

IEEE P802.3ck D1.1 100/200/400 Gb/s Electrical Interfaces Task Force 2nd Task Force review comments

Cl **FM** SC **FM** P**13** L**13** # **3**
 Marris, Arthur Cadence Design Systems
 Comment Type **E** Comment Status **X**
 IEEE Std 802.3cm-2020 and 802.3cq-2002 have now been approved
 SuggestedRemedy
 Change 802.3cm-20XX to 802.3cm-2020 and 802.3cq-20XX to 802.3cq-2020 throughout the draft
 Proposed Response Response Status **O**

Cl **1** SC **1.1.3.2** P**30** L**49** # **1**
 Marris, Arthur Cadence Design Systems
 Comment Type **E** Comment Status **X**
 "Three" should be underlined
 SuggestedRemedy
 Underline the word "Three"
 Proposed Response Response Status **O**

Cl **1** SC **1.5** P**32** L**8** # **2**
 Marris, Arthur Cadence Design Systems
 Comment Type **T** Comment Status **X**
 Should the MDI specifications listed in 162.12 be included in 1.5 (Abbreviations) or 1.3 (Normative references)?
 SuggestedRemedy
 Add SFP, DSFP, QSFP and OSFP to "1.5 Abbreviations", and the appropriate reference for DSFP and OSFP to "1.3 Normative references"
 Proposed Response Response Status **O**

Cl **45** SC **45.2.1.129** P**50** L**50** # **82**
 Healey, Adam Broadcom Inc.
 Comment Type **T** Comment Status **X**
 Chip-to-chip transmitter equalization register definitions have been written as being general for 100/200/400GAUI-n but 100GAUI-1, 200GAUI-2, and 400GAUI-4 appear to be on a trajectory to have different tap counts and coefficient step sizes.
 SuggestedRemedy
 The correct amendment to 45.2.1.129 through 45.2.1.132 seems to be to indicate these registers are specific to 100GAUI-n (n > 1), 200GAUI-n (n > 2) and 400GAUI-n (n > 4) until the Annex 120F taps counts, coefficient step sizes, and control scheme are finalized. At this point it seems likely a different set of registers would be needed for Annex 120F controls.
 Proposed Response Response Status **O**

Cl **69** SC **69.1.1** P**62** L**13** # **4**
 Marris, Arthur Cadence Design Systems
 Comment Type **E** Comment Status **X**
 "service interface or 200Gb/s or 400Gb/s providing" does not read right
 SuggestedRemedy
 Change to "service interface or at 200Gb/s or 400Gb/s providing"
 Proposed Response Response Status **O**

Cl **69** SC **69.2.3** P**65** L**31** # **5**
 Marris, Arthur Cadence Design Systems
 Comment Type **T** Comment Status **X**
 Surely Inverse RS-FEC is optional?
 SuggestedRemedy
 Change M to O for Clause 152 to align with Table 80-3 which has Inverse RS-FEC as optional. Also make the nomenclature listed in Tables 80-3 and 69-3a match. For example for 161 make both be "100GBASE-P RS-FEC-Int"
 Proposed Response Response Status **O**

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CI 73 SC 73.6.4 P68 L26 # 55
 Brown, Matt Huawei Technologies Canada
 Comment Type E Comment Status X
 Editing instruction is overly descriptive given that all information is shown in the table. But it would be helpful to show the previous unchanged row.
 SuggestedRemedy
 In the editing instruction delete "by adding the following new rows for A16, A17 and A18 and revising the reserved row".
 In Table 73-4, add one row with ellipse at the begin and insert unchange row for A15 above the new row A16.
 Proposed Response Response Status O

CI 73 SC 73.6.5 P69 L22 # 56
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status X
 Why is the paragraph being deleted? Instead, further descriptions for the RS-FEC-Int should be provided.
 SuggestedRemedy
 Show the paragraph without strikethrough and add the following sentence: "F4 is used by 100G PHYs where RS-FEC-Int (See Clause 161) is an alternative to the default RS-FEC (See Clause 91)."
 Proposed Response Response Status O

CI 73 SC 73.6.5.a P69 L27 # 46
 Brown, Matt Huawei Technologies Canada
 Comment Type E Comment Status X
 formatting
 SuggestedRemedy
 Use proper editing instruction format (bold + italic).
 Proposed Response Response Status O

CI 73 SC 73.6.5.a P69 L29 # 47
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status X
 Title describes the scope incorrectly. This resolution is not for 100G PHYs, rather it is for PHYs using 100 Gb/s per lane. Also, no capitalization in titles except for first letter, acronyms, and proper nouns.
 SuggestedRemedy
 Change title to "FEC resolution for 100GBASE-P PHYs using RS-FEC-Int
 Proposed Response Response Status O

CI 73 SC 73.6.5.a P69 L31 # 48
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status X
 It is more specifically for PHYs which support RS-FEC-Int in addition to the default Clause 91 FEC. It is not an operating mode, it's a choice of sublayer to invoke. What if neither requests RS-FEC-Int?
 SuggestedRemedy
 "For 100GBASE-P PHYs which support RS-FEC-Int (see Clause 161) in addition to the default RS-FEC (see Clause 91) the F4 field is used to negotiate which FEC sublayer is to be used. If either PHY requests RS-FEC-Int operation then RS-FEC-Int sublayer is enabled, otherwise RS-FEC sublayer is enabled."
 Proposed Response Response Status O

CI 73 SC 73.7.6 P70 L6 # 49
 Brown, Matt Huawei Technologies Canada
 Comment Type E Comment Status X
 All of the changes described in the editing instruction are obvious from amendment markup and thus are unnecessary. The changes to the priority numbers in all of the rows should be shown.
 SuggestedRemedy
 Change editing instruction to: "Change Table73-5 (as modified by IEEE Std 802.3cb-2018 and IEEE Std 802.3cd-2018) as follows:"
 Include all rows in the table and show the priority numbers changed to the new values.
 Proposed Response Response Status O

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Cl 80 SC 80.1.5 P75 L6 # 20

Trowbridge, Steve Nokia
 Comment Type ER Comment Status X

Clause 80.1.4 of IEEE Std 802.3-2018 section 6, page 84 line 6 has two paragraphs that classify 100G Physical Layers as either 100GBASE-R or 100GBASE-P. Table 80-3 doesn't match either as formatted.

SuggestedRemedy

Split Table 80-3 into two parts. The first part (Table 80-3) should retain 100GBASE-KR4/CR4/CR10 PHY types and be re-titled as "Nomenclature and clause correlation (100GBASE-R copper)", since these are the PAM2 PHY types. New Table 80-3a should be created with 100GBASE-KR1/KR2/KP4/CR1/CR2 and should be entitled "Nomenclature and clause correlation (100GBASE-P copper)". This would match the two paragraphs.

Proposed Response Response Status O

Cl 80 SC 80.1.5 P75 L18 # 22

Slavick, Jeff Broadcom
 Comment Type T Comment Status X

In Table 80-3 we list CUI-4 and CAUI-10 as Optional sub-layers for a 100G-KR1/CR1 PHY. If these are utilized, don't they use a CI83 PMA? So shouldn't CI83 be also marked as Optional.

SuggestedRemedy

Add O in the column for Cl 83 for 100GBASE-KR1 and 100GBASE-CR1

Proposed Response Response Status O

Cl 93A SC 93A.1.6.1 P197 L33 # 12

Hidaka, Yasuo Credo Semiconductor
 Comment Type T Comment Status X

In the definition of σ_{DFE}^2 in equation (93A-37a), the range of index of $b'(k)$ is not correct, because this value must be calculated for each potential bank location.

SuggestedRemedy

Change $b'(k)$ to $b'(n+k)$.

In the second sentence of step b on line 15, change "for each potential bank location" to "for each potential bank location n".

Proposed Response Response Status O

Cl 120 SC 120.5.7.2 P99 L46 # 61

Ran, Adele Intel
 Comment Type T Comment Status X

Following up on comment #220 against D1.0, which suggested that "136.8.11.7.5 is an incorrect cross-reference"

After the discussion in the January meeting it became clear that it is the correct cross reference, but the text is misleading. Instead of referring to the PMD control function, it should refer to the PMD control state diagram, which is where the cross-reference points to.

SuggestedRemedy

Change from "precoder_tx_out_enable_i and precoder_rx_in_enable_i shall be set as determined by the PMD control function on lane i (see 136.8.11.7.5)"

to "precoder_tx_out_enable_i and precoder_rx_in_enable_i shall be set as determined in the LINK_READY state of the PMD control state diagram on lane i (see 136.8.11.7.5)"

Proposed Response Response Status O

Cl 120F SC 120F.1 P201 L49 # 34

Ben Artsi, Liav Marvell
 Comment Type T Comment Status X

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

SuggestedRemedy

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

Proposed Response Response Status O

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CI 120F SC 120F.1 P202 L31 # 59
 Ran, Adee Intel
 Comment Type T Comment Status X
 "If implemented, the transmitter equalization feedback mechanism described in 120D.3.2.3 may be used to identify an appropriate setting"
 As presented in ran_3ck_adhoc_02_021920, that mechanism supports the equalizer that was specified in the original CAUI-4 C2M (Annex 83D), which has only 3 taps with 5% coefficient resolution. The PAM4 AUIs defined in 802.3.bs (120D.3.1.5) and re-used in 802.3cd have kept this structure. However, we now have a 5-tap equalizer with a finer resolution. Even if pre-cursor tap c(-3) is removed as suggested in 120F.3.1.4 it would not be identical to the FFE in Annex 83D.

Therefore, re-using this method for 100GAUI-1 is impossible and new method should be defined. Possible solutions include a training protocol as in the PMD control function, new management variables and registers, or combinations of the two approaches.
 SuggestedRemedy
 A presentation with possible solutions is planned.
 Proposed Response Response Status O

CI 120F SC 120F.3.1 P201 L10 # 35
 Ben Artsi, Liav Marvell
 Comment Type T Comment Status X
 TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.
 SuggestedRemedy
 Measurement will still be done at TP0a, but Tx is to be specified at TP0. A new annex is to be defined to specify method of extrapolating/simulating each of the Tx parameters from TP0 to TP0a. A presentation will be provided.
 Proposed Response Response Status O

CI 120F SC 120F.3.1 P203 L30 # 70
 Mellitz, Richard Samtec
 Comment Type TR Comment Status X
 C2C, KR, and CR devices may be the same ports on chips. Align Av, Afe, and Ane with Vf in table 163-5
 SuggestedRemedy
 Replace with Vfmin=0.413
 Proposed Response Response Status O

CI 120F SC 120F.3.1 P203 L32 # 144
 Dawe, Piers Mellanox
 Comment Type TR Comment Status X
 The third precursor has only minor value for "28 dB" channels, so I don't expect it will be worthwhile for "20 dB" channels, yet it adds complexity to the silicon and the tuning. This is not KR or CR, it should be done with simpler silicon, like C2M.
 SuggestedRemedy
 Remove the third precursor.
 Proposed Response Response Status O

CI 120F SC 120F.3.1 P203 L38 # 151
 Dudek, Mike Marvell
 Comment Type T Comment Status X
 Footnote b to table 163-5 which updates the linear fit procedure for measuring SNDR should be applied to chip to chip as well as backplane.
 SuggestedRemedy
 Add the same footnote to the SNDR row in Table 120F-1.
 Proposed Response Response Status O

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CI 120F SC 120F.3.1.3 P205 L48 # 77
 Healey, Adam Broadcom Inc.
 Comment Type T Comment Status X
 A 3rd pre-cursor coefficient is not that useful for chip-to-chip channels. It adds incremental complexity (implementation and configuration) for what should be a "lightweight" interface.
 SuggestedRemedy
 Remove c(-3) tap for n00GAU-n C2C.
 Proposed Response Response Status O

CI 120f SC 120f.4.1 P208 L40 # 157
 Li, Mike Intel
 Comment Type TR Comment Status X
 Tr TBD
 SuggestedRemedy
 Change it to Tr =6.5 ps, which is consistent with CEI-112G-PAM4-MR
 Proposed Response Response Status O

CI 120F SC 120F.3.2.3 P206 L48 # 78
 Healey, Adam Broadcom Inc.
 Comment Type T Comment Status X
 I believe the intent is for the return loss of the test setup to have "test fixture" grade performance.
 SuggestedRemedy
 In item b), change "Equation (TBD)" to "Equation (163-2)" (Test fixture reference return loss limit).
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P209 L52 # 69
 Mellitz, Richard Samtec
 Comment Type TR Comment Status X
 C2C, KR, and CR devices may be the same ports on chips. Align Av, Afe, and Ane with table 163-10
 SuggestedRemedy
 replace the TBD"s with Av=0.0413,Afe=0.413,Ane=0.608
 Proposed Response Response Status O

CI 120F SC 120F.3.2.4 P207 L22 # 36
 Ben Artsi, Liav Marvell
 Comment Type T Comment Status X
 Reciever jitter tolerance test is specified at specific frequency points with no specified extrapolation between frequency points. More specifically, 5UI at 40KHz, 0.15UI at 1.33MHz 0.05UI at 4-40MHz. Tx is measured when applying high pass filter on the jitter filtering out much of the low frequency jitter of a transmitter. A transmitter may still comply with the TX specifications and have much more than 0.15UI of jitter at frequencies which reside around a few handers of Hz. Since there is no Rx jitter tolerance requirement at these frequencies: A transmitter may have relatively high jitter at low frequencies and still be compliant. The Rx may not be able to tolerate this jitter while being compliant as well. The interoperability between these specified Tx and Rx is questionable.
 SuggestedRemedy
 Add a sentence that the reciever is expected to meet any frequency point between the specified in table 163-9 while jitter tolerance requirement is linearly extrapolated between any consecutive specified frequency points.
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P209 L52 # 132
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Transmitter differential peak output is TBD
 SuggestedRemedy
 Replace Av with 0.413 V
 Replace Afe with 0.413 V
 Replace Ane with 0.608 V
 Proposed Response Response Status O

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CI 120F SC 120F.4.1 P210 L11 # 133
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 DFE tap length missing
 SuggestedRemedy
 Replace TBD with 5 or alternatively with 3 fixed+2 floating taps with span of 12 UI to support full range of channels and packages, for supporting material see ghiasi_3ck_02_0320.pdf
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P210 L11 # 16
 Sun, Junqing Credo Semiconductor
 Comment Type TR Comment Status X
 Simulations show 5 tap DFE is sufficient to cover contributed channels. Nb=5 will be a good starting point. Simulation results will be provided.
 SuggestedRemedy
 set Nb=5.
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P210 L11 # 147
 Dawe, Piers Mellanox
 Comment Type TR Comment Status X
 The C2C channel is only a little harder than the C2M one so a similar reference receiver could be used. Low power silicon will be needed if this application is to be viable.
 SuggestedRemedy
 4 taps, or 5 as Ali proposed. See my C2M comments for proposed tap weight limits.
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P210 L13 # 134
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Bmax values are TBDs
 SuggestedRemedy
 Replace TBD with B1max=0.5 and B[2-5]max=0.1 ghiasi_3ck_02_0320.pdf
 Proposed Response Response Status O

CI 120f SC 120f.4.1 P210 L11 # 158
 Li, Mike Intel
 Comment Type TR Comment Status X
 Nb TBD
 SuggestedRemedy
 Change it to Nb = 14, which is consistent with CEI-112G-PAM4-MR
 Proposed Response Response Status O

CI 120f SC 120f.4.1 P210 L13 # 159
 Li, Mike Intel
 Comment Type TR Comment Status X
 bmax TBD
 SuggestedRemedy
 Change it to bmax = 0.85, which is consistent with CEI-112G-PAM4-MR
 Proposed Response Response Status O

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CI 120F SC 120F.4.1 P210 L14 # 17
 Sun, Junqing Credo Semiconductor
 Comment Type TR Comment Status X
 simulation shows bmax(1)=0.85. bmax(2:5)=0.2 are sufficient to cover contributed channels. Simulation results will be provided.
 SuggestedRemedy
 set bmax(1)=0.85 and bmax(2:4)=0.2.
 Proposed Response Response Status O

CI 120f SC 120f.4.2 P211 L26 # 90
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 ERL is TBD
 SuggestedRemedy
 ERL(min)=14.5 dB
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P210 L18 # 146
 Dawe, Piers Mellanox
 Comment Type TR Comment Status X
 One-sided noise spectral density of 8.2e-9 V2/√GHZ is extremely aggressive and optimistic and was chosen to make 28 dB backplane channels pass COM. It is not appropriate for this 20 dB spec.
 SuggestedRemedy
 Change to 1.64e-8, same as 50GBASE-CR but lower than proposed for C2M (4.1e-8). (For info, 50G/lane C2C (120C) has 2.6e-8.)
 Proposed Response Response Status O

CI 120f SC 120f3.2.3 P207 L5 # 156
 Li, Mike Intel
 Comment Type TR Comment Status X
 Np TBD
 SuggestedRemedy
 Change it to 18 (length of TX pre-taps + RX DFE taps+main tap)
 Proposed Response Response Status O

CI 120F SC 120F.4.1 P210 L21 # 135
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 To keep C2C power low need to limit max loss including package/filter
 SuggestedRemedy
 Add new line to table 120F-5, Total IL_wpkgs_wTr (max)=28 dB
 Proposed Response Response Status O

CI 120G SC 120G P221 L20 # 153
 Dudek, Mike Marvell
 Comment Type T Comment Status X
 The referenced section for the eye measurements is not correct as 120E.4.2 uses the wrong reference equalizer.
 SuggestedRemedy
 Change 120E.4.2 to 120G.3.1.6.
 Proposed Response Response Status O

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CI 120G SC 120G P221 L 20 # 154

Dudek, Mike Marvell

Comment Type T Comment Status X

The Vertical Eye Closure has a TBD value, and the appropriate value depends on the parameters in the test methodology table 120G.4.2. I will have a presentation to justify the choices in the proposed change.

SuggestedRemedy

Change the values in table 120G-9 from TBD to
 One sided spectral noise 5e-8
 b1max = 0.4
 b2-bn max=0.15
 Change the VEC in table 120G-1 to 7.5dB.

Proposed Response Response Status O

CI 120G SC 120G.1 P216 L 43 # 84

Heck, Howard Intel

Comment Type E Comment Status X

In figure 120G.1, I think "100GBASE-P" should be "100GBASE-R"

SuggestedRemedy

Change to "100GBASE-R"

Proposed Response Response Status O

CI 120G SC 120G.1 P217 L 20 # 91

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status X

Figure 120G-2 covers 100 GbE, then two additional figures 120G-3, and 120G-4 to cover 200 and 400 GbE.

SuggestedRemedy

The three figures can be combined where the box reads 100GAUI-1, 200GAUIU-2, and 400GAUI-4 then number of connecting line could read 1, 2, or 4.

Proposed Response Response Status O

CI 120G SC 120G.1 P217 L 29 # 81

Healey, Adam Broadcom Inc.

Comment Type E Comment Status X

The caption of Figure 120G-2 is cites the wrong frequency.

SuggestedRemedy

Change "100GAUI-1 C2M insertion loss budget at 25.56 GHz" to "100GAUI-1 C2M insertion loss budget at 26.56 GHz".

Proposed Response Response Status O

CI 120G SC 120G.1 P217 L 29 # 83

Heck, Howard Intel

Comment Type E Comment Status X

"25.56 GHz" is incorrect.

SuggestedRemedy

Change to "26.56 GHz"

Proposed Response Response Status O

CI 120G SC 120G.1 P218 L 48 # 71

Mellitz, Richard Samtec

Comment Type TR Comment Status X

The equation is only recommended. The way 120G-1 is annotated before the graph is annotated suggest that that it is required for performance.

SuggestedRemedy

Add section titled 120G.1.1 Informative IL

Proposed Response Response Status O

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Cl 120G SC 120G.1 P218 L48 # 72
 Mellitz, Richard Samtec
 Comment Type **TR** Comment Status **X**
 The equation is only recommended. The way 120G-1 is annotated before the graph is annotated suggest that that it is required for performance.
 SuggestedRemedy
 Add section titled 120G.1.2 Informative COM based on sun_3ck_01a_0120.pdf slide 29 and 30
 Proposed Response Response Status **O**

Cl 120G SC 120G.1.1 P219 L26 # 92
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 The bit error ratio (BER) not clear if this is pre or post .
 SuggestedRemedy
 The pre-FEC bit error ratio (BER) provided that the error statistics are sufficiently random when processed ...
 Proposed Response Response Status **O**

Cl 120g SC 120g.2 P220 L10 # 93
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **E** Comment Status **X**
 Component not necessary
 SuggestedRemedy
 Remove component after host
 Proposed Response Response Status **O**

Cl 120g SC 120g.2 P220 L32 # 94
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **ER** Comment Status **X**
 Component not necessary
 SuggestedRemedy
 Remove component after module
 Proposed Response Response Status **O**

Cl 120G SC 120G.3.1 P221 L1 # 10072
 Wu, Mau-Lin MediaTek
 Comment Type **T** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.1 - Pg 213 - In 34]
 There are a lot of TBD values in Table 120G-1 - Host output characteristics at TP1a. I prepared one contribution, wu_3ck_02_0120, to address how to settle down on these.
 SuggestedRemedy
 Proposed to change values in Table 120G-1 according to the contribution, wu_3ck_02_0120.
 Proposed Response Response Status **O**

Cl 120G SC 120G.3.1 P221 L18 # 95
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 ESMW is TBD
 SuggestedRemedy
 Replace TBD with 0.12 UI and see ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

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CI 120G SC 120G.3.1 P221 L20 # 11
 Hidaka, Yasuo Credo Semiconductor
 Comment Type TR Comment Status X
 As we discussed in ad hoc in hidaka_3ck_adhoc_01_021920, I recommend max 9dB VEC at TP1a with Rx noise of $\eta_0 = 4.1E-8V^2/GHz$.
 In the same presentation, EH (min) and bmax(n) were also provided.
 SuggestedRemedy
 Change Table 120G-1 as follows:
 Change the value of vertical eye closure (max) from TBD dB to 9 dB.
 Change the value of eye height, differential (min) from 15 mV to 14mV.
 Change Table 120G-9 as follows:
 Change the value of η_0 from TBD V^2/GHz to $4.1E-8V^2/GHz$.
 Change the value of b_max(1) from TBD to 0.5.
 Change the value of b_max(2) from TBD to 0.15.
 Change the value of b_max(3) from TBD to 0.1.
 Change the value of b_max(4) from TBD to 0.05.
 Alternatively, if a lower value of b_max(1) is preferred, the following is also OK.
 Change Table 120G-1 as follows:
 Change the value of vertical eye closure (max) from TBD dB to 9 dB.
 Change the value of eye height, differential (min) from 15 mV to 13.5mV.
 Change Table 120G-9 as follows:
 Change the value of η_0 from TBD V^2/GHz to $4.1E-8V^2/GHz$.
 Change the value of b_max(1) from TBD to 0.3.
 Change the value of b_max(2) from TBD to 0.2.
 Change the value of b_max(3) from TBD to 0.1.
 Change the value of b_max(4) from TBD to 0.05.
 Proposed Response Response Status O

CI 120G SC 120G.3.1 P221 L20 # 10056
 Dudek, Mike Marvell
 Comment Type T Comment Status D VEC
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.1 - Pg 213 - In 53]
 The vertical eye height is TBD
 SuggestedRemedy
 Adopt the value proposed in Dudek_3ck_01_1119 (7.5dB). A presentation will be made providing more information.
 Proposed Response Response Status O

CI 120G SC 120G.3.1 P221 L21 # 96
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Vertical eye closure is TBD
 SuggestedRemedy
 Replace TBD with 10 and see ghiasi_3ck_01_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.1 P221 L23 # 118
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 ERL is TBD
 SuggestedRemedy
 ERL=10.5 dB, see ghiasi_3ck_03_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.1 P221 L28 # 127
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Module output also needs common mode return loss
 SuggestedRemedy
 RLCC=12-9*f dB, from 10 MHz to 1 GHz
 RLCC=3 dB 1 to 53 GHz
 See ghiasi_3ck_03_0320
 Proposed Response Response Status O

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CI 120G SC 120G.3.1.3 P222 L33 # 10059

Dudek, Mike Marvell
 Comment Type E Comment Status D C2M ERL

[Comment resubmitted from Draft 1.0. Subcl. 120G.3.1.3 - Pg 215 - In 25]

This section labelled Host output effective return loss is referenced by the Module output test, the Host input test and the module input test.

SuggestedRemedy

Either add separate sections for the module output ERL test or broaden the title and text of this section to include the other points. I think it may be better to have two sections one for the Host tests (using the HCB) and one for the Module tests (using the MCB).

Proposed Response Response Status O

CI 120G SC 120G.3.1.3 P222 L36 # 10071

Wu, Mau-Lin MediaTek
 Comment Type T Comment Status D ERL

[Comment resubmitted from Draft 1.0. Subcl. 120G.3.1.3 - Pg 215 - In 28]

In the paragraph of "Host output effective return loss", the sentence of "The value of T_fx is twice the delay associated with the TP1a test fixture being used" is NOT appropriate because the section of 120G.3.1.3 is used not only for Host output ERL, but also Module output ERL, Module input ERL, and Host input ERL. Based on this, the current description is not appropriate.

SuggestedRemedy

The sentence of "The value of T_fx is twice the delay associated with the TP1a test fixture being used" shall be changed as "The value of T_fx is twice the delay associated with the specific test fixture being used."

Proposed Response Response Status O

CI 120G SC 120G.3.1.3 P222 L37 # 10057

Dudek, Mike Marvell
 Comment Type T Comment Status D C2M ERL

[Comment resubmitted from Draft 1.0. Subcl. 120G.3.1.3 - Pg 215 - In 29]

The test fixture delay should be clarified so that the connector is not included in the delay that is removed

SuggestedRemedy

Change "associated with the TP1a test fixture" to from the measurement point TP1a to the beginning of the TP1a test fixture MDI connector".

Proposed Response Response Status O

CI 120G SC 120G.3.1.3 P222 L37 # 19

Sun, Junqing Credo Semiconductor
 Comment Type TR Comment Status X

Nb is defined in Table 120G-9

SuggestedRemedy

Chang to "in Table 120G-9"

Proposed Response Response Status O

CI 120G SC 120G.3.1.3 P223 L12 # 120

Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X

ERL is TBD

SuggestedRemedy

ERL=10.5 dB, see ghiasi_3ck_03_0320

Proposed Response Response Status O

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CI 120G SC 120G.3.2 P224 L28 # 10191
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.2 - Pg 217 - In 28]
 Need improve test methodology for moulded output compliance
 SuggestedRemedy
 See ghiasi_3ck_03_0120
 Proposed Response Response Status O

CI 120G SC 120G.3.2 P224 L36 # 10192
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D C2M eye opening
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.2 - Pg 217 - In 28]
 Module output EH is TBDs and need values
 SuggestedRemedy
 See ghiasi_3ck_03_0120 and
 Near end TP4 EH = 50 mV
 Far end TP5-L1 EH = 32 mV
 Far end TP5-L2 EH = 20 mV
 Proposed Response Response Status O

CI 120G SC 120G.3.2 P224 L36 # 10193
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D C2M vec
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.2 - Pg 217 - In 28]
 Module output VEC is TBDs and need values
 SuggestedRemedy
 See ghiasi_3ck_03_0120 and
 Near end TP4 VEC = 7.0 dB
 Far end TP5-L1 VEC = 7.5 dB
 Far end TP5-L2 VEC = 7.5 dB
 Proposed Response Response Status O

CI 120G SC 120G.3.2 P224 L37 # 60
 Ran, Adeo Intel
 Comment Type T Comment Status X
 Signal swing and Tx equalization are important in PAM4 since the receiver has a limited linear range. A large swing at the host input may prevent linear operation and detection of PAM4. Attenuation has been used in past Rx designs, but it is becoming harder to implement with the large bandwidth requirements for 100G.
 The current module output specifications have limited information about output swing and ISI (only implicitly through far-end eye height and far-end precursor ISI ratio, which are defined with a single channel), and do not mention any control of the Tx setting. With the large range of C2M host channels, it is unlikely that a fixed Tx setting will be usable for all hosts.

Actual modules even in 50G have some control of equalization and swing. There are indications that this control is required for actual operation.
 If we ignore this capability in the specifications, some hosts may not be able to operate with the settings used for module output compliance; this means the module compliance specs are useless and measuring them is a waste of time.
 The standard should at least mention the module's Tx control capabilities (with reference to external documents) and preferably define requirements for them, with management variables and control registers. It will be beneficial if the Tx specifications include these capabilities.

SuggestedRemedy
 A presentation is planned with further details.
 Proposed Response Response Status O

CI 120G SC 120G.3.2 P224 L50 # 10144
 Dawe, Piers Mellanox
 Comment Type TR Comment Status D
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.2 - Pg 217 - In 50]
 Far-end pre-cursor ISI ratio has not been justified and doesn't fit well with the other C2M specs. Better to choose the reference receiver tap limits wisely.
 SuggestedRemedy
 Remove the row for far-end pre-cursor ISI ratio from the table.
 Proposed Response Response Status O

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CI 120G SC 120G.3.2 P224 L52 # 125
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 RLCD return loss can be improved
 SuggestedRemedy
 RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
 RLCD=15 dB 12.89 to 53 GHz
 See ghiasi_3ck_03_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.3 P226 L43 # 122
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 ERL is TBD
 SuggestedRemedy
 ERL=10.5 dB, see ghiasi_3ck_03_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.2 P224 L52 # 126
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Module output also needs common mode return loss
 SuggestedRemedy
 RLCC=12-9*f dB, from 10 MHz to 1 GHz
 RLCC=3 dB 1 to 53 GHz
 See ghiasi_3ck_03_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.3 P226 L60 # 10060
 Dudek, Mike Marvell
 Comment Type E Comment Status D C2M ERL
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.3 - Pg 219 - In 43]
 The reference to ERL in table 120G-4 is directly to 120G.3.1.3 but there is a separate section 120G.3.3.1 (but it points directly to 120G.3.1.3 see other comment)
 SuggestedRemedy
 Either delete section 120G.3.3.1 or change the reference in table 120G-4 to 120G.3.3.1
 Proposed Response Response Status O

CI 120G SC 120G.3.2 P224 L53 # 121
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 ERL is TBD
 SuggestedRemedy
 ERL=11.5 dB, see ghiasi_3ck_03_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.3.2 P227 L15 # 101
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Farend ESMW is TBD
 SuggestedRemedy
 Replace TBD with 0.175 UI see ghiasi_3ck_01_0320
 Proposed Response Response Status O

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Cl **120G** SC **120G.3.3.2** P **227** L **16** # **102**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Farend EW is TBD
 SuggestedRemedy
 Replace TBD with 0.175 UI see ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.3.2.1** P **227** L **52** # **109**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Table reference is TBD
 SuggestedRemedy
 Replace TBD with table 120F-1
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.3.2** P **227** L **20** # **10194**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D** C2M eye opening
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.3.2 - Pg 220 - ln 6]
 Far end eye height is TBD
 SuggestedRemedy
 Replace TBD with 50 mV
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.3.2.1** P **228** L **39** # **10063**
 Dudek, Mike Marvell
 Comment Type **T** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.3.2.1 - Pg 221 - ln 39]
 The draft is missing the information for how to set up the stressed receiver input signal.
 SuggestedRemedy

Insert the following (modified from 120E.3.3.2.1) " Random jitter and the pattern generator output levels are adjusted (without exceeding the differential pk-pk input voltage tolerance specification as shown in Table 120G-4) to result in the eye height for all three eyes and eye width for the smallest eye given in Table 120G-5 with the setting of the CTLE that maximizes the product of eye height and eye width.
 The far-end pre-cursor ISI ratio is measured using the method defined in 120E.3.2.1.2 and it shall meet the specification in Table 120G-3. Pre-emphasis capability is likely to be required in the pattern generator to meet this requirement". However consider whether the product of eye height and eye width is the best criteria or whether it would be better to replace "that maximizes the product of eye height and eye width" with "that minimizes the value of vertical eye closure.

Proposed Response Response Status **O**

Cl **120G** SC **120G.3.3.2.1** P **227** L **52** # **108**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Table reference is TBD
 SuggestedRemedy
 Replace TBD with table 120F-1
 Proposed Response Response Status **O**

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Cl **120G** SC **120G.3.4** P **229** L **15** # **124**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 RLCD return loss can be improved
 SuggestedRemedy
 RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
 RLCD=15 dB 12.89 to 53 GHz
 See ghiasi_3ck_03_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.4.1** P **229** L **36** # **10195**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D** C2M eye opening
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.4.1 - Pg 222 - In 32]
 Module stress input eye height is TBD
 SuggestedRemedy
 Replace TBD with 15 mV @ nominal VEC of 8.5 dB
 Add 2nd test condition 30 mV @ nominal VEC of 11 dB
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.4** P **229** L **43** # **123**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 ERL is TBD
 SuggestedRemedy
 ERL=11.5 dB, see ghiasi_3ck_03_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.4.1** P **229** L **40** # **104**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 ESMW is TBD
 SuggestedRemedy
 Replace TBD with 0.12 UI see ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.4.1** P **222** L **2** # **119**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 RLCD return loss can be improved
 SuggestedRemedy
 RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
 RLCD=15 dB 12.89 to 53 GHz
 See ghiasi_3ck_03_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G.3.4.1** P **229** L **46** # **105**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Eye height is TBD
 SuggestedRemedy
 Replae TBD with 15 mV see ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

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CI 120G SC 120G.3.4.1 P229 L47 # 106
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Eye width is TBD
 SuggestedRemedy
 Replace TBD with 0.12 UI see ghiasi_3ck_01_0320
 Proposed Response Response Status O

CI 120G SC 120G.3.4.1.1 P230 L52 # 107
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 Table reference is TBD
 SuggestedRemedy
 Replace TBD with table 120F-1
 Proposed Response Response Status O

CI 120G SC 120G.3.4.1.1 P231 L9 # 110
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 loss at TP1a is TBD plus two more TBDs on the same line
 SuggestedRemedy
 ..TP1a is 19.2 dB. The 19.2 dB loss represents 16 dB channels loss ...
 Proposed Response Response Status O

CI 120G SC 120G.3.4.1.1 P231 L11 # 10061
 Dudek, Mike Marvell
 Comment Type T Comment Status D C2M eye opening
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.4.1.1 - Pg 224 - In 12]
 The sections referenced for measuring Eye height and VEC don't have the correct reference receiver and section 4.2 has more details about how to measure these.
 SuggestedRemedy

Change "Eye height and VEC are then measured at TP1a based on the measurement methodology given in 120E.4.2 and vertical eye closure is measured according to 120E.4.3." to Eye height and VEC are then measured at TP1a as described in 120G.4.2 "
 Proposed Response Response Status O

CI 120G SC 120G.3.4.1.1 P231 L16 # 111
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status X
 CTLE setting for max loss is TBD
 SuggestedRemedy
 add table of supported CTLE per ghiasi_3ck_01_0320 where includes min g_DC and g_DC_HP, min g_DC=10 dB and min g_DC_HP=2 dB
 Proposed Response Response Status O

CI 120G SC 120G.3.4.1.1 P231 L22 # 10062
 Dudek, Mike Marvell
 Comment Type T Comment Status D C2M VEC
 [Comment resubmitted from Draft 1.0. Subcl. 120G.3.4.1.1 - Pg 224 - In 22]
 Multiple presentations have shown that the VEC at TP1a is more critical for end to end performance than just the eye opening.
 SuggestedRemedy
 Add a VEC min specification to Table 120G-8. Value TBD. Move the sentence on line 22 beginnin with "In both cases" to a separate paragraph (to emphasis that it applies to both the high and low loss cases) and change it to "In both cases, the input VEC is less than TBD dB and greater than the value in table 120G-8
 Proposed Response Response Status O

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Cl **120G** SC **120G.3.4.1.1** P**231** L**23** # **112**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 CTLE setting for min loss is TBD
 SuggestedRemedy
 add table of supported CTLE per ghiasi_3ck_01_0320 where includes min g_DC and g_DC_HP, min g_DC=4 dB and min g_DC_HP=1 dB
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P**232** L**9** # **116**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 TP4 need its own reference receiver table
 SuggestedRemedy
 Create a new table that references table of gDC/gDC2 for TP4. In the new table DFE normalized coefficient b1max=0.15, b[2-4]max=0.05 and n0=8.37e-9
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P**232** L**3** # **10273**
 Hidaka, Yasuo Credo Semiconductor
 Comment Type **TR** Comment Status **D** C2M VEC
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 225 - In 28]
 Our study showed that VEC (vertical eye closure) is not a good performance metric of whole link performance, if we take account of receiver impairments. This is partly because VEC is not a function of channel insertion loss. EVEC (effective vertical eye closure) as proposed in sun_3ck_02_1119.pdf (page 3) is a better alternative, because it takes account of EH (eye height) as an indicator of channel insertion loss.
 SuggestedRemedy
 Replace "Vertical eye closure (max)" in Table 120G-1 with "Effective vertical eye closure (max)".
 Add a sub section to define effective vertical eye closure.
 A presentation of a detail proposal will be given at the January meeting.
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P**232** L**15** # **10158**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 225 - In 40]
 These look like the CTLE limits for TP1a and TP4 far end.
 SuggestedRemedy
 Where are the limits for TP4 near end?
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P**232** L**9** # **117**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 TP5 need its own reference receiver table
 SuggestedRemedy
 Create a new table that references table of gDC/gDC2 for TP4. In the new table DFE normalized coefficient b1max=0.3, b[2-4]max=0.08 and n0=8.37e-9
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P**232** L**15** # **143**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **X**
 The allowed CTLE settings for TP4 near end are not the same as for TP1a and TP4 far end, and as Ali and I have proposed, should not be simple min/max limits anyway.
 SuggestedRemedy
 Replace with tables from Ali or me. Also see D1.0 comment 157
 Proposed Response Response Status **O**

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Cl **120G** SC **120G.4.2** P **232** L **15** # **10197**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 40]
 gDC max gian of 14 dB is unnecessary with a DFE receiver and channel <=16 dB
 SuggestedRemedy
 12 dB would be more than adequete and with further study we can even further reduce the gDC.
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **15** # **114**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Is not necessary to allow all combination of gDC and gDC2
 SuggestedRemedy
 Move gDC and gDC2 into a new table with 3 columns for TP1a, TP4, and TP5 per ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **19** # **10157**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 225 - In 44]
 This allows combinations such as gDC=-3, gDC2=-3 that should not happen, receivers don't need to design for, and waste time in the "for each valid combination of gDC and gDC2" measurement procedure.
 SuggestedRemedy
 Limit the combinations:
 gDC2 gDC
 0 or 1 3 to 14
 2 6 to 14
 3 9 to 14
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **19** # **10143**
 Dawe, Piers Mellanox
 Comment Type **T** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 225 - In 46]
 Are 1 dB steps for gDC2 fine enough?
 SuggestedRemedy
 Change to 1/2 dB?
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **19** # **10199**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 40]
 To speed up testing and eliminating weired cases one should gDC/gDC2 combinations
 SuggestedRemedy
 See ghiasi_3ck_03_0120 for table of allowed CTLE combinations.
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **30** # **140**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **X**
 The C2M normalized DFE coefficient magnitude limits need to be chosen carefully so that the reference receiver is not better than, or grossly different to, a range of real receiver implementations. Optical modules probably won't use this classic DFE. This requires separate max and min tap limits. See hidaka_3ck_adhoc_01_021920 for example tap weights found.
 SuggestedRemedy
 Tap 1 min 0.15 max 0.45
 Tap 2 min -0.1 max 0.1
 Taps 3, 4 min -0.05 max 0.05
 Adjust names of limits and 93A.1 to support separate max and min limits; see another comment, against 162.11.7.
 Proposed Response Response Status **O**

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Cl **120G** SC **120G.4.2** P **232** L **30** # **113**
 Ghiasi, Ali Mellanox Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 DFE tap weights are TBD
SuggestedRemedy
 Replace bmax(1)=0.3 and bmax[2-4]=0.1, see ghiasi_3ck_01_0320 supporting presentation
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **32** # **149**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **X**
 For the one-sided noise spectral density, currently TBD V^2/GHz , the middle option in hidaka_3ck_adhoc_01_021920 looks promising. However, expressing this as a noise spectral density may be more clumsy and complicated than necessary.
SuggestedRemedy
 Use $4.1e-8$ for now.
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **31** # **10145**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 10]
 We need minimum limits for the C2M normalized DFE coefficient magnitudes. We saw for backplane that the minimum limits should be very different to the maximum limits.
SuggestedRemedy
 Add bmin limits.
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **32** # **115**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 One sided noise spectral density is TBD
SuggestedRemedy
 Replae TBD with $8.2e-9 V^2/\text{GHz}$
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **32** # **10155**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 11]
 In the same way that COM has η_{a0} , this measurement should have a standardised "added" noise to represent noise that a product might have but the measurement doesn't, so that the reference receiver is not better than a range of real receiver implementations. This can be a constant in mV or V^2/GHz . Further, it needs a second noise term to account for reflections that a product might have but the measurement doesn't. This is proportional to the signal, so can be a set ratio to $\text{sum}(AV_{\text{upp}} + AV_{\text{mid}} + AV_{\text{low}})$.
SuggestedRemedy
 Include two noise items in the measurement, one a constant in mV or V^2/GHz , the other a set ratio to $\text{sum}(AV_{\text{upp}} + AV_{\text{mid}} + AV_{\text{low}})$. To be RSSd with the measured, equalised signal. Allow RSSing out the scope noise (as done in TDECQ) if it's significant.
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **33** # **141**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **X**
 Need a way to account for the additional reflections that are plaguing our short-channel analyses, but trying to put capacitors on the software transmission line in the scope seems impractical.
SuggestedRemedy
 Add a second noise items in the measurement, a set ratio to $\text{sum}(AV_{\text{upp}} + AV_{\text{mid}} + AV_{\text{low}})$. To be RSSd with the measured, equalised signal.
 Proposed Response Response Status **O**

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CI 120G SC 120G.4.2 P232 L33 # 10274

Hidaka, Yasuo Credo Semiconductor

Comment Type TR Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - ln 28]

In the performance study at TP1a in sun_3ck_02_1119.pdf, eta_0 noise of 8.20E-9 V^2/GHz was added at the CTLE input. However, eta_0 noise is not added in the reference receiver described in 120G.4.2. If we do not add the eta_0 noise in the reference receiver in the scope, measurd eye opening will be larger than the performance study. This will creat a hole in the specification.

An easy fix is to add eta_0 noise in the reference receiver.

Another option is to re-do the performance study without eta_0 noise in the reference receiver in order to estimate the performance accurately, but it will take time. I recommend to add eta_0 noise in the reference receiver for now. We can remove it later, after we finish re-doing the performance study without eta_0 noise in the reference receiver.

SuggestedRemedy

Add eta_0 noise of 8.20E-9 V^2/GHz to table 120G-9.
 Add a step to add eta_0 noise after step b in page 226.
 Here, eta_0 noise is a gaussian noise consistent with the third term of (93A-41).

Proposed Response Response Status O

CI 120G SC 120G.4.2 P232 L36 # 10156

Dawe, Piers Mellanox

Comment Type TR Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - ln 13]

This recipe is a weird combination of the existing C2M measurement method and COM, which is a simulation not a measurement method, for channels not signals, and for backplanes with transmitter training not low power C2M.

SuggestedRemedy

Unless someone can show that it works, change to the CTLE/FFE method as in OIF CEI-112G-VSR.

Proposed Response Response Status O

CI 120G SC 120G.4.2 P232 L37 # 137

Dawe, Piers Mellanox

Comment Type TR Comment Status X

This is incomplete: "Capture the signal according the method defined in 162.9.3.1.1", because it throws away the noise and jitter in the signal. This method could be used to find the pulse response, DFE tap weights and sampling phase, but...

SuggestedRemedy

Make it clear that the signal that is used in step e "Compute the receiver input signal yrx(k) by applying the effect of the DFE" is captured according to 120E but with a different observation filter. Actually, there is one measurement, and the measured signal is processed (e.g. averaged) to obtain the signal of 162.9.3.1.1.

Proposed Response Response Status O

CI 120G SC 120G.4.2 P232 L38 # 13

Hidaka, Yasuo Credo Semiconductor

Comment Type T Comment Status X

It is written as "associated parameters in Table 120G-9" as if the receiver noise filter had plural parameters. However, the receiver noise filter H_r(f) defined by equation (93A-20) has a single parameter f_r. A reference by a singular noun with the parameter symbol f_r is recommended for clarification.

SuggestedRemedy

Change "associated parameters in Table 120G-9" to "associated parameter f_r in Table 120G-9".

Proposed Response Response Status O

CI 120G SC 120G.4.2 P232 L39 # 142

Dawe, Piers Mellanox

Comment Type TR Comment Status X

Should account for scope noise as TDECQ does.

SuggestedRemedy

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

Proposed Response Response Status O

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Cl **120G** SC **120G.4.2** P **232** L **45** # **10166**
 Li, Mike Intel
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 24]
 "Np equal to 200" is not appropriate as UI becomes half in second.
 SuggestedRemedy
 "Np equal to 200" to "Np equal to 400"
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **232** L **45** # **10165**
 Li, Mike Intel
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 24]
 "Dp equal to 3" is not right as there are 3 pre-taps for the host
 SuggestedRemedy
 change "Dp equal to 3" to ""Dp equal to 4".
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **233** L **6** # **10167**
 Li, Mike Intel
 Comment Type **TR** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 33]
 "Within the set of combinations of gDC and gDC2 with eye height meeting the target requirement, for the combination resulting in the smallest vertical eye closure, the eye height, eye width, and vertical eye closure are used as the measured values.", VEC alone will not be a good FOM for optimization, it needs to be the combination of VEC and EH, which is EVEC. Further, the clarity of the whole sentences is not good.
 SuggestedRemedy
 change the whole sentence to: "Within the set of combinations of gDC and gDC2, the eye height, eye width, and vertical eye closure, resulting in the smallest effective vertical eye closure, are used as the measured values."
 Proposed Response Response Status **O**

Cl **120G** SC **120G.4.2** P **233** L **6** # **10066**
 Dudek, Mike Marvell
 Comment Type **E** Comment Status **D**
 [Comment resubmitted from Draft 1.0. Subcl. 120G.4.2 - Pg 226 - In 33]
 The paragraph describing what the measured values of Eye height, Eye width and VEC are is difficult to follow.
 SuggestedRemedy
 Consider replacing this paragraph with "The measured values of eye height, eye width and vertical eye closure are the values obtained with the combination of gDC and gDC2 that produces an eye height above the target value and the minimum value of vertical eye closure."
 Proposed Response Response Status **O**

Cl **120G** SC **120G3.2** P **224** L **44** # **97**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Near end ESMW is TBD
 SuggestedRemedy
 Replace TBD with 0.175 UI see ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

Cl **120G** SC **120G3.2** P **224** L **44** # **100**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **X**
 Far-end eye height is TBD
 SuggestedRemedy
 Replace TBD with 20 mV see ghiasi_3ck_01_0320
 Proposed Response Response Status **O**

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CI 120G SC 120G3.2 P224 L46 # 98
Ghiasi, Ali Ghiasi Quantum/Inphi
Comment Type TR Comment Status X
Near-end eye height is TBD
SuggestedRemedy
Replae TBD with 50 mV see ghiasi_3ck_01_0320
Proposed Response Response Status O

CI 120G SC 120G3.2 P224 L47 # 99
Ghiasi, Ali Ghiasi Quantum/Inphi
Comment Type TR Comment Status X
Far end ESMW is TBD
SuggestedRemedy
Replace TBD with 0.175 UI see ghiasi_3ck_01_0320
Proposed Response Response Status O

CI 120G SC 120G3.3.2 P227 L19 # 103
Ghiasi, Ali Ghiasi Quantum/Inphi
Comment Type TR Comment Status X
Far-end eye height is TBD
SuggestedRemedy
Replace TBD with 20 mV see ghiasi_3ck_01_0320
Proposed Response Response Status O

CI 135A SC 135A.2 P238 L12 # 29
Slavick, Jeff Broadcom
Comment Type E Comment Status X
MMD 9 looks like it might be bold while MMD8 and MMD1 are not
SuggestedRemedy
Fix the font for MMD 9
Proposed Response Response Status O

CI 152 SC 152 P110 L1 # 50
Brown, Matt Huawei Technologies Canada
Comment Type E Comment Status X
Clause 152 was updated in 802.3ct Draft 1.2 such that the Inverse FEC is generic and no amendments are required.
SuggestedRemedy
Delete Clause 152.
Proposed Response Response Status O

CI 161 SC 161.5.2.6 P114 L3 # 23
Slavick, Jeff Broadcom
Comment Type E Comment Status X
In a) and c) the first sentence if is "if" while the second sentence "if" is "If". Seems like the should be the same
SuggestedRemedy
Change them to all be "if"
Proposed Response Response Status O

CI 161 SC 161.5.2.6 P114 L7 # 24
Slavick, Jeff Broadcom
Comment Type E Comment Status X
Missing coma after the x <= 3
SuggestedRemedy
Add the coma
Proposed Response Response Status O

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Cl 161 SC 161.5.2.6 P115 L39 # 88

Nicholl, Shawn Xilinx

Comment Type TR Comment Status X

Figure 161-4 contains the text "am_mapped" while the term "am_txmapped" is used throughout the sub-clause.

SuggestedRemedy

Propose to update Figure 161-4 to change "am_mapped" to "am_txmapped" in two locations.

Proposed Response Response Status O

Cl 161 SC 161.5.4.3 P122 L122 # 89

Nicholl, Shawn Xilinx

Comment Type TR Comment Status X

Figure 161-6 incorrectly contains "pcs_enable_skew" in the DESKEW state.

SuggestedRemedy

Propose to update the DESKEW state of Figure 161-6 to change "pcs_enable_skew" to "fec_enable_deskew".

Proposed Response Response Status O

Cl 161 SC 161.6 P123 L3 # 42

Gustlin, Mark Cisco Systems

Comment Type T Comment Status X

FEC histogram counter are very useful for understanding the performance of an interface. Add in optional histogram counters for the RS-FEC decoder.

SuggestedRemedy

Add into the RS-FEC-Int MDIO function mapping the following registers: RS-FEC symbol error per codeword 1 through RS-FEC symbol error per codeword 15 (a total of 15 registers). 32b each. Each counter counts the number of codewords that contain that specific number of errors. Also add an RS-FEC codeword counter that counts all of the codewords that are received (errored or not), also 32 bits. Note that each of these counters counts all codewords or symbol errors from both interleaved codewords, we do no break these out by interleaved instance.

Proposed Response Response Status O

Cl 161 SC 161.6 P123 L25 # 21

Slavick, Jeff Broadcom

Comment Type TR Comment Status X

PHY stackup is based upon the given PHY type. When layers within that stackup is optional to implement then the existence of that layer in the stackup maybe there or not. When the layer is mandatory to implement the layer is always there. If a layer is optional to use then a method to bypass it's function is provided for the cases when it's implemented but functionality is being skipped. Cl74 (74.8.2) , Cl108 (108.6.3), Cl73 (73.6.10) all provide methods to "bypass" the functionality of the clause when not in use. Cl91 and Cl161 don't have this bypass function in the draft.

SuggestedRemedy

In Table 161-1 add mapping to register 1.200.5 as RS_FEC_Int_enable. Add sub-clause describing this bit as "161.6.14 RS_FEC_Int_enable
The RS-FEC-Int sublayer shall have the capability to enable or disable the FEC function. An MDIO interface or an equivalent management interface shall be provided to access the variable RS_FEC_Int_Enable for the RS-FEC-Int sublayer. When RS_FEC_Int_Enable variable is set to a one, the RS-FEC-Int sublayer performs the transmit function as specified in 161.5.2 and the receive function as specified in 161.5.3. When the variable is set to zero, the transmit and receive functions are disabled, and the RS-FEC-Int sublayer is bypassed, effectively connecting its service interface to the service interface of its underlying sublayer. This variable is mapped to the bit defined in 45.2.1.110.aa."
In Table 45-88 assign bit 6 to be RS-FEC Enable with 1-RS-FEC is enabled, 0 - RS-FEC is disabled, R/W
Description for this bit "Bit 1.200.6 enables the Reed-Solomon FEC described in Clause 91 for PHYs that include both Clause 161 and Clause 91.
Bring in Table 91-2 from 802.3cd-2018 and add a row for RS-FEC Enable, RS_FEC_enable, 1.200.6, RS_FEC_enable
Add new sub-clause to describe the FEC_enable variable as "91.6.2a RS_FEC_enable
For PHYs supporting RS-FEC-Int operation this sublayer shall have the capability to enable or disable its FEC function. An MDIO interface or an equivalent management interface shall be provided to access the variable RS_FEC_Enable for the RS-FEC sublayer. When RS_FEC_Enable variable is set to zero, the RS-FEC sublayer performs the transmit function as specified in 91.5.2 and the receive function as specified in 91.5.3. When the variable is set to a one, the transmit and receive functions are disabled, and the RS-FEC sublayer is bypassed, effectively connecting its service interface to the service interface of its underlying sublayer. This variable is mapped to the bit defined in 45.2.1.110.xx."

Proposed Response Response Status O

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CI 162 SC 162.2 P134 L10 # 6
 Marris, Arthur Cadence Design Systems
 Comment Type E Comment Status X
 Make Clause 119 a cross reference
 SuggestedRemedy
 Add cross reference to Clause 119
 Proposed Response Response Status O

CI 162 SC 162.7 P137 L6 # 7
 Marris, Arthur Cadence Design Systems
 Comment Type T Comment Status X
 Many of the control and status variables in Tables 162-5 and 162-6 are not described or referenced in Clause 162.
 SuggestedRemedy
 Remove rows from Table 162-5 and 162-6 that refer to variables that are not mentioned in Clause 162
 Proposed Response Response Status O

CI 162 SC 162.7 P137 L24 # 25
 Slavick, Jeff Broadcom
 Comment Type TR Comment Status X
 Table 162-5 has a bunch of new entries that don't map to anything. Some of the existing mappings are wrong as well

SuggestedRemedy
 Using editorial license. Rename Table 162-5 to "MDIO/PMD variable mapping". Copy first 7 rows from Table 162-6 to Table 162-5, inserting before Restart training row. Delete Table 162-6. Replace the rows after Seed 0 in Table 162-5 with the following information for each lane

Receiver status #	BASE-R PMD status 1.151.(0+4*#)	local_trained_#
Frame lock #	BASE-R PMD status 1.151.(1+4*#)	local_tf_lock_#
Start-up protocol status #	BASE-R PMD status 1.151.(2+4*#)	training_#
Training failure #	BASE-R PMD status 1.151.(3+4*#)	training_failure_#
Receiver ready #	LP status # 1.(1220+#).15	remote_rx_ready
Modulation and precoding status #	LP status # 1.(1220+#).11:10	remote_tp_mode
Rx frame lock #	LP status # 1.(1220+#).9	remote_tf_lock
Initial condition request #	LP control # 1.(1120+#).13:12	ic_req
Coefficient select #	LP control # 1.(1120+#).4:2	coef_sel
Coefficient request #	LP control # 1.(1120+#).1:0	coef_req
Receiver ready #	LD status # 1.(1420+#).15	local_rx_ready
Initial condition status #	LD status # 1.(1420+#).8	ic_sts
Coefficient status #	LD status # 1.(1420+#).2:0	coef_sts
Modulation and precoding request #	LD control # 1.(1320+#).11:10	local_tp_mode

Proposed Response Response Status O

CI 162 SC 162.8.11 P145 L23 # 18
 Sun, Junqing Credo Semiconductor
 Comment Type TR Comment Status X
 max_wait_timer needs to be extended for 100G due to high complexity. 15 seconds has been discussed.
 SuggestedRemedy
 set max_wait_timer equal to 15 seconds. 10s is the second choice.
 Proposed Response Response Status O

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CI 162 SC 162.8.11 P145 L 34 # 10247

Ran, Adeel Intel
 Comment Type T Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 162.8.11 - Pg 138 - Ln 32]

The PMD control function as currently specified is only effective during start up.

Operation across a wide range of temperatures in some environments may cause slow changes in channel and device characteristics that may require occasional changes of the Tx equalization, preferably without link flaps. It would be good to enable doing it while the link is up.

In Data mode, the startup (training) protocol is inactive. We can specify that when mr_training_en set to 0, instead of exchanging the control and status fields through the protocol, these fields will be written to and read from management registers if MDIO is implemented. Management can relay the control and status fields to/from the link partner through higher level messaging (such as LLDP).

A detailed proposal is planned, but the requested addition in the PMD clauses is a subclause for behavior of the PMD control function when training is false (data mode).

SuggestedRemedy

Add the following paragraphs:

When the training variable is set to false (see 136.8.11.7.1), the PMD control function may optionally continue using Equalization control as defined 136.8.11.4 in the SEND_DATA state, using MDIO registers or alternative methods to exchange control and status fields with the link partner instead of the training frame specified in 136.8.11.1.

NOTE--When training is false, any update to variables corresponding to a change of the Modulation and precoding request bits or the Initial condition request bits, or to setting the Coefficient request bits to "No equalization", can be disruptive to a network.

Proposed Response Response Status O

CI 162 SC 162.9.3 P140 L 8 # 62

Ran, Adeel Intel
 Comment Type T Comment Status X

The maximum step size for c(1) is 0.05, while for all other coefficient it is 0.02.

Having a larger size for c(1) than for c(0) in the transmitter can create unexpected complexities to an optimization algorithm in the receiver (which has no way to tell if the sizes are equal or not). Training algorithms can be made simpler if the steps are nominally equal for all coefficients, so that decrements/increments in c(1) have the same effect on signal swing as other coefficients.

From the transmitter's point of view, there is little benefit, if at all, from having c(1) with a larger step size than all others.

Note that this comment is specific to the Tx electrical specifications. The COM search grid does not necessarily have to change (especially since c(1) is usually set to 0 in COM).

A presentation with further explanations is planned.

SuggestedRemedy

Change step size limits for c(1) to align with all other coefficients.

Add a recommendation that implementations should have the same nominal step size for all coefficients, with editorial license.

Proposed Response Response Status O

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CI 162 SC 162.9.3 P140 L10 # 63

Ran, Adeel Intel
 Comment Type T Comment Status X

The maximum step size of 2% for a PAM4 equalizer creates a significant increase in complexity for a DAC-based transmitter implementation, compared to the step size required in the 802.3cd specs.

A PAM4 DAC with the 2.5% specification in 802.3cd is required to be able of outputting 6/0.025=240 possible values, while with a 2% step size it requires 6/0.02=300 possible values. This means an additional bit should be used in the logic implementing the FFE and DAC control, and the analog circuits should enable more combinations.

The estimated cost in power consumption of the FFE+DAC logic and analog circuits from this small change in resolution, with a non-naive design, is about 0.3-0.4 pJ/bit. This additional power is going to be consumed regardless of the channel in question.

As presented in ran_3ck_adhoc_01_021920, COM sensitivity analysis shows the benefit from this finer resolution is negligible. It is expected that real life performance will also have little dependence on the step size. Therefore, requiring a smaller maximum step than 2/5% will just waste power.

SuggestedRemedy

Change the (max.) values for c(-3), c(-2), c(-1), and c(0) to 0.025.

Proposed Response Response Status O

CI 162 SC 162.9.3 P146 L19 # 73

Healey, Adam Broadcom Inc.
 Comment Type T Comment Status X

A +/-100 ppm frequency tolerance on the signaling rate is "traditional" but I understand reference clocks with at least half of this tolerance are available at similar costs. Incremental improvements to receiver performance margin are available with the use of a higher precision reference.

SuggestedRemedy

Change the frequency tolerance to +/-50 ppm in Tables 162-8, 162-11, 163-5, 120F-1, 120G-1, 120G-3, 120G-4, and 120G-7.

Proposed Response Response Status O

CI 162 SC 162.9.3 P146 L27 # 10003

Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL

[Comment resubmitted from Draft 1.0. Subcl. 162.9.3 - Pg 139 - In 27]

ERL of 11 dB seems to capture most of posted channel data.

SuggestedRemedy

In table 162-8 change ERL(min) to 11 dB as suggested on slide 5 of mellitz_3ck_04_1119.

Proposed Response Response Status O

CI 162 SC 162.9.3 P147 L9 # 74

Healey, Adam Broadcom Inc.
 Comment Type T Comment Status X

The maximum step size for the transmitter equalizer coefficients is unnecessarily small.

SuggestedRemedy

Increase the maximum step size to 0.025 for all coefficients.

Proposed Response Response Status O

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Cl 162 SC 162.9.3 P147 L10 # 10249

Ran, Adeel Intel
 Comment Type T Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 162.9.3 - Pg 140 - In 10]

The maximum step size of 2% for a PAM4 equalizer creates a significant increase in complexity for a DAC-based transmitter implementation, compared to the step size allowed in the 802.3cd specs.

A PAM4 DAC with the 2.5% specification in 802.3cd is required to be able of outputting $6/0.025=240$ possible values, while with a 2% step size it requires $6/0.02=300$ possible values. This means an additional bit should be used in the logic implementing the FFE and DAC control, and the analog circuits should enable more combinations.

The estimated cost in power consumption of the FFE+DAC logic and analog circuits from this small change in resolution, with a non-naive design, is about 0.3-0.4 pJ/bit. This additional power is going to be consumed regardless of the channel in question.

The benefit from this finer resolution has not been analyzed thoroughly enough to justify such an increase in implementation burden and power consumption.

SuggestedRemedy

Change the (max.) values for c(-3) to c(0) to 0.024 (which can be met with a DAC capable of 256 output values).

Proposed Response Response Status

Cl 162 SC 162.9.3 P147 L20 # 65

Mellitz, Richard Samtec
 Comment Type TR Comment Status X

SNDR needs be 0.5 dB less than SNR_Tx to account for measurements. Straw poll on this subject was done without proper presented data.

SuggestedRemedy

Replace SNDR 32.2 dB with 31.5 dB

Proposed Response Response Status

Cl 162 SC 162.9.3 P147 L24 # 10252

Ran, Adeel Intel
 Comment Type T Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 162.9.3 - Pg 140 - In 24]

Maximum for even-odd jitter is specified here. This is mainly required for transmitters which are driven by a half-rate clock.

For >53.1 GBd signaling, a >26.3 GHz clock is needed to drive the transmitter clock in half-rate. This is a high frequency for current CMOS processes and implementations with quarter-rate clocking (13.3 GHz clock) should be considered.

With quarter-rate signaling, even if the even-odd jitter (mismatches between phases 0:2 and between 1:3) is controlled to meet the specifications, the quadrature jitter (mismatches between phases 0:1 and between 2:3) can be large, and the current even-odd jitter measurements do not cover this impairment.

We need to limit quadrature jitter so a similar portion of the UI.

New specification for quadrature jitter will be provided in future contributions. I assume it will be similar to the EOJ measurement with slight modifications. For the time being the measurement method can be left as TBD.

SuggestedRemedy

Add a line for "Quadrature jitter, Pk-Pk", with subclause reference TBD, and value 0.019 UI.

Proposed Response Response Status

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Cl 162 SC 162.9.3.1 P148 L1 # 57

Ran, Adee Intel
 Comment Type T Comment Status X

The COM parameter b_max(n) for n=2 is 0.3. This resulted from observations that for some channels there is a large 2nd postcursor after the linear equalization performed in the COM calculation.

However, it is likely that many real implementations will not implement a 2nd DFE tap and instead use linear equalization (a combination of CTLE, FFE in the receiver, and possibly the Tx equalizer c(+1) too) to handle this ISI.

If linear equalization is required for the 2nd postcursor then it may be beneficial to make it available in the transmitter by adding c(+2). Implementation of another tap in the transmitter is simple (impact on power etc. is low). Receivers may chose whether to use internal equalization or utilize the training protocol to control c(+2).

Note that this additional coefficient does not necessarily need to have an equivalent in COM; it is observed that in COM results, even c(+1) is left at 0 for most channels, so the addition of another tap may just increase run time and is not expected to change the results. However, c(+1) (and the proposed c(+2)) can be used in actual implementations where the Rx may have different structure than the COM reference.

SuggestedRemedy

A presentation is planned with further details.

Proposed Response Response Status O

Cl 162 SC 162.9.3.1.5 P150 L33 # 27

Slavick, Jeff Broadcom
 Comment Type ER Comment Status X

There are 3 taps being set to zero now, however both refers to just 2.

SuggestedRemedy

Delete the "both" after c(-1)

Proposed Response Response Status O

Cl 162 SC 162.9.3.1.5 P150 L34 # 51

Brown, Matt Huawei Technologies Canada
 Comment Type E Comment Status X

There are 3 taps so "both" should be deleted.

SuggestedRemedy

Change "both set to zero" to "set to zero".

Proposed Response Response Status O

Cl 162 SC 162.9.3.1.5 P150 L43 # 26

Slavick, Jeff Broadcom
 Comment Type E Comment Status X

For testing the range of c(1) and c(-1) you lump that both c(0) and the tap are at "their" minimum values, but with c(-3) you use the form used for c(-2) where c(0) is at it's minimum and c(-2) is at it's minimum.

SuggestedRemedy

change "With c(-2), c(-1) and c(1) set to zero, c(0) having received sufficient "decrement" requests so that it is at its minimum value, and c(-3) having received sufficient "decrement" requests so that it is at its minimum value, c(-3) shall be less than or equal to -0.06." to be

"With c(-2), c(-1) and c(1) set to zero and both c(0) and c(-3) having received sufficient "decrement" requests so that they are at their respective minimum values, c(-3) shall be less than or equal to -0.06."

Proposed Response Response Status O

Cl 162 SC 162.9.3.1.5 P150 L47 # 52

Brown, Matt Huawei Technologies Canada
 Comment Type E Comment Status X

Unnecessary comma. Not needed to separate two distinct phrases.

SuggestedRemedy

Change "162.8.11, or by" to "162.8.11 or by".

Proposed Response Response Status O

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CI 162 SC 162.9.3.4 P151 L21 # 10009
Mellitz, Richard Samtec
Comment Type TR Comment Status D ERL
[Comment resubmitted from Draft 1.0. Subcl. 162.9.3.4 - Pg 144 - ln 26]
The relation between Pmax/Vf and ERL has not been established for this data rate
SuggestedRemedy
Change line 36 to ERL >= 11 dB. Change TBD parameters in table 162-10 beta_x, rho_x, N, and N_bx to 2.4 GHz, 0.3, 1000 UI, and 12 UI respectively as suggested on slide 6 of mellitz_3ck_04_1119.
Proposed Response Response Status O

CI 162 SC 162.9.3.4 P151 L26 # 128
Ghiasi, Ali Ghiasi Quantum/Inphi
Comment Type TR Comment Status X
Nbx and ERL, TBD, Bx, N, Rho are TBDs
SuggestedRemedy
Nbx=12, ERL =11 dB, Bx=2.3047e9, Bx=0.19, and N=300
See ghiasi_3ck_03_0320
Proposed Response Response Status O

CI 162 SC 162.9.4 P151 L44 # 8
Marris, Arthur Cadence Design Systems
Comment Type E Comment Status X
Make 162A.3 a cross reference
SuggestedRemedy
Add cross reference to 162A.3
Proposed Response Response Status O

CI 162 SC 162.9.4 P152 L14 # 10010
Mellitz, Richard Samtec
Comment Type TR Comment Status D ERL
[Comment resubmitted from Draft 1.0. Subcl. 162.9.4 - Pg 145 - ln 15]
ERL of 11 dB seems to capture most of posted channel data as suggested in slide 5 mellitz_3ck_04_1119
SuggestedRemedy
Change ERL min to 11 dB
Proposed Response Response Status O

CI 162 SC 162.9.4 P152 L15 # 129
Ghiasi, Ali Ghiasi Quantum/Inphi
Comment Type TR Comment Status X
ERL is TBD
SuggestedRemedy
ERL=11.0 dB, see ghiasi_3ck_03_0320
Proposed Response Response Status O

CI 162 SC 162.9.4 P152 L16 # 130
Ghiasi, Ali Ghiasi Quantum/Inphi
Comment Type TR Comment Status X
ERL is TBD
SuggestedRemedy
RLCD=30-30*f/25.78 dB, from 10 MHz to 12.89 GHz
RLCD=15 dB 12.89 to 53 GHz
See ghiasi_3ck_03_0320
Proposed Response Response Status O

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CI 162 SC 162.9.4.3 P152 L38 # 37

Ben Artsi, Liav

Marvell

Comment Type T Comment Status X

Receiver characteristics lacks the definition of capability to tolerate common mode noise at the receiver input

SuggestedRemedy

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

Proposed Response Response Status O

CI 162 SC 162.9.4.3 P153 L28 # 53

Brown, Matt

Huawei Technologies Canada

Comment Type E Comment Status X

Editor's note has expired.

SuggestedRemedy

Delete editor's note.

Proposed Response Response Status O

CI 162 SC 162.9.4.3.3 P154 L1 # 9

Marris, Arthur

Cadence Design Systems

Comment Type T Comment Status X

Define the acronyms SCHS, CTSP, HOSP, CASP

SuggestedRemedy

Explain these acronyms here or in 1.5

Proposed Response Response Status O

CI 162 SC 162.9.4.5 P156 L14 # 10011

Mellitz, Richard

Samtec

Comment Type TR Comment Status D ERL

[Comment resubmitted from Draft 1.0. Subcl. 162.9.4.5 - Pg 148 - In 48]

ERL of 11 dB seems to capture most of posted channel data as suggested in slide 5 mellitz_3ck_04_1119

SuggestedRemedy

Change to "Receiver ERL at TP3 shall be greater than or equal to 11dB"

Proposed Response Response Status O

CI 162 SC 162.9.4.5 P156 L15 # 131

Ghiasi, Ali

Ghiasi Quantum/Inphi

Comment Type TR Comment Status X

ERL is TBD

SuggestedRemedy

ERL=11.0 dB, see ghiasi_3ck_03_0320

Proposed Response Response Status O

CI 162 SC 162.11.2 P157 L11 # 10079

Palkert, Tom

Molex

Comment Type T Comment Status D

Comment resubmitted from Draft 1.0. Subcl. 162.11.2 - Pg 150 - In 3]

Differential to common-mode return loss, Differential to common mode conversion loss and Common-mode to common-mode return loss are not required if ERL and COM are used to specify Cable Assembly characteristics.

SuggestedRemedy

Delete Differential to common-mode return loss, Differential to common mode conversion loss and Common-mode to common-mode return loss from Table 162-13 (Cable assembly characteristics summary)

Proposed Response Response Status O

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CI 162 SC 162.11.2 P157 L15 # 10276
 DiMinico, Christopher MC Communications
 Comment Type T Comment Status D Late
 [Comment resubmitted from Draft 1.0. Subcl. 162.11.2 - Pg 150 - ln 6]
 Comment#2
 Min Cable/PCB calculation for 802.3cd assumed linear scaling for cable and PCBs.
 Use same Cable/PCB IL assumptions for Max/Min Cable Assembly.
 Table 162-13—Cable assembly characteristics summary [Minimum insertion loss at 26.56 GHz 162.11.2 11.09 dB]
 Table 162A-1—Insertion loss budget values at 26.56 GHz [ILCamin 11.09 dB]
 SuggestedRemedy
 See diminico_3ck_2_0220.pdf.
 Proposed Response Response Status O

CI 162 SC 162.11.3 P157 L11 # 10013
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL
 [Comment resubmitted from Draft 1.0. Subcl. 162.11.3 - Pg 150 - ln 8]
 ERL of 13.5 dB seems to capture most of posted channel data as suggested in slide 3 mellitz_3ck_04_1119
 SuggestedRemedy
 Change Minimum cable assembly ERL to 13.5 dB in table 162-13.
 Proposed Response Response Status O

CI 162 SC 162.11.3 P157 L43 # 10012
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL
 [Comment resubmitted from Draft 1.0. Subcl. 162.11.3 - Pg 150 - ln 39]
 ERL of 13.5 dB seems to capture most of posted channel data as suggested in slide 3 mellitz_3ck_04_1119
 SuggestedRemedy
 Change line 39 to Cable assembly ERL at TP1 and at TP4 shall be greater than or equal to 13.5 dB for cable assemblies that have a COM less than 4 dB. Also change TBD parameters in table 162-14 beta_x, rho_x, N, and N_bx to 2.4 GHz, 0.21, 3000 UI, and 12 UI respectively as suggested on slide 4 of mellitz_3ck_04_1119.
 Proposed Response Response Status O

CI 162 SC 162.11.7 P158 L26 # 66
 Mellitz, Richard Samtec
 Comment Type TR Comment Status X
 Tr should be scaled from 50G BaseKR because other timing parameter were scaled.
 SuggestedRemedy
 Replace TBD for Tr with 6.01e-3 ns
 Proposed Response Response Status O

CI 162 SC 162.11.7 P158 L38 # 54
 Brown, Matt Huawei Technologies Canada
 Comment Type E Comment Status X
 Editor's note is no longer required.
 SuggestedRemedy
 Delete editor's note.
 Proposed Response Response Status O

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CI 162 SC 162.11.7 P159 L21 # 75

Healey, Adam Broadcom Inc.

Comment Type T Comment Status X

The transmitter equalizer coefficient ranges are unnecessarily broad. This leads to wasted search time and the possibility that an expected channel will meet the COM requirements.

SuggestedRemedy

Reduce the coefficient ranges to the minimum required to support reasonable channels submitted for Task Force consideration. Make similar changes to Table 163-10.

Proposed Response Response Status O

CI 162 SC 162.11.7 P160 L6 # 10014

Mellitz, Richard Samtec

Comment Type TR Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 162.11.7 - Pg 152 - ln 33]

To move forwards a value for SNR_Tx needs to be chosen

SuggestedRemedy

Replace TBD with 32 dB as in slide 8 of mellitz_3ck_03_1119, slide 9 of lim_3ck_01_1119 in Table 162-15.

Proposed Response Response Status O

CI 162 SC 162.11.7 P160 L6 # 64

Mellitz, Richard Samtec

Comment Type TR Comment Status X

SNR_Tx needs to account for host board crosstalk as suggested in mellitz_3ck_03b_1119 and lim_3ck_01_1119.pdf

SuggestedRemedy

Replace TBD for SNR_Tx with 32 dB

Proposed Response Response Status O

CI 162 SC 162.11.7 P160 L11 # 136

Dawe, Piers Mellanox

Comment Type TR Comment Status X

Slide 6 of heck_3ck_01_0919 shows that the DFE taps are 2 and 3 are always strongly positive, and no taps strongly negative, yet the draft would allow such untypical/hypothetical channels that a real receiver need not, and maybe can't, cope with. kasapi_3ck_01_1119 slide 7 shows the first tap also. We need sensible minimum tap limits.

SuggestedRemedy

Add minimum tap weight limits:

Tap 1: min +0.3

Tap 2: min +0.05

Remembering that a tap weight limit isn't a hard pass-fail limit; channels can go outside it but pay a (very small, for one or two small excursions) increase in COM for the excess ISI noise that they cause; and that cable channels are smoother than backplane channels but can have higher loss:

All other taps: min -0.03 (tighter than for KR).

Turn the existing "Normalized DFE coefficient magnitude limit"s into "Normalized DFE coefficient limit"s.

Update definition of COM in 93A.1.

Proposed Response Response Status O

CI 162 SC 162.11.7 P160 L18 # 10151

Dawe, Piers Mellanox

Comment Type TR Comment Status D

[Comment resubmitted from Draft 1.0. Subcl. 162.11.7 - Pg 152 - ln 45]

40 UI span was chosen to fit data on backplane channels, and is excessive even for them. Cable channels are smoother. Very short low loss cables should pass easily anyway.

SuggestedRemedy

Change 40 to an appropriate number, e.g. 24.

Proposed Response Response Status O

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CI 162 SC 162.11.7 P160 L18 # 148
 Dawe, Piers Mellanox
 Comment Type T Comment Status X
 This says "DFE floating tap span 40 UI" which is not what was intended. The span of the floating taps in this draft is 40-12 = 28.
 SuggestedRemedy
 Change the name or the number. Adjust 93A.1 if appropriate.
 Proposed Response Response Status O

CI 162 SC 162.11.7 P180 L45 # 160
 Kareti, Upen Reddy Cisco
 Comment Type TR Comment Status X
 DFE floating tap tail root-sum-of-squares limit 0.02, which is changed from from adopted baseline value of 0.03.
 This constraint was created to avoid test programs to create unrelastic channel and subject serdes to pass such a channel This is not intended to limit resonable real channels. The value 0.03 is arrived by looking KR and CR channels for possible package combination. Constraining further only fails some of the channels including Task Force identified must pass cahnnels.
 SuggestedRemedy
 Change back to Adopted base line value of 0.03 or eliminate this constaint altogether
 Proposed Response Response Status O

CI 162 SC 162.11.7.1 P160 L42 # 40
 Ben Artsi, Liav Marvell
 Comment Type T Comment Status X
 Cable assembly "include PCB" section lacks the representation of host board discontinuities as were presented in benartsi_3ck_01a_0919.pdf slide #6
 SuggestedRemedy
 Update section 162.11.7.1 to accommodate the "include PCB" representation as described in benartsi_3ck_01a_0919.pdf slide #6 e.g. add two capacitive discontinuities and set their values to 19fF and 29fF. Update the trace parameters according to the supplied in the slide
 Proposed Response Response Status O

CI 162 SC 162.11.7.1 P160 L42 # 41
 Ben Artsi, Liav Marvell
 Comment Type T Comment Status X
 Cable assembly "include PCB" section lacks the appropriate trace loss representation
 SuggestedRemedy
 Once adding two capacitive discontinuities to section 162.11.7.1 to accommodate the "include PCB" representation as described in benartsi_3ck_01a_0919.pdf slide #6 trace parameters should be updated accordingly, thus set trace parameters according to the supplied in slide #6 of benartsi_3ck_01a_0919.pdf
 Proposed Response Response Status O

CI 162 SC 162.11.7.1 P160 L48 # 10016
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D
 [Comment resubmitted from Draft 1.0. Subcl. 162.11.7.1 - Pg 153 - In 28]
 Fill in Zp TBD's with data from slide 8 of benartsi_3ck_01a_0719.
 SuggestedRemedy
 Change Line 28ff to Equation (93A-13) and Equation (93A-14) using zp = 110.3 mm in length and the parameter values given in {new table}, with the exception that Zc is 100 O, representing an insertion loss of 4.33 dB at 26.56 GHz on each PCB
 Proposed Response Response Status O

CI 162 SC 162.11.7.1 P160 L48 # 10017
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D
 [Comment resubmitted from Draft 1.0. Subcl. 162.11.7.1 - Pg 153 - In 28]
 add {new table for 93A transmission line with data from slide 8 of benartsi_3ck_01a_0719.
 SuggestedRemedy
 gamma0, a1, a2 = [0 3.8206e-04 9.5909e-05]; tau=5.790E-03 ns/mm
 Proposed Response Response Status O

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CI 162 SC 162.11.7.1.2 P161 L19 # 10018
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D
 [Comment resubmitted from Draft 1.0. Subcl. 162.11.7.1.2 - Pg 153 - ln 51]
 Fill in TBD's with data from slide 8 of benartsi_3ck_01a_0719.
 SuggestedRemedy
 use same data as for signal path
 Proposed Response Response Status O

CI 162A SC 162A.5 P241 L13 # 138
 Dawe, Piers Mellanox
 Comment Type T Comment Status X
 In Figure 162A-1, TP4 and TP5 are shown aligned with each other, and TP0 and the end of the MCB, while TP1 and the end of the MCB, and TP2 and the end of the HCB, are not aligned. Compare Figure 92A-2.
 SuggestedRemedy
 Show TP5 further right than TP4, and TP0 to the left of the end of the MCB. Align TP1 and the end of the MCB, and TP2 and the end of the HCB.
 Proposed Response Response Status O

CI 162A SC 162A.5 P241 L45 # 145
 Dawe, Piers Mellanox
 Comment Type T Comment Status X
 I wonder if there is an inconsistency between the numbers in Table 162A-1 and those in Figure 162A-2. The 0.2 dB "MCB via allowance" could be the cause of the confusion.
 SuggestedRemedy
 Proposed Response Response Status O

CI 162B SC 162B.1.3 P245 L25 # 10277
 DiMinico, Christopher MC Communications
 Comment Type TR Comment Status D Late
 [Comment resubmitted from Draft 1.0. Subcl. 162B.1.3 - Pg 235 - ln 24]
 Annex 162B 162B.1.3 Mated test fixtures
 Provide values for TBDs;
 162B.1.3.1 Mated test fixtures differential insertion loss Equation (162B-3) and Equation (162B-5).
 162B.1.3.3 Mated test fixtures common-mode conversion insertion loss Equation (162B-9).
 162B.1.3.5 Mated test fixtures common-mode to differential mode return loss Equation (162B-10).

SuggestedRemedy
 See diminico_3ck_1_0220.pdf.
 Proposed Response Response Status O

CI 162B SC 162B.1.3.6 P249 L27 # 43
 Zambell, Andrew Luxshare-ICT
 Comment Type T Comment Status X
 Should we still be saying SFP28?
 SuggestedRemedy
 Replace SFP28 with either SFP112 (like it's stated in 162.12 and 162.D) or Single-lane (like tables 162B-3 & 162B-4).
 Proposed Response Response Status O

CI 162B SC 162B.1.3.6 P249 L27 # 152
 Dudek, Mike Marvell
 Comment Type T Comment Status X
 This section is describing the test fixtures for 112G use which are called SFP112 in 162C.2.1 which have different specifications to those for SFP28.
 SuggestedRemedy
 Change SFP28 to SFP112 in 4 places in annex 162B.
 Proposed Response Response Status O

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Cl 162B SC 162B.1.3.6 P249 L32 # 44
 Zambell, Andrew Luxshare-ICT
 Comment Type T Comment Status X
 Should we still be saying SFP28?
 SuggestedRemedy
 Replace SFP28 with either SFP112 (like it's stated in 162.12 and 162.D) or Single-lane (like tables 162B-3 & 162B-4).
 Proposed Response Response Status O

Cl 162C SC 162C.2.6 P262 L29 # 87
 Kocsis, Sam Amphenol
 Comment Type ER Comment Status X
 Figure 162C-12 missing image
 SuggestedRemedy
 Include "receptacle" image referenced in kocsis_3ck_adhoc_01_030420
 Proposed Response Response Status O

Cl 162B SC 162B.1.3.6 P249 L43 # 45
 Zambell, Andrew Luxshare-ICT
 Comment Type T Comment Status X
 Should we still be saying SFP28?
 SuggestedRemedy
 Replace SFP28 with either SFP112 (like it's stated in 162.12 and 162.D) or Single-lane (like tables 162B-3 & 162B-4).
 Proposed Response Response Status O

Cl 162C SC 162C.2.6 P262 L29 # 85
 Kocsis, Sam Amphenol
 Comment Type ER Comment Status X
 Figure 162C-12 description says "OSFP"
 SuggestedRemedy
 Replace "OSFP" with "DSFP"
 Proposed Response Response Status O

Cl 162C SC 162C.2.6 P262 L15 # 86
 Kocsis, Sam Amphenol
 Comment Type ER Comment Status X
 Figure 162C-11 missing image
 SuggestedRemedy
 Include "plug" image referenced in kocsis_3ck_adhoc_01_030420
 Proposed Response Response Status O

Cl 162D SC 162D P306 L1 # 150
 Dudek, Mike Marvell
 Comment Type T Comment Status X
 This section is informative and will be rather similar to 136D duplicating lots of information with technically obvious changes.
 SuggestedRemedy
 Consider deleting this section
 Proposed Response Response Status O

Cl 163 SC 163.7 P173 L54 # 10
 Marris, Arthur Cadence Design Systems
 Comment Type E Comment Status X
 Make 162.7 a proper cross reference
 SuggestedRemedy
 Convert 162.7 to a cross reference
 Proposed Response Response Status O

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Cl 163 SC 163.9.1 P175 L 26 # 30
 Ben Artsi, Liav Marvell
 Comment Type T Comment Status X
 TP0a has been shown to be extremely difficult to be used as a point to measure Specified Tx compliance parameters.
SuggestedRemedy
 Measurement will still be done at TP0a, but Tx is to be specified at TP0.
 A new annex is to be defined to specify method of extrapolating/simulating each of the Tx parameters from TP0 to TP0a.
 A presentation will be provided.
 Proposed Response Response Status O

Cl 163 SC 163.9.1 P175 L 35 # 58
 Ran, Adeo Intel
 Comment Type T Comment Status X
 As was discussed in the January 2020 meeting there is interest in enabling DC-coupled channels in some applications (mainly backplane and C2C) when the two link partners support this operation. Avoiding AC coupling capacitors in the channels can help board design, improve signal integrity, and reduce costs, and it is becoming a common requirement.
 Current channel specs refer back to 93.9.4 where it is stated that AC coupling capacitors may not exist between TP0 and TP5, but in that case some specifications may need modifications for interoperability (without stating the modifications explicitly). This leaves the burden of defining new Rx and Tx specifications to implementers and integrators - with no standard to assist them.
 Indeed, the current transmitter specifications in 120F.3.1 and in 163.9.1 allow high common mode voltage up to 1.9 V, which is detrimental for DC coupling with modern CMOS devices. This high value is also not useful for Tx design with modern applications.
 DC coupling can be supported by limiting the Tx common mode voltage to a more reasonable and useful range. If this is done, the existing specs may be useable without change for DC coupled channels (although receivers may still need special support for this).
 This proposal is specific for KR and C2C specifications which require on-board AC coupling; CR and C2M have AC coupling in the cable and in the module, respectively, so they need a separate discussion.
SuggestedRemedy
 In the transmitter characteristics tables of Clause 163 and Annex 120F, Change the Tx common mode voltage to be between 0.2 and 0.8 volts.
 Additional content may be beneficial for the AC coupling subclauses. I intend to provide some text in a presentation, to complement the suggested Tx specs.
 Proposed Response Response Status O

Cl 163 SC 163.9.1 P175 L 44 # 68
 Mellitz, Richard Samtec
 Comment Type TR Comment Status X
 Vfmin should align with Av in COM table 163-10 since Np=200
SuggestedRemedy
 Replace 0.4 with 0.413
 Proposed Response Response Status O

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CI 163 SC 163.9.1 P176 L8 # 76
 Healey, Adam Broadcom Inc.
 Comment Type T Comment Status X
 The maximum step size for c(1) (0.05) does not agree with the same value specified in Table 162-8 (0.02) for n00GBASE-CRn. There is no reason that they should be different.
 SuggestedRemedy
 Align the coefficient step size requirements between Tables 162-8, 163-5, and 120F-1.
 Proposed Response Response Status O

CI 163 SC 163.9.1.1 P176 L27 # 10069
 Wu, Mau-Lin MediaTek
 Comment Type T Comment Status D ERL
 [Comment resubmitted from Draft 1.0. Subcl. 163.9.2.1 - Pg 171 - In 5]
 Current ERL calculation doesn't consider DFE "floating-tap". The concern is the ERL is very sensitive across "N_bx" boundary as raised in wu_3ck_02a_1119. We need to enhance ERL calculation methodology.
 SuggestedRemedy
 Modify ERL as capable of DFE floating tap as proposed in wu_3ck_01_0120. The same methodology shall be applied to CR TX, CR RX, KR TX, & KR RX ERL calculations in the following subclauses.
 162.9.3.4 Transmitter effective return loss (ERL) 162.9.4.5 Receiver ERL
 163.9.2.1 Transmitter ERL
 163.9.3 Receiver characteristics
 Proposed Response Response Status O

CI 163 SC 163.9.1.1 P176 L27 # 80
 Healey, Adam Broadcom Inc.
 Comment Type T Comment Status X
 As observed in healey_3ck_01a_0120, effective return loss (ERL), as it is currently defined, does not adequately constrain the re-reflection interference seen by the receiver. This is arguably its primary function and the method/parameters need to be re-evaluated.
 SuggestedRemedy
 Modify parameters and/or method to achieve better correlation to re-reflection interference and set the limit accordingly. Similar change would apply to Annex 120F.
 Proposed Response Response Status O

CI 163 SC 163.9.1.1 P176 L30 # 10020
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL
 [Comment resubmitted from Draft 1.0. Subcl. 163.9.2.1 - Pg 171 - In 5]
 Nbx=Nb has been shown not correlate well to COM in mellitz_3ck_adhoc_02_100219.
 Nbx=24 seems to be a better choice
 SuggestedRemedy
 Change "Nbx is set to the value of Nb in Table 163-10" to "Nbx is set to 24 UI"
 Proposed Response Response Status O

CI 163 SC 163.9.1.1 P176 L34 # 10021
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL
 [Comment resubmitted from Draft 1.0. Subcl. 163.9.2.1 - Pg 171 - In 10]
 Table 163-3 was developed for a different data rate and reference package assumption. Recommendation were proposed in mellitz_3ck_01_1119 slide 7.
 SuggestedRemedy
 In Table 163-3 set: beta_x=2.4 GHz , rho_x=.3
 Proposed Response Response Status O

CI 163 SC 163.9.1.2 P176 L47 # 31
 Ben Artsi, Liav Marvell
 Comment Type T Comment Status X
 A reference TP0 - TP0a test fixture is specified. It is also indicated that the difference between the test fixture and the actual implementation is to be taken into account in the measurement. It is not stated how to do this adjustment.
 SuggestedRemedy
 Specify an achievable range for the TP0 - TP0a test fixture: Loss @ ~26GHz <6dB ; ILD ; ERL? A presentation is to be provided with the actual suggestion
 Proposed Response Response Status O

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CI 163 SC 163.9.1.2 P176 L53 # 14
 Sun, Junqing Credo Semiconductor
 Comment Type **TR** Comment Status **X**
 0.01dB is found to be a typo.
SuggestedRemedy
 Change 0.01dB to 0.1dB as in clause 93.8.1.1.
 Proposed Response Response Status **O**

CI 163 SC 163.9.2 P178 L45 # 38
 Ben Artsi, Liav Marvell
 Comment Type **T** Comment Status **X**
 Receiver characteristics lacks the definition of capability to tolerate common mode noise at the receiver input
SuggestedRemedy
 Add the required capability of Rx common mode broadband noise tolerance and set it at TBD at least for now
 Proposed Response Response Status **O**

CI 163 SC 163.9.2.1 P178 L52 # 10022
 Mellitz, Richard Samtec
 Comment Type **TR** Comment Status **D** ERL
 [Comment resubmitted from Draft 1.0. Subcl. 163.9.3.1 - Pg 171 - In 44]
 Nbx=Nb has been shown not correlate well to COM in mellitz_3ck_adhoc_02_100219.
 Nbx=24 seems to be a better choice
SuggestedRemedy
 Change "Nbx is set to the value of Nb in Table 163-10" to "Nbx is set to 24 UI"
 Proposed Response Response Status **O**

CI 163 SC 163.9.2.2 P179 L21 # 32
 Ben Artsi, Liav Marvell
 Comment Type **T** Comment Status **X**
 The Rx test fixture is embedded as part of the interconnect used for the interference tolerance test. Thus, there is no reason to limit the loss and behavior so tightly as done on line 21. Doing so will not enable connecting more than very few (if any!) Rx lanes to TP5a for testing.
SuggestedRemedy
 Recommend increasing loss limits to 4dB at 26.56GHz
 Proposed Response Response Status **O**

CI 163 SC 163.9.2.2 P179 L22 # 15
 Sun, Junqing Credo Semiconductor
 Comment Type **TR** Comment Status **X**
 0.01dB is found to be a typo.
SuggestedRemedy
 Change 0.01dB to 0.1dB as in clause 93.8.2.1.
 Proposed Response Response Status **O**

CI 163 SC 163.9.2.3 P179 L34 # 79
 Healey, Adam Broadcom Inc.
 Comment Type **T** Comment Status **X**
 The receiver interference tolerance procedure defined in 120F.3.2.3 includes guidance on the output return loss of the test setup (item b). This guidance does not appear to be present in this description of a similar test procedure for n00GBASE-KRn.
SuggestedRemedy
 Add an item stating "The return loss of the test setup in Figure 93C-4 measured at TP5 replica towards TPt meets the requirements of Equation (163-2)."
 Proposed Response Response Status **O**

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Cl 163 SC 163.9.2.4 P180 L47 # 33

Ben Artsi, Liav Marvell
 Comment Type T Comment Status X

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

SuggestedRemedy

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

Proposed Response Response Status O

Cl 163 SC 163.10 P181 L26 # 39

Ben Artsi, Liav Marvell
 Comment Type T Comment Status X

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

SuggestedRemedy

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

Proposed Response Response Status O

Cl 163 SC 163.10 P181 L28 # 67

Mellitz, Richard Samtec
 Comment Type TR Comment Status X

Tr should be scaled from 50G BaseKR because other timing parameter were scaled.

SuggestedRemedy

Replace TBD for Tr with 6.01e-3 ns

Proposed Response Response Status O

Cl 163 SC 163.10 P181 L29 # 155

Li, Mike Intel
 Comment Type TR Comment Status X

Tr TBD

SuggestedRemedy

Change it to Tr =6.5 ps, which is consistent with CEI-112G-PAM4-LR

Proposed Response Response Status O

Cl 163 SC 163.10 P183 L13 # 139

Dawe, Piers Mellanox
 Comment Type TR Comment Status X

Slide 6 of heck_3ck_01_0919 shows that the DFE taps are 2 and 3 are always strongly positive, and no taps strongly negative, yet the draft would allow such untypical/hypothetical channels that a real receiver need not, and maybe can't, cope with. kasapi_3ck_01_1119 slide 7 shows the first tap also. We need sensible minimum tap limits.

SuggestedRemedy

Add minimum tap weight limits:

Tap 1: min +0.3

Tap 2: min +0.05

Remembering that a tap weight limit isn't a hard pass-fail limit; channels can go outside it but pay a (very small, for one or two small excursions) increase in COM for the excess ISI noise that they cause:

All other taps: min -0.04 (looser than for CR).

Turn the existing "Normalized DFE coefficient magnitude limit"s into "Normalized DFE coefficient limit"s.

Update definition of COM in 93A.1.

Proposed Response Response Status O

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CI 163 SC 163.10.2 P184 L 24 # 10024

Mellitz, Richard Samtec
Comment Type TR Comment Status D ERL

[Comment resubmitted from Draft 1.0. Subcl. 163.10.2 - Pg 177 - ln 13]

Table 163-11 was developed for a different data rate and reference package assumption.
Recommendation were proposed in mellitz_3ck_01_1119 slide 5.

SuggestedRemedy

In Table 163-11 set: beta_x=2.4 GHz , rho_x=.19

Proposed Response Response Status O

CI 163 SC 163.13.4.2 P188 L 26 # 28

Slavick, Jeff Broadcom
Comment Type TR Comment Status X

References in 162 go to 136 when possible

SuggestedRemedy

- Change:
PC3 to refer to 136.8.11.1.3
PC5 to refer to 136.8.11.3.3
PC6 to refer to 136.8.11.4.1
PC7 to refer to 136.8.11.6
PC8 to refer to 136.8.11.7.5
PC9 to refer to 136.8.11.7.5

Proposed Response Response Status O