peak-to-peak voltage is limited at TP4, not the PG.

SuggestedRemedy

Change "differential peak-to-peak voltage are adjusted" to "amplitude are adjusted".
Change "voltage tolerance given" to "voltage tolerance at TP4 given".
See another comment about introducing the pattern generator.
Similarly in 120G.3.4.2.2 step g.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.4.2.2** *P* **262** *L* **24** # 137

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

This is misleading: "For the high-loss case, the reference receiver CTLE is limited to settings where gDC + gDC2 is less than or equal to -13 dB. This restriction does not apply for the low-loss case." Even the previous text, "The CTLE setting, gDC+gDC2, has to be less than or equal to -13 dB" was misinterpreted to mean that there is no constraint on gDC + gDC2. Yet the limits for the appropriate test point in Table 120G-11 still apply.

SuggestedRemedy

Change "Eye height and VEC are measured at TP1a as described in 120G.5.2." to "Eye height and VEC are measured at TP1a as described in 120G.5.2, with an addtional constraint for the high-loss case: the reference receiver CTLE is limited to settings where gDC + gDC2 is less than or equal to -13 dB.
Alternatively, modify Table 120G-11 to add the rule there.
Delete "For the high-loss case, the reference receiver CTLE is limited to settings where gDC + gDC2 is less than or equal to -13 dB. This restriction does not apply for the low-loss case."

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.4.2.2** *P* **262** *L* **25** # 138

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

Remove ambiguity

SuggestedRemedy

Change "pattern generator pre-emphasis" to "pattern generator precursor emphasis"

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.3.4.2.2** *P* **262** *L* **1** # 139

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

Changing the "pattern generator pre-emphasis" in step g will change the pattern generator transition time from step a.

SuggestedRemedy

In step a, say that, exceptionally, this pattern generator transition time is defined for neutral emphasis at the pattern generator output.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **120G** *SC* **120G.5.2** *P* **264** *L* **40** # 140

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

This needs explanation: "the probabilities are relative to the number of PAM4 symbols measured."

SuggestedRemedy

For a histogram, it should be the expectation of number of bad samples in the histogram / total number of samples *in the histogram*, assumed evenly distributed across its width.
In conventional eye mask terminology, hit ratios are hits in a keepout region / number of samples, assumed evenly distributed across 1 UI (see 86.8.3.2.1).

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162A** *SC* **162A.4** *P* **274** *L* **34** # 141

Dawe, Piers — Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

TP0 to TP2 or from TP3 to TP5 including the test fixture is determined using Equation (162A-3), and illustrated in Figure 162A-1.

SuggestedRemedy

Figure 162A-2

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162A** *SC* **162A.5** *P* **276** *L* **1** # 142

Dawe, Piers — Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

ILMatedTF(f) is the reference insertion loss in dB of the mated test fixture using Equation (162B-1)

SuggestedRemedy

ILMTFref(f) ... Equation (162B-5) several places

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162B** *SC* **162B.1.3** *P* **281** *L* **25** # 143

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

"The TP2 or TP3 and cable assembly test fixtures" sounds like three test fixtures.

SuggestedRemedy

The TP2 or TP3 test fixture and the cable assembly test fixture

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162B** *SC* **162B.1.3.3** *P* **283** *L* **37** # 144

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

Use the naming convention we agreed last round.

SuggestedRemedy

Change CMCIL to Ildc, twice

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162D** *SC* **162D.1** *P* **302** *L* **14** # 145

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

A host can have other than six MDI connector receptacles. Aligning terminology with 162C, third sentence. Smplifying.

SuggestedRemedy

Change:
There are six MDI connector "receptacles" specified for hosts.
to
There are six MDI connector types.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162D** *SC* **162D.1.1** *P* **304** *L* **20** # 146

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

supportable PMDs

SuggestedRemedy

supportable number of PMDs

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **162D** *SC* **162D.1.1** *P* **303** *L* **6** # 147

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

other end

SuggestedRemedy

other end(s)

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **163A** *SC* **163A.3.1** *P* **306** *L* **23** # 148

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

Make it easier to see what S(0) is

SuggestedRemedy

In figures 163A-2, 3 and 4, change "Reference channel" to "Reference channel S(0)

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **163A** *SC* **163A.3.1.1** *P* **307** *L* **15** # 149

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

Duplication

SuggestedRemedy

Move this sentence to p 306 line 53: "If the invoking clause lists more than one set of reference package parameters, the calculation is performed with the longer package trace length." At line 36, delete "If the invoking clause lists more than one set of reference package parameters, the calculation in Equation (163A–3) is performed with the longer package trace length."

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **163A** *SC* **163A.3.1.3** *P* **307** *L* **53** # 150

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

The method for obtaining the reference transition time using the measured test fixture scattering parameters and the reference transmitter and package models are defined below, and are outlined in Figure 163A–3.

SuggestedRemedy

method ... is ... is

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **163A** *SC* **163A.3.1.3** *P* **308** *L* **27** # 151

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **X** *LATE*

Out of order

SuggestedRemedy

Swap equations 163A-5 and 4

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **163A** *SC* **163A.3.2.2** *P* **309** *L* **42** # 152

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

Give the units

SuggestedRemedy

Say that ERL(ref) and ERL(meas) are in decibels

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.

Cl **163B** *SC* **163B.2** *P* **311** *L* **21** # 153

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **X** *LATE*

Complete the example

SuggestedRemedy

As this is a Clause 163 example, there's another package length zp = 12. Give both ERLs in 163B.3, e.g. in the text, with the lower value in Table 163B-1, or at least say which zp the ERL in the table is based on.

Proposed Response *Response Status* **O**

This comment was received after the ballot closed.