

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

Cl 1 SC 1.4 P30 L3 # 208
 Ran, Adee Intel
 Comment Type E Comment Status A bucket
 1.4.24 is not "100GBASE-X"
 SuggestedRemedy
 Change to "100BASE-X" (without G)
 Response Response Status C
 ACCEPT.

Cl 69 SC 69.1.2 P61 L14 # 210
 Ran, Adee Intel
 Comment Type E Comment Status A bucket
 In item l) there are now two MDIs.
 SuggestedRemedy
 Change "MDI" to "MDIs".
 Response Response Status C
 ACCEPT.

Cl 45 SC 45.2.1.111.8 P40 L30 # 209
 Ran, Adee Intel
 Comment Type E Comment Status A bucket
 References to subclauses of new clause 161 are inserted out of order. Here and in other places in clause 45.
 SuggestedRemedy
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve in the same way as comment #108

Cl 69 SC 69.2.3 P62 L4 # 211
 Ran, Adee Intel
 Comment Type E Comment Status A bucket
 The comma after Table 69-3a and the "Table69-3c" are new text.
 SuggestedRemedy
 Apply underline.
 Response Response Status C
 ACCEPT.

Cl 45 SC 45.2.1.111.8 P40 L30 # 108
 Slavick, Jeff Broadcom
 Comment Type E Comment Status A bucket
 Shouldn't 161 show up as the last entry in the list (listing clauses to look at in numerical order)
 SuggestedRemedy
 Update 45.2.1.111.8, 45.2.1.111.9, 45.2.1.112, 45.2.1.113, 45.2.1.115 lists that insert Cl161 to have Cl161 added at the end of the list.
 Response Response Status C
 ACCEPT.

Cl 69 SC 69.2.3 P62 L10 # 212
 Ran, Adee Intel
 Comment Type E Comment Status A bucket
 Underscores in editorial instruction should be spaces.
 SuggestedRemedy
 Change to spaces.
 Response Response Status C
 ACCEPT.

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Cl 69 SC 69.2.3 P62 L18 # 213

Ran, Adeel Intel
 Comment Type T Comment Status A bucket

There is no column for AN in this table. AN is included in table 69.3 (the original 100G backplane table). It seems that 802.3cd omitted this column in the new tables (3a and 3b) it added here, although it is included in the tables that were added in clause 116.

May require maintenance approval but I assume it will be done in this project.

SuggestedRemedy

Add AN column and populate it - mandatory for all rows.

Also in tables 69-3b and 69-3c.

Response Response Status C

ACCEPT.

Cl 69 SC 69.2.3 P63 L10 # 214

Ran, Adeel Intel
 Comment Type T Comment Status A bucket

The column for clause 78 is not required since EEE is not defined at all for 400GBASE-KR4 (clause 78 is not mentioned in the new PMD clauses, and EEE is not in scope...) and there is no other PHY in this table.

Clause 116 also leaves this column blank (not even optional) for the new 200G and 400G PMDs.

SuggestedRemedy

Delete this column.

Response Response Status C

ACCEPT.

Cl 73 SC 73.2 P64 L18 # 215

Ran, Adeel Intel
 Comment Type E Comment Status A bucket

In the new figure 73-1, The label on the right of the arrow looks like two separate labels.

Also, in the label below "Medium", there is no space after "50 Gb/s", and there is no bottom-pointing brace above the list of PHYs (compare to Figure 69-5).

SuggestedRemedy

Add comma after XLGMII, and reduce line spacing (or delete the extra line break).

Add brace and add space after "50 Gb/s".

Response Response Status C

ACCEPT IN PRINCIPLE.

For this figure, there is no brace in the base standard or any approved amendments thereof.

Implement the suggested remedy, except do not add the brace.

Cl 73 SC 73.6.4 P65 L10 # 77

Gustlin, Mark Cisco Systems
 Comment Type T Comment Status A FEC AN

Adopt the details of AN for 100GBASE-CR1/KR1

SuggestedRemedy

I will present the options to choose from, adopt if we have task force consensus.

Response Response Status C

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/gustlin_3ck_01_0120.pdf

Implement option A as proposed on slides 7 and 8 in the reviewed presentation with editorial license.

Straw poll #1:

I support adoption of the following FEC AN option as proposed in gustlin_3ck_01_0120:

a: option A -- 35

b: option B -- 0

c: option C -- 1

Choose one.

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CI 73 SC 73.10.2 P67 L25 # 216

Ran, Adeel Intel

Comment Type E Comment Status A

Table 73-7 is shown with all rows, most of which are not changed, and is spread across two pages. Only one new row is inserted.

Using "some unchanged rows are not shown" here and keeping only the "link_fail_inhibit_timer" rows would make this change easier to understand.

SuggestedRemedy

Change table per comment with editorial license.

Response Response Status C

ACCEPT.

CI 80 SC 80.4 P72 L20 # 217

Ran, Adeel Intel

Comment Type T Comment Status A

There should be a new row in Table 80-5 for the delay constraints of the RS-FEC-Int sublayer.

SuggestedRemedy

Add a row based on the constraints in 161.4 (subject of another comment).

Response Response Status C

ACCEPT IN PRINCIPLE.

See comment #116.

CI 80 SC 80.5 P73 L36 # 112

Nicholl, Shawn Xilinx

Comment Type TR Comment Status A bucket

Since 161.5.2.2 says that it's identical to 91.5.2.2, then "Table 80-6 -- Summary of Skew constraints" should contain a reference to 161.5.2.2

SuggestedRemedy

Propose to update Table 80-6 such that the Notes column for the "At RS-FEC transmit" row contains a reference to Clause 161. Proposed text for the table cell is:
See 91.5.2.2, 161.5.2.2

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #107.

CI 80 SC 80.5 P73 L36 # 107

Slavick, Jeff Broadcom

Comment Type TR Comment Status A bucket

New FEC needs to be referenced

SuggestedRemedy

Add 161.5.2.2 to FEC transmit row and 161.5.3.1 to the FEC receive row into both Table 80-6 and 80-7

Response Response Status C

ACCEPT IN PRINCIPLE.

Implement the suggested remedy.

Also, for both tables in the first column.

Change "At RS-FEC transmit" to "At RS-FEC or RS-FEC-Int transmit"
Change "At RS-FEC receive" to "At RS-FEC or RS-FEC-Int receive"

CI 80 SC 80.5 P73 L38 # 113

Nicholl, Shawn Xilinx

Comment Type TR Comment Status A bucket

Since 161.5.3.1 specifies the Rx deskew capabilities, then "Table 80-6 -- Summary of Skew constraints" should contain a reference to 161.5.3.1

SuggestedRemedy

Propose to update Table 80-6 such that the Notes column for the "At RS-FEC receive" row contains a reference to Clause 161. Proposed text for the table cell is:
See 91.5.3.1, 161.5.3.1

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #107.

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Cl 80 SC 80.5 P74 L32 # 114
 Nicholl, Shawn Xilinx
Comment Type TR Comment Status A bucket
 Since 161.5.2.2 says that it's identical to 91.5.2.2, then "Table 80-7 -- Summary of Skew Variation constraints" should contain a reference to 161.5.2.2
SuggestedRemedy
 Propose to update Table 80-7 such that the Notes column for the "At RS-FEC transmit" row contains a reference to Clause 161. Proposed text for the table cell is:
 See 91.5.2.2, 161.5.2.2
Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the response to comment #107.

Cl 80 SC 80.5 P74 L34 # 115
 Nicholl, Shawn Xilinx
Comment Type TR Comment Status A bucket
 Since 161.5.3.1 specifies the Rx deskew capabilities, then "Table 80-7 -- Summary of Skew Variation constraints" should contain a reference to 161.5.3.1
SuggestedRemedy
 Propose to update Table 80-7 such that the Notes column for the "At RS-FEC receive" row contains a reference to Clause 161. Proposed text for the table cell is:
 See 91.5.3.1, 161.5.3.1
Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the response to comment #107.

Cl 82 SC 82.2.13 P152 L0 # 132
 Brown, Matt Huawei Technologies Canada
Comment Type T Comment Status A bucket
 Table 82-7 "Skew tolerance parameters" has an entry "100GBASE-R with RS-FEC". To be complete this should also include "RS-FEC-Int" per Clause 161.
SuggestedRemedy
 Import Table 82-7, and show change of "100GBASE-R with RS-FEC" to "100GBASE-R with RS-FEC or RS-FEC-Int".
Response Response Status C
 ACCEPT.

Cl 93A SC 93A.1 P186 L36 # 47
 Dudek, Mike Marvell
Comment Type E Comment Status A bucket
 For style consistency the other parameters that some clauses don't use should be in a footnote.
SuggestedRemedy
 Add a footnote c stating "Some clauses that invoke this method do not provide a value for Nbg, Nbf, Nf, bgmax, sigmax, Nts. See 93A.1.6
Response Response Status C
 ACCEPT.

Cl 93a SC 93a.1.6 P189 L21 # 1
 Mellitz, Richard Samtec
Comment Type TR Comment Status A bucket
 If floating taps are not specified, for compatibility with older clauses, Nf should be Nb.
SuggestedRemedy
 Change:
 ...are not specified then no floating taps are used.
 to
 ...are not specified then no floating taps are used and Nf takes the value of Nb from referring clauses.
Response Response Status C
 ACCEPT.

Cl 93A SC 93A.1.6.1 P190 L12 # 159
 Kasapi, Athos Cadence
Comment Type TR Comment Status A
 Likely typo; existing text refers to number of taps in bank, N_{bf}, as N_b
SuggestedRemedy
 Change N_f - N_b + 1 to N_f - N_{bf} + 1
Response Response Status C
 ACCEPT.

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Cl 93a SC 93a.1.6.1 P190 L24 # 2
 Mellitz, Richard Samtec
 Comment Type TR Comment Status R
 This works better as its own clause. In future drafts we may want to apply to any tail tap starting location.
 SuggestedRemedy
 Bifurcate 93a.1.6.1 to 93a.1.6.1 and 93a.1.2. Title 93a.1.6.2 "limiting power in tail DFE taps". If N_ts is defined in the reference clause further limit the DFE tap as specified in 93a.1.6.2. Adjust wording to accommodate if Nf is not defined.
 Response Response Status C
 REJECT.
 Constraining the floating taps is part of a series of steps to set the floating coefficients, not an independent measurement or constraint.

Cl 120 SC 120.1 P91 L6 # 218
 Ran, Adee Intel
 Comment Type E Comment Status A bucket
 Label is "Overvie"
 SuggestedRemedy
 Change to "Overview".
 Response Response Status C
 ACCEPT.

Cl 118 SC 118.1.3 P0 L0 # 109
 Slavick, Jeff Broadcom
 Comment Type TR Comment Status A bucket
 Clause 118.1.3 lists the AUI that a 200/400GXS may use. The new 100G serial ones should be included in that list.
 SuggestedRemedy
 Bring in 118.1.3 and add 120G and 120F to both of the 200G and 400G lists of supported physically instantiated AUIs
 Response Response Status C
 ACCEPT.

Cl 120 SC 120.1 P91 L4 # 110
 Slavick, Jeff Broadcom
 Comment Type E Comment Status A bucket
 The w is missing from Overview
 SuggestedRemedy
 Add the w
 Response Response Status C
 ACCEPT.

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CI 120 SC 120.5.1 P92 L43 # 219

Ran, Adee

Intel

Comment Type T Comment Status A

In the original text, the list of annexes had "or" which made it clear that only one of the annexes is appropriate. The new "Annex 120B through Annex 120G" reads as if all specifications in all of the annexes should be met "as appropriate". It is not quite clear what is appropriate.

Note that the corresponding transmitter specification appears in 120.5.6 with a full list of annexes and their corresponding AUIs.

To make this more readable and maintainable, I suggest adding a new table mapping annexes to AUIs (this can be done in 120.1.1) and referring to this table in both places and everywhere else where it can be used, instead of the current text.

Alternatively: change this sentence to "the PMA shall meet the electrical and timing specifications in the corresponding Annex (120B through 120G).

Also applies to 135.5 and possibly other places.

This comment is about existing clauses 120 and 135. Since these clauses are being changed anyway I assume this change is within the scope of the project.

SuggestedRemedy

Add a new table mapping AUIs to Annexes and refer to it in this paragraph and elsewhere (if in scope), with editorial license.

Response Response Status C

ACCEPT IN PRINCIPLE.

The text should not imply that more than one of the Annexes is relevant. However, it is not necessary to add a table to map each of the AUIs to an annex and such a table would make future amendments more onerous. When reviewing each of the annexes it is unambiguous which AUI it is defining.

Change the text to "Annex 120B, Annex 120C, Annex 120D, Annex 120E, Annex 120F, or Annex 120G" in two places.

CI 120 SC 120.5.7.2 P94 L44 # 221

Ran, Adee

Intel

Comment Type T Comment Status D

In the text describing the precoding control for PMDs, the case where training is supported but is disabled by management is not covered. In this case the variables should be "set as required by implementation" similar to C2C.

Repeating the list of PMDs twice would make the text cumbersome. The change in the suggested remedy attempts a more general definition that should make the test easier to read and maintain.

Also applies to similar text in 135.5.7.2.

This comment is about existing clauses 120 and 135. Since these clauses are being changed anyway I assume this change is within the scope of the project.

SuggestedRemedy

Replace the 4th paragraph and the one inserted below it with the following:

"If the PMA is connected to the service interface of a PMD that uses the PMD control function (136.8.11), then precoder_tx_out_enable_i and precoder_rx_in_enable_i shall be set as determined by the PMD control function on lane i. The method by which the PMD control function affects these variables is implementation dependent.

If the PMA is connected to the service interface of a PMD that supports the PMD control function but training is disabled by the management variable mr_training_enable (see 136.7), or if the PMA is part of a 200GAUI-2 C2C or a 400GAUI-4 link, then precoder_tx_out_enable_i, precoder_rx_in_enable_i, precoder_tx_in_enable_i, and precoder_rx_out_enable_i are set as required by the implementation. The method described in 135F.3.2.1 may be used for 200GAUI-2 C2C or 400GAUI-4 links."

Apply a similar change in 135.5.7.2 with changes as necessary.

Implement with editorial license.

Proposed Response Response Status Z

REJECT.

This comment was WITHDRAWN by the commenter.

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Cl 120 SC **120.5.7.2** P**94** L**47** # **220**
 Ran, Adeel Intel
 Comment Type **E** Comment Status **D**
 136.8.11.7.5 is an incorrect cross-reference - it points to the state diagrams subclause which which does not address precoding in any way.
 It should be corrected to 136.8.11, here and also in clause 136 (possibly with maintenance approval).
 SuggestedRemedy
 Per comment.
 Proposed Response Response Status **Z**
 REJECT.
 This comment was WITHDRAWN by the commenter.

Cl 120 SC **120.5.11.2.4** P**95** L**32** # **148**
 Dawe, Piers Mellanox
 Comment Type **TR** Comment Status **A** bucket
 This editor's note says "the assumption that the square wave test pattern will continue to be required for 200GAUI-2 and 400GAUI-4 testing". But the square wave is not used for AUI testing at all, nor is it required for anything except measuring the RIN of an optical transmitter (which is typically done on the optical module alone, not in a complete system, anyway). The text at line 21 says it's optional, not required. This project does not add or alter optical PMDs.
 SuggestedRemedy
 Delete this editor's note, and the first part of the editor's note in 135.5.10.2.4.
 Response Response Status **C**
 ACCEPT IN PRINCIPLE.
 The commenter has clarified that the reason for supporting the square wave in the PMA is not for testing of an AUI transmitter but rather for testing of currently specified PMD transmitters.
 Regardless, the editor's notes were intended to be deleted in D1.1, per the included text.
 Remove the editor notes on page 95 and page 102.

Cl 120 SC **120.7.3** P**97** L**3** # **222**
 Ran, Adeel Intel
 Comment Type **E** Comment Status **A** bucket
 Font size is inconsistent in this table (existing and new text).
 SuggestedRemedy
 use consistent font size
 Response Response Status **C**
 ACCEPT.

Cl 120A SC **120A** P**0** L**0** # **136**
 Brown, Matt Huawei Technologies Canada
 Comment Type **T** Comment Status **A** layer diagrams
 Some layer diagrams in Annex 120A should show the new 200GAUI-2 and 400GAUI-4 in addition to 200GAUI-4/8 and 400GAUI-8/16.
 SuggestedRemedy
 Import portions of Annex 120A and add 200GAUI-2 and 400GAUI-4 or alternately add new diagrams to include these.
 Response Response Status **C**
 ACCEPT.

Cl 120F SC **120F.1** P**192** L**22** # **48**
 Dudek, Mike Marvell
 Comment Type **T** Comment Status **A** bucket
 The 100G Phys using RS544,514 are 100GBASE-P not 100GBASE-R
 SuggestedRemedy
 Change 100GBASE-R to 100GBASE-P in figure 120F-1
 Response Response Status **C**
 ACCEPT.

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CI 120F SC 120F.1 P192 L39 # 49
 Dudek, Mike Marvell
 Comment Type T Comment Status A layer diagrams
 There are no examples of these C2C interfaces in 120A or 135A
 SuggestedRemedy
 Either delete the references to these annexes or bring these Annexes into 80.3ck and add examples (e.g. add n=1 to Figure 135A-8
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the responses to comments #135, #136, and #139.

CI 120F SC 120F.1 P193 L22 # 266
 Ran, Adeo Intel
 Comment Type T Comment Status R
 In some applications AC coupled is required to be inside the receiver. This can result from routing limitations and can provide signal integrity improvements.
 C2C is an engineered link so the channel can be designed with knowledge of the Rx capability.
 It would be good to mention that the receiver may implement internal AC coupling and in that case the channel is not required to have additional AC coupling.
 SuggestedRemedy
 Add a NOTE where convenient:
 NOTE: Some devices include internal AC-coupling. Applications that use such devices may choose not to include AC-coupling in the channel if the devices are compatible with this design choice.
 Response Response Status C
 REJECT.
 Alternate to AC coupling being provided in the receiver as suggested by the commenter, the transmitter and receiver might be designed such that no AC-coupling is required (DC-coupled).
 There may thus be various solutions slightly different than specified that might be practical. In any of these cases, the implementer is responsible for ensuring that the transceivers are compatible. This is outside the scope of this specification.

CI 120F SC 120F.1 P193 L26 # 267
 Ran, Adeo Intel
 Comment Type E Comment Status R
 The text for three AUIs (100G, 200G, 400G) is repetitive and the figures are almost identical.
 Merging to a single figure and text would help the readers.
 SuggestedRemedy
 Per comment, Implement with editorial license.
 Response Response Status C
 REJECT.

It is recognized that there is much similarity between the different Ethernet rates. The same concern was addressed when specifying Annex 135D/E/F/G in IEEE Std 802.3cd-2018. In the end, separate text and diagrams for each Ethernet rate were used.
 Providing separate diagrams and text avoids having to list out multiple entities, parameters in the text and diagram to allow for the different lane widths, etc. The text and diagrams read much easier to follow this way.

CI 120F SC 120F.1 P194 L33 # 268
 Ran, Adeo Intel
 Comment Type T Comment Status D withdrawn
 "If implemented, the transmitter equalization feedback mechanism described in 120D.3.2.3 may be used to identify an appropriate setting"
 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, in we now have a 5-tap equalizer with 2% 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.
 Re-using this method for 100GAUI-1 is impossible if the specified Tx equalizer is different from what it was in Annex 83D. A new method should be defined.
 Also applies to 45.2.1.129.
 SuggestedRemedy
 I am planning a presentation with some possible solutions.
 Proposed Response Response Status Z
 PROPOSED REJECT.
 This comment was WITHDRAWN by the commenter.

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CI 120F SC 120F.1 P194 L38 # 177
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status R bucket
 Missing informative channel loss
 SuggestedRemedy
 Add informative channel loss
 Insertion_Loss(f)=1.083+1.25V??+0.47?? 0.01=??=50 ??????
 Response Response Status C
 REJECT.
 The informative channel insertion loss is specified in 120F.4.2.

CI 120F SC 120F.2 P194 L6 # 270
 Ran, Adeo Intel
 Comment Type T Comment Status A
 This subclause's title is "Transmitter electrical characteristics". The first paragraph is about 1/(1+D) precoding, but precoding does not affect electrical characteristics.
 Also, the "shall" here is not required from the electrical interface, but from the PMA above it.
 SuggestedRemedy
 Delete this paragraph. Maybe add instead some text to the introduction about the option to use precoding in the PMA client.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 In 120F.3.1, delete the first paragraph.
 Replace the last paragraph in In 120F.1 with the following:
 The 100GAUI-1 C2C, 200GAUI-2 C2C, and 400GAUI-4 C2C transmitter supports 1/(1+D) mod 4 precoding, as specified in 135.5.7.2 and 120.5.7.2, that may be enabled or disabled as required. The 100GAUI-1 C2C, 200GAUI-2 C2C, and 400GAUI-4 C2C receiver may support 1/(1+D) mod 4 precoding, as specified in 135.5.7.2 and 120.5.7.2. Precoding may be enabled and disabled using the precoder request mechanism specified in 135F.3.2.1.

CI 120F SC 120F.2 P194 L43 # 269
 Ran, Adeo Intel
 Comment Type E Comment Status A
 The content of this subclause is
 "The electrical characteristics for the 100GAUI-1 C2C, 200GAUI-2 C2C, and 400GAUI-4 C2C interfaces are as defined in 163.9.1"
 This sentence is not about compliance points; it should be in 120F.3 (electrical characteristics) and it can replace the existing content there.
 Where are the compliance points defined? The editor's note should be replaced by definitive text.
 SuggestedRemedy
 Move the sentence to 120F.3.
 Add a description of the compliance points or refer to the correct place in the backplane clause.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 "163.9.1 Compliance Points" specifies the transmitter and receiver compliance measurement points for 100GBASE-KR, 200GBASE-KR2, and 400GBASE-KR4 PMDs. The intent of the of the paragraph referenced by the commenter was to use these test points for the C2C measurements.
 Change the text in 120F.2 to:
 The electrical characteristics for the 100GAUI-1 C2C, 200GAUI-2 C2C, and 400GAUI-4 C2C interfaces are defined at test points as described in 163.9.1.

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CI 120F SC 120F.3.1 P195 L22 # 271

Ran, Adee

Intel

Comment Type T Comment Status R

The current Tx specs in 93.8.1.3 allow common mode voltage up to 1.9 V. This precludes internal AC coupling when the Rx operates on lower voltages, since EMI diodes will cause nonlinear effects.

Many devices will have lower common mode voltages in the Tx which will enable using internal AC coupling in the Rx, which can help routing and signal integrity.

Since C2C is an engineered link, the integrator may benefit from knowing if the Tx has lower CM voltage and if the Rx has internal AC coupling. If both are true, then the integrator does not need to add AC caps on the channel.

I suggest defining the following as optional features:

1. Tx common mode voltage between 0 and 900 mV.
2. Rx includes internal AC coupling

Both are to be included in the PICS and AC coupling is required only if either of them is not supported.

SuggestedRemedy

Discuss this idea; if it is plausible, we should think about possible ways to write it down.

Response Response Status C

REJECT.

The commenter is proposing an additional mode of operation that was not part of the adopted baseline nor has been the subject of any presentation in this project. This seems to be a problem for interoperability due to mismatches in transmitter and receiver technology.

The suggested remedy provides no guidance for implementing the specifications suggested in the comment.

However, there is interest in revisiting the DC common-mode specifications. The commenter is invited to provide a more complete solution.

CI 120F SC 120F.3.1 P195 L33 # 26

Mellitz, Richard

Samtec

Comment Type TR Comment Status A

The dependence of Vf on Nv is has proved to be confusing. The result is that a single device with a C2C and KR transmitter may have two specification which is confusing for performing tests. Since we specify that ratio of Pmax to Vf there really is no good reason no to make Nv more like a real steady state voltage. See Mellitz_3ck_01b_0919 for reference.

SuggestedRemedy

Add a subsection detailing "Transmitter output waveform" similar to 163.9.3.1. Add exception and exception list for this subclause setting Nv to 200 for the determination of Vf. Refer to clause "136.9.3.1 Transmitter output waveform" : Change k = -2 to 1 to k = -3 to 1 Refer to clause "120D.3.1.3 Linear fit to the measured waveform": Change Dp= 3 to Dp= 4 See Mellitz_3ck_01b_0919 for reference.

Response Response Status C

ACCEPT IN PRINCIPLE.

For vf (min.) and (max.) replace the reference to 120D.3.1.4 with 162.9.3.1.2.

CI 120F SC 120F.3.1 P195 L40 # 27

Mellitz, Richard

Samtec

Comment Type TR Comment Status A

If Nv is set to 200 UI then and packages in Table 120F-5 are the same as KR, then Signal-to-noise-and-distortion ratio SNDR (min) should be the same as for KR

SuggestedRemedy

Change Signal-to-noise-and-distortion ratio SNDR (min)from TBD to 33 dB. This matches SNR_Tx in 120F-5

Response Response Status C

ACCEPT IN PRINCIPLE.

There was consensus to change the value to 32.5 dB in line with the backplane specifiaton.

Change the SNDR specification from TBD to 32.5 dB.

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CI 120F SC 120F.3.1.1 P196 L6 # 176

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status A RL

Transmitter differential output return loss is redundant given that ERL will be used

SuggestedRemedy

Remove section and reference 163.9.2.1

Response Response Status C

ACCEPT IN PRINCIPLE.

Remove 120F.3.1.1 with editorial license.

ERL parameters in 163.9.2.1 are not necessarily correct for C2C. A full proposal is required to add a specification.

CI 120F SC 120F.3.1.1 P196 L14 # 272

Ran, Adeel Intel

Comment Type T Comment Status A RL

This return loss mask can allow unacceptable reflections with most of the BW allowed to be worse than 4 dB. It is more relaxed than the 50G RL specs in 120D.3.1.1 and even the old 25G RL specs in 93.8.1.4.

We should use ERL for this annex, with similar specs to the PMDs.

SuggestedRemedy

Refer to the ERL specs in 163.

Response Response Status C

ACCEPT IN PRINCIPLE.

The commenter is referring to the subclause on transmitter output differential return loss.

Another subclause (120F.3.1.2) specifies the effective return loss (ERL).

The resolution to Comment #176 deletes subclause 120F.3.1.1.

CI 120F SC 120F.3.1.4 P197 L39 # 140

Dawe, Piers Mellanox

Comment Type T Comment Status R

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.

SuggestedRemedy

Remove the third precursor.

Response Response Status C

REJECT.

The commenter has provided no evidence that the third precursor can be removed without adversely affecting channel performance.

There is no consensus to make the proposed change. The need for the third precursor tap may be dependent on the choice of reference receiver which is not known at this time. Further analysis is required.

CI 120F SC 120F.3.2.3 P199 L51 # 50

Dudek, Mike Marvell

Comment Type T Comment Status A

The sentence does not make sense. (missing reference equation).

SuggestedRemedy

Change to "The filtered voltage transfer function H(k)(f) calculated in Equation (93A-19) uses the filter Ht(f) defined by Equation (93A-46)."

Response Response Status C

ACCEPT.

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Cl 120F SC 120F.4.1 P201 L46 # 202

Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status R COM burst penalty

COM table and analysis does not include penalty due to burst error, current COM code on some weird channel

SuggestedRemedy

http://www.ieee802.org/3/ck/public/19_03/anslow_3ck_01_0319.pdf page has 2 dB of SNR penalty with pre-coding on for tap weights [0.85, 0.05, 0.25, -0.05, 0.15], the Anslow analysis showed that non of the 115 channels would be as bad but how can we gurantee some weird channel will not in the mix that passes 3 dB COM but would fail due to burst error? Assuming there is interest we can bring a proposal in future task force meeting for an analytical burst error estimator that can be added to COM.

Response Response Status C

REJECT.

[Editor's note: The clause/subclause were changed from 120/120.4.1 to 120F/120F.4.1]

The issue described here has been raised in previous amendments and was resolved by accounting for possible degradation due to correlated errors in the PAM4 electrical interface (AUI-C2C) in PHYs which use these interfaces. The requirements of all PMDs in these PHYs are defined to result in somewhat lower frame loss ratio than the requirement for a full PHY. See 136.1, 137.1, 138.1.1, 139.1.1, 140.1.1. Similar derated requirements are used for the new PMDs defined in clauses 162 and 163.

See also http://www.ieee802.org/3/cd/public/July16/anslow_3cd_01_0716.pdf.

Also, see the response for comment 200.

Commenter has not provided changes to the draft.

Cl 120F SC 120F.4.1 P202 L36 # 51

Dudek, Mike Marvell
 Comment Type T Comment Status A

The step size for C(1) in table 120F-5 (0.05) does not match the max value in Table 120F-1.

SuggestedRemedy

Either change the step size in table 120F-5 to 0.02
 Or change Table 120F-1 to indicate that the max step size for C(1) is 0.05. (Be consistent with the step size for 162 and 163 which has similar comments).

Response Response Status C

ACCEPT.

In Table 120F-1, change C(1) max. step value to 0.05.

Cl 120F SC 120F.4.1 P203 L11 # 178

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

DFE tap length missing

SuggestedRemedy

Replace TBD with Nb=5 and see ghiasi_3ck_02_0120

Response Response Status C

REJECT.

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/ghiasi_3ck_02_0120.pdf

There is no consensus to adopt the proposed changes. More analysis, esp. including lower loss channels, is required to make a decision.

Cl 120F SC 120F.4.1 P203 L15 # 141

Dawe, Piers Mellanox
 Comment Type T Comment Status A C2C floating taps

C2C should have a DFE floating tap tail root-sum-of-squares limit as CR and KR do, although the limit might differ.

SuggestedRemedy

Add a DFE floating tap tail root-sum-of-squares limit.

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #179.

Cl 120F SC 120F.4.1 P203 L15 # 179

Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type T Comment Status A C2C floating taps

C2M doesn't have floating taps

SuggestedRemedy

Remove the floating taps

Response Response Status C

ACCEPT IN PRINCIPLE.

Remove the row in Table 120F-5 for parameter "Max DFE value for floating taps".

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Cl 120F SC 120F.4.1 P203 L15 # 52
 Dudek, Mike Marvell
 Comment Type T Comment Status A C2C floating taps
 If there are floating taps then multiple additional rows are required to describe them. If not then Bmaxg should not be in the table.
 SuggestedRemedy
 Either delete Bmaxg row or add the other rows (see table in Annex 93A). Values TBD.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the response to comment #179.

Cl 120F SC 120F.4.1 P203 L15 # 70
 Wu, Mau-Lin MediaTek
 Comment Type T Comment Status A C2C floating taps
 In Table 120F-5, the parameter of "Max DFE value for floating taps" shall be removed since we don't have consensus on applying DFE floating taps to C2C.
 SuggestedRemedy
 Remove the row of "Max DFE value for floating taps" from Table 120F-5.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the response to comment #179.

Cl 120F SC 120F.4.1 P203 L19 # 142
 Dawe, Piers Mellanox
 Comment Type TR Comment Status R
 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. (For info, 50G/lane C2C (120C) has $2.6e-8$.)
 Response Response Status C
 REJECT.
 The commenter has provided insufficient evidence to support the proposed change.
 The value for eta_0 may be dependent upon the choice of reference receiver architecture which has not yet been determined.

Cl 120G SC 120G.1 P209 L43 # 53
 Dudek, Mike Marvell
 Comment Type T Comment Status A bucket
 The 100G Phys using RS544,514 are 100GBASE-P not 100GBASE-R
 SuggestedRemedy
 Change 100GBASE-R to 100GBASE-P in figure 120G-1
 Response Response Status C
 ACCEPT.

Cl 120G SC 120G.1 P210 L5 # 54
 Dudek, Mike Marvell
 Comment Type T Comment Status A layer diagrams
 There are no examples of these C2M interfaces in 120A or 135A
 SuggestedRemedy
 Either delete the references to these annexes or bring these Annexes into 80.3ck and add examples (e.g. add n=1 to Figure 135A-8)
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the responses to comments 135, 136, and 139.

Cl 120G SC 120G.1.1 P212 L27 # 55
 Dudek, Mike Marvell
 Comment Type T Comment Status A bucket
 Clause 120 does not apply to 100GAUI-1
 SuggestedRemedy
 Add "or clause 135 for 100GAUI-1"
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Replace the paragraph in 120G.1.1 to the following...
 "The bit error ratio (BER) when processed according to Clause 135 for 100GAUI-1 C2M or Clause 120 for 200GAUI-2 or 400GAUI-4 C2M for shall be less than 10^{-5} ."

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Cl **120G** SC **120G.3.1** P**213** L**30** # **180**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **A** measurement filter
 Transmitter 4th order BT4 filter BW is TBD
 SuggestedRemedy
 Replace TBD with 39.8 GHz
 Response Response Status **C**
 ACCEPT IN PRINCIPLE.
 The commenter is referring the transmitter measurement bandwidth.
 Change the measurement BW from TBD to 40 GHz.

Cl **120G** SC **120G.3.1** P**213** L**34** # **72**
 Wu, Mau-Lin MediaTek
 Comment Type **T** Comment Status **D**
 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 **W**
 PROPOSED ACCEPT IN PRINCIPLE.
 The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/wu_3ck_02a_0120.pdf
 The reviewed presentation makes proposals for VEC pass/fail criteria, EH, and methodology correction.
 The resolution to comment #189 provides a value for EH.
 The resolution to comment #190 was that there is no consensus to make a change to the VEC pass/fail criteria.

Cl **120G** SC **120G.3.1** P**213** L**52** # **189**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **A** C2M eye opening
 Eye height min is TBD
 SuggestedRemedy
 per http://www.ieee802.org/3/ck/public/19_11/sun_3ck_01b_1119.pdf should be 15 mV
 Response Response Status **C**
 ACCEPT IN PRINCIPLE.
 Set eye height minimum to 15 mV.
 Add note indicating that this value may need to change in response to changes in measurement methodology.

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CI 120G SC 120G.3.1 P213 L52 # 190

Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A C2M VEC

VEC is TBD

SuggestedRemedy

per http://www.ieee802.org/3/ck/public/19_11/sun_3ck_01b_1119.pdf should be 8.5 dB if EH <15 mV
 ?????? - 0.1667*???? -15, i????????????????????????????????15????????30??
 ??????-2.5????,????????>30????

Response Response Status C

ACCEPT IN PRINCIPLE.

The text in the suggested remedy did not render properly. It is assumed that the commenter is referring to the specification on slide 9 of the referenced presentation.

Various proposals to address the host output VEC specifications as reflected in Strawpoll #6 were discussed.

After offline discussion and strawpoll #13 and #14, there is consensus to implement VEC with noise methodology (with related parameters TBD).

Implement VEC with noise methodology (with related parameters TBD) with editorial license.

Strawpoll #6

For host output, I would support VEC pass/fail criteria (with parameters TBD):
 A: EVEC (page 9 of sun_3ck_01b_1119)
 B: VEC with noise (bullet 3, slide 26, sun_3ck_01a_0120)
 C: VEC without noise (based on 120E)
 A: 6 B: 7 C: 0
 Choose 1.

Strawpoll #13

For host output, I would support VEC pass/fail criteria (with parameters TBD):
 A: EVEC (page 9 of sun_3ck_01b_1119)
 B: VEC with noise (bullet 3, slide 26, sun_3ck_01a_0120)
 A: 4 B: 17
 Choose 1.

Strawpoll #14

I would support closing comment #190 using VEC with noise (bullet 3, slide 26, sun_3ck_01a_0120) (with parameters TBD):
 Yes: 17
 No: 5

CI 120G SC 120G.3.1 P213 L53 # 56

Dudek, Mike Marvell
 Comment Type T Comment Status D VEC

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 W

PROPOSED ACCEPT IN PRINCIPLE.

In the comment, "vertical eye height" should be "vertical eye closure".

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/dudek_3ck_01_0120.pdf

The resolution to comment #190 was that there is no consensus to make a change to the VEC pass/fail criteria.

CI 120G SC 120G.3.1.3 P215 L25 # 59

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

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 W

PROPOSED ACCEPT IN PRINCIPLE.

Create a new subclause each for host input, module output, and module input written in the context of the test point, but with the same specifications as in 120G.3.1.3.

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CI 120G SC 120G.3.1.3 P215 L28 # 71

Wu, Mau-Lin

MediaTek

Comment Type T Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

Based on Strawpoll #xxx, there are concerns with the current ERL test methodology.

As are result, it is not possible to select values for related parameters with any confidence.

CI 120G SC 120G.3.1.3 P215 L29 # 57

Dudek, Mike

Marvell

Comment Type T Comment Status D C2M ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

There is no MDI for C2M.

See comment 71.

CI 120G SC 120G.3.1.5 P216 L30 # 181

Ghiasi, Ali

Ghiasi Quantum/Inphi

Comment Type TR Comment Status A measurement filter

Transmitter 4th order BT4 filter BW is TBD

SuggestedRemedy

Replace TBD with 39.8 GHz

Response Response Status C

ACCEPT IN PRINCIPLE.

The commenter is referring the transmitter measurement bandwidth.

Change the measurement BW from TBD to 40 GHz.

CI 120G SC 120G.3.1.6 P216 L30 # 58

Dudek, Mike

Marvell

Comment Type T Comment Status A C2M eye opening

The counter-propagating signals should be asynchronous so that crosstalk is properly evaluated. (in the system the counter-propagating signals will be asynchronous).

SuggestedRemedy

Change "synchronous" to "asynchronous".

Response Response Status C

ACCEPT.

CI 120G SC 120G.3.2 P217 L28 # 193

Ghiasi, Ali

Ghiasi Quantum/Inphi

Comment Type TR Comment Status D C2M vec

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 W

PROPOSED ACCEPT IN PRINCIPLE.

A presentation relating to this comment is anticipated for the January meeting.

For task force discussion.

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CI 120G SC 120G.3.2 P217 L28 # 191
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D
 Need improve test methodology for mould output compliance
 SuggestedRemedy
 See ghiasi_3ck_03_0120
 Proposed Response Response Status W
 PROPOSED REJECT.
 The comment does not identify how the methodology is deficient nor does it provide a remedy.
 A presentation relating to this comment is anticipated for the January meeting.
 For task force discussion.

CI 120G SC 120G.3.2 P217 L28 # 192
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D C2M eye opening
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 A presentation relating to this comment is anticipated for the January meeting.
 For task force discussion.

CI 120G SC 120G.3.2 P217 L30 # 182
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A measurement filter
 Transmitter 4th order BT4 filter BW is TBD
 SuggestedRemedy
 Replace TBD with 39.8 GHz
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 For task force discussion.
 Change the measurement BW from TBD to 40 GHz.

CI 120G SC 120G.3.2 P217 L50 # 144
 Dawe, Piers Mellanox
 Comment Type TR Comment Status D
 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 W
 PROPOSED REJECT.
 The commenter has not provided sufficient evidence for the proposed change. However, there was no evidence provided to justify inclusion of this parameter. Given that the specification includes EH and VEC, this might be redundant.
 For task force discussion.

CI 120G SC 120G.3.3 P219 L43 # 60
 Dudek, Mike Marvell
 Comment Type E Comment Status D C2M ERL
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 In Table 120G-4, change the reference for ERL to 120G.3.3.1.

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Cl 120G SC 120G.3.3.2 P220 L6 # 194
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D C2M eye opening
 Far end eye height is TBD
 SuggestedRemedy
 Replace TBD with 50 mV
 Proposed Response Response Status W
 PROPOSED ACCEPT IN PRINCIPLE.
 See ghiasi_3ck_03_0120.
 For task force discussion.

Cl 120G SC 120G.3.3.2.1 P221 L39 # 63
 Dudek, Mike Marvell
 Comment Type T Comment Status D
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 Insert the following, with the selected optimization <optimization criteria>:
 "Random jitter and the pattern generator output levels are adjusted (without exceeding the differential peak-to-peak 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 <optimization criteria>.
 The far-end pre-cursor ISI ratio is measured using the method defined in 120E.3.2.1.2 and it meets the specification in Table 120G-3. Pre-emphasis capability is likely to be required in the pattern generator to meet this requirement".
 For <optimization criteria> select from one of the following:
 (a) "maximizes the product of eye height and eye width"
 (b) "minimizes the value of vertical eye closure"
 For task force discussion.

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CI 120G SC 120G.3.4.1 P222 L32 # 195
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status D C2M eye opening
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 See comment #61.

CI 120G SC 120G.3.4.1.1 P224 L12 # 61
 Dudek, Mike Marvell
 Comment Type T Comment Status D C2M eye opening
 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 W
 PROPOSED ACCEPT.

CI 120G SC 120G.3.4.1.1 P224 L22 # 62
 Dudek, Mike Marvell
 Comment Type T Comment Status D C2M VEC
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 Move the sentence to a new paragraph and change to the following:
 "In both the low-loss and high-loss cases, the input VEC is less than TBD dB and greater than the value in table 120G-8."
 The TBD value might be chosen if the value in Table 120G-8 is also chosen.
 For task force discussion.

CI 120G SC 120G.4.1 P224 L51 # 64
 Dudek, Mike Marvell
 Comment Type E Comment Status A bucket
 This section appears to be a direct copy of 120E.3.1 except that it only applies to the module and host Tx (not calibration of the stressed inputs)
 SuggestedRemedy
 Replace the text in the section with "The signal levels are as defined in 120E.3.1"
 Response Response Status C
 ACCEPT.

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Cl 120G SC 120G.4.2 P225 L28 # 273

Hidaka, Yasuo

Credo Semiconductor

Comment Type TR Comment Status D C2M VEC

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 W

PROPOSED ACCEPT IN PRINCIPLE.

The task force reviewed the following presentation:

http://www.ieee802.org/3/ck/public/20_01/sun_3ck_01a_0120.pdf

The resolution to comment #190 was that there is no consensus to make a change to the VEC pass/fail criteria.

Cl 120G SC 120G.4.2 P225 L29 # 65

Dudek, Mike

Marvell

Comment Type T Comment Status R measurement filter

In the capture of the signals to be analyzed there is a BT filter with TBD bandwidth. This section is including a Butterworth noise filter in addition.

SuggestedRemedy

Consider whether both filters should be used. I hope to have information on the effect of the two filters on VEO and VEC for the next meeting.

Response Response Status C

REJECT.

Resolve using the response to comment #275.

Cl 120G SC 120G.4.2 P225 L31 # 275

Hidaka, Yasuo

Credo Semiconductor

Comment Type T Comment Status A measurement filter

The reference receiver has a receiver noise filter as defined in 93A.1.4.1. Hence, we should not apply the 4th-order BT filter.

On the other hand, 120G.3.1 and 120G.3.2 specify that a 4th-order BT filter is to be used for all output signal measurements, unless otherwise specified.

However, this otherwise condition is not clearly stated in 120G.4.2

SuggestedRemedy

Add the following statement to 120G.4.2 prior to Table 120G-9.

When this eye opening measurement method is used, do not use the fourth-order Bessel-Thomson low-pass response in the output signal measurements.

Response Response Status C

ACCEPT IN PRINCIPLE.

Based on the result of straw poll #2 and related discussions, there is consensus to specify the measurement includes a Butterworth filter with BW of 0.75*fb (~39.8 GHz) for the eye opening measurements in Annex 120G.

Also, as a result, remove the reference receiver noise filter in 120G.4.2 and add note that the measurement filter represents the reference receiver noise filter.

Implement with editorial license.

Straw poll #2:

I would support the following combination of filters:

A: scope BT @ ~0.75*fb and RR BUT @ 0.75*fb

B: scope Butterworth @ 0.75*fb, RR no filter

C: scope BT @ 0.75*fb, RR no filter

Choose 1.

where RR = "reference receiver"

A: 0 B: 14 C: 6

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CI 120G SC 120G.4.2 P225 L38 # 160
 Li, Mike Intel
 Comment Type E Comment Status A bucket
 3/4 is not a normal numerical representation
 SuggestedRemedy
 change it to 0.75
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 For consistency with Clause 162 and Clause 163 set the value to "0.75 x fb".

CI 120G SC 120G.4.2 P225 L40 # 158
 Dawe, Piers Mellanox
 Comment Type TR Comment Status D
 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 W
 PROPOSED REJECT.
 It is assumed that the commenter is referring to the continuous-time filter (CTF) parameters in Table 120G-9.
 There is no issue stated in the comment nor any proposed changes in the suggested remedy.
 The CTF parameters specified in this Table 120G-9 are for either case.

CI 120G SC 120G.4.2 P225 L44 # 157
 Dawe, Piers Mellanox
 Comment Type TR Comment Status D
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 For task force discussion.

CI 120G SC 120G.4.2 P225 L46 # 143
 Dawe, Piers Mellanox
 Comment Type T Comment Status D
 Are 1 dB steps for gDC2 fine enough?
 SuggestedRemedy
 Change to 1/2 dB?
 Proposed Response Response Status W
 PROPOSED REJECT.
 There is no justification provided for the proposed changed.

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CI 120G SC 120G.4.2 P226 L9 # 196

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status R

Bmax values are TBDs

SuggestedRemedy

Limit B1(max)<=0.3 and B[2,3,4](max)<=0.1
see ghiasi_3ck_03_0120 for justification.

Response Response Status C

REJECT.

The task force reviewed the presentation ghiasi_3ck_03_0120.

After task force discussion, strawpoll #4 and #5 and offline discussions indicated no clear consensus to make any specific changes. More work toward a consensus proposal is encouraged.

Strawpoll #4

For TP1a, I would support b_max(1) value being:

- A: 0.25
- B: 0.3
- C: 0.4
- D: 0.5
- Chicago rules
- A: 2+8=10 B: 4+8=12 C: 0 D: 5+6=11

Strawpoll #5

For TP1a, I would support b_max(2:4) value being:

- A: 0.1
- B: 0.15
- C: 0.2
- Chicago rules
- A: 5+9=14 B: 3+6=9 C: 5+5=10

CI 120G SC 120G.4.2 P226 L9 # 154

Dawe, Piers Mellanox

Comment Type TR Comment Status R

The C2M normalized DFE coefficient magnitude limits need to be chosen carefully so that the reference receiver is not better than a range of real receiver implementations. Although this may not be a particularly good way of ensuring the spec has margin - see another comment about noise loading.

SuggestedRemedy

Start with bmax(1)=0.25, bmax(2:4)=0.1?

Response Response Status C

REJECT.

Resolve using the response to comment #196.

CI 120G SC 120G.4.2 P226 L10 # 145

Dawe, Piers Mellanox

Comment Type TR Comment Status D

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 W

PROPOSED REJECT.

The parameter b_max(n) defines the "magnitude" of the coefficient and thus the minimum value is already specified as -b_max(n). See Equation 93A-26.

The suggested remedy provides no recommendation for alternate bmin values.

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CI 120G SC 120G.4.2 P226 L11 # 155

Dawe, Piers Mellanox

Comment Type TR Comment Status D

In the same way that COM has eta0, 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 V²/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 sum(AVupp + AVmid + AVlow).

SuggestedRemedy

Include two noise items in the measurement, one a constant in mV or V²/GHz, the other a set ratio to sum(AVupp + AVmid + AVlow). 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 W

PROPOSED REJECT.

The commenter has not provided justification for the proposed specification methodology, e.g., improvement in accuracy, actual expected values, etc. relating to the proposed methodology.

CI 120G SC 120G.4.2 P226 L13 # 156

Dawe, Piers Mellanox

Comment Type TR Comment Status D

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 W

PROPOSED REJECT.

The methodology specified is consistent with the adopted baseline (DFE not FFE).

The commenter does not provide evidence that the method is insufficient such that the alternate method in the suggested remedy is required.

CI 120G SC 120G.4.2 P226 L14 # 161

Li, Mike Intel

Comment Type TR Comment Status A

136.9.3.1.1 is a wrong reference

SuggestedRemedy

change it to 162.9.3.1.1 to be correct

Response Response Status C

ACCEPT.

CI 120G SC 120G.4.2 P226 L14 # 162

Li, Mike Intel

Comment Type ER Comment Status A

"with an effective sampling period of Tb/M with parameter M greater than or equal to 32" had been defined in 162.9.3.1.1 and references therein, there is not need to repeat.

SuggestedRemedy

delete "with an effective sampling period of Tb/M with parameter M greater than or equal to 32"

Response Response Status C

ACCEPT IN PRINCIPLE.

[Editor's note: Add page and line number to comment details.]

The resolution to comment #161 changes the reference to 162.9.3.1.1.

As a result, implement the suggested remedy.

CI 120G SC 120G.4.2 P226 L23 # 164

Li, Mike Intel

Comment Type TR Comment Status A

"136.9.3.1.1" is not the right reference.

SuggestedRemedy

Change it to "85.8.3.3.5 and 85.8.3.3.6"

Response Response Status C

ACCEPT IN PRINCIPLE.

Change "136.9.3.1.1" to "162.9.3.1.1".

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Cl **120G** SC **120G.4.2** P**226** L**23** # **163**
 Li, Mike Intel
 Comment Type **E** Comment Status **A** bucket
 "of p2(k)" does not read right
 SuggestedRemedy
 delete "of"
 Response Response Status **C**
 ACCEPT.

Cl **120G** SC **120G.4.2** P**226** L**24** # **166**
 Li, Mike Intel
 Comment Type **TR** Comment Status **D**
 "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 **W**
 PROPOSED REJECT.

The linear pulse fit is intended for determining the DFE sampling phase position. As such, the extra precision potentially gained by the larger Np value likely is not necessary. In fact, it may be possible to reduce the value without impact.

Further evidence is required to determine if any changes are needed.

For task force discussion.

See comment 165.

Cl **120G** SC **120G.4.2** P**226** L**24** # **165**
 Li, Mike Intel
 Comment Type **TR** Comment Status **D**
 "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 **W**
 PROPOSED ACCEPT IN PRINCIPLE.

Host and module transmitter equalization architecture is not specified so there is no need to match the parameters in that regard.

The linear fit pulse response is intended only for determining the DFE sampling phase position. As such, the extra precision potentially gained by the larger Dp value may not be necessary.

On the other hand, since the measured data is filtered with any of the compliant CTLE settings applied, a larger value may be required for some CTLE settings.

Further evidence is required to determine if any changes are needed.

For task force discussion.

See comment 166.

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CI 120G SC 120G.4.2 P226 L28 # 274

Hidaka, Yasuo

Credo Semiconductor

Comment Type TR Comment Status D

In the performance study at TP1a in sun_3ck_02_1119.pdf, eta_0 noise of 8.20E-9 V²/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, measured eye opening will be larger than the performance study. This will create 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 V²/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 W

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

See comment #155.

CI 120G SC 120G.4.2 P226 L33 # 167

Li, Mike

Intel

Comment Type TR Comment Status D

"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 W

PROPOSED REJECT.

The criteria as written is intended to result in a single (e.g., greater than 0, less than 2) candidates.

The commenter makes reference to a parameter EVEC but does not define it.

CI 120G SC 120G.4.2 P226 L33 # 66

Dudek, Mike

Marvell

Comment Type E Comment Status D

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 W

PROPOSED REJECT.

The criteria at the end of the proposed text might result in candidates for multiple parameter combinations. The criteria as written is intended to result in a single (i.e., greater than 0, less than 2) candidates.

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Cl **120G** SC **120G.4.2** P**226** L**40** # **198**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D** *withdrawn*
 gDC max gian of 14 dB is unnecessary with a DFE receiver and channel <=16 dB
SuggestedRemedy
 12 dB would be more than adequate and with further study we can even further reduce the gDC.
 Proposed Response Response Status **Z**
 PROPOSED REJECT.
 This comment was WITHDRAWN by the commenter.

Cl **120G** SC **120G.4.2** P**226** L**40** # **197**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D**
 gDC max gian of 14 dB is unnecessary with a DFE receiver and channel <=16 dB
SuggestedRemedy
 12 dB would be more than adequate and with further study we can even further reduce the gDC.
 Proposed Response Response Status **W**
 PROPOSED REJECT.
 The commenter provides no evidence that the current specification is incorrect.
 For task force discussion.

Cl **120G** SC **120G.4.2** P**226** L**40** # **199**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **D**
 To speed up testing and eliminating weird cases one should gDC/gDC2 combinations
SuggestedRemedy
 See ghiasi_3ck_03_0120 for table of allowed CTLE combinations.
 Proposed Response Response Status **W**
 PROPOSED ACCEPT IN PRINCIPLE.
 A presentation relating to this comment is anticipated at the January meeting.
 For task force discussion.

Cl **135** SC **135.1.4** P**98** L**42** # **223**
 Ran, Adee Intel
 Comment Type **E** Comment Status **R** *bucket*
 This phrasing "53.GbD by one-lane" is unnatural. It should be either by-1 or one-lane.
 Preferably the latter.
 This phrasing is used existing text, and is also awkward there. It should be changed.
SuggestedRemedy
 Remove "by" in items 2-4 (the result would be simply four-lane, two-lane, and one-lane).
 Response Response Status **C**
 REJECT.

Although the referenced text is not perfect, it communicates the intent correctly.
 The text of the first 3 bullets is established text in an approved amendment (IEEE Std 802.3-2018). Changes to this text is out of scope for this project.
 The new bullet (#4) was written in the same form as the first three bullets.

Cl **135** SC **135.1.4** P**99** L**15** # **30**
 Dudek, Mike Marvell
 Comment Type **T** Comment Status **A** *bucket*
 There are errors in the MMD8 and MMD1 100G PMA's in figure 135-2
SuggestedRemedy
 Change the MMD8 100G PMA between 100GAUI-4 and 100GAUI-P from PMA(4:2) to PMA(4:p) and change the PMA (2:n) to PMA (p:n).
 Response Response Status **C**
 ACCEPT.

Cl **135** SC **135.1.4** P**99** L**15** # **224**
 Ran, Adee Intel
 Comment Type **T** Comment Status **A** *bucket*
 In Figure 135-2, with the new variable p, PMAs above and below the 100GAUI-p should be PMA(4:p) and PMA(p:n) respectively.
SuggestedRemedy
 Change labels per comment.
 Response Response Status **C**
 ACCEPT.

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CI 135 SC 135.5.7.2 P101 L29 # 225
 Ran, Adee Intel
 Comment Type E Comment Status R bucket
 The bottom brace below the "MEDIUM" and the text "50GBASE-R or 100GBASE-P" don't seem to serve any purpose in this diagram. These are families of PHYs, not specific PMDs or media. Also these are all the families in which this clause is used, so it goes without saying.
 SuggestedRemedy
 Delete the brace and the label.
 Response Response Status C
 REJECT.
 These braces are consistent with the original diagram in IEEE Std 802.3cd-2018 and thus removing them would be out of scope for this project.
 This diagram has been updated only as required regarding addition of the new interfaces in P802.3ck.

CI 135A SC 135A.2 P0 L0 # 111
 Slavick, Jeff Broadcom
 Comment Type TR Comment Status A bucket
 We've added 100GAUI-1 so need to update Figure 135A-8 to indicate that
 SuggestedRemedy
 Change n = 2 or 4 to n = 1 or 2 or 4
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Change "n = 2 or 4" to "n = 1, 2, or 4".

CI 135A SC 135A P0 L0 # 135
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status A layer diagrams
 Some layer diagrams in Annex 135A should show the new 100GAUI-1 C2C and C2M in addition to 100GAUI-2 and 100GAUI-1.
 SuggestedRemedy
 Import portions of Annex 135A and include 100GAUI-1 where 100GAUI-2 and 100GAUI-4 are shown.
 Response Response Status C
 ACCEPT.

CI 161 SC 161.3 P107 L3 # 226
 Ran, Adee Intel
 Comment Type E Comment Status A Bucket
 Missing period after the sentence
 SuggestedRemedy
 Add a period.
 Response Response Status C
 ACCEPT.

CI 135A SC 135A P0 L0 # 139
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status A layer diagrams
 Some layer diagrams in Annex 135A should include the RS-FEC (Clause 91), Inverse RS-FEC (Clause 152), and RS-FEC-Int (Clause 161).
 SuggestedRemedy
 Add layer diagram showing RS-FEC, Inverse RS-FEC, and RS-FEC-Int.
 Response Response Status C
 ACCEPT.

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Cl 161 SC 161.4 P107 L7 # 227

Ran, Adee Intel

Comment Type T Comment Status A

Delay constraint of an interleaved FEC are likely not the same as those of clause 91.

Interleaved FEC is defined in the PCS of clause 119. The delay constraint there is 313 pause_quanta, compared to 80 pause_quanta in clause 91.

I would expect that the delay constraint is mainly affected by the buffering and decoding, and for interleaved FEC it should be twice the delay constraint of clause 91. But even if I add the delay of the 100GBASE-R PCS (69 pause_quanta), the numbers don't match - $2*80+69=229$, far from 313.

The proposed change is based on the smaller number (doubling the constraint of clause 91) but if there is a reason behind the larger number of bit times in clause 119 it should be considered.

SuggestedRemedy

Replace the content of this subclause with the following (taken from clause 91, doubling all numbers):

The maximum delay contributed by the RS-FEC-Int sublayer (sum of transmit and receive delays at one end of the link) shall be no more than 81920 bit times (160 pause_quanta or 819.2 ns). A description of overall system delay constraints and the definitions for bit times and pause_quanta can be found in 80.4 and its references.

Response Response Status C

ACCEPT IN PRINCIPLE.

See response to comment #116.

Cl 161 SC 161.4 P107 L7 # 116

Nicholl, Shawn Xilinx

Comment Type TR Comment Status A

Since CL161 sublayer delay is larger than CL91 due to the interleaving of two codewords, the maximum delay constraint needs to be updated accordingly.

SuggestedRemedy

Proposed to update text in 161.4 to following:
The maximum delay contributed by the RS-FEC-Int sublayer (sum of transmit and receive delays at one end of the link) shall be no more than 51200 bit times (100 pause_quanta or 512 ns). A description of overall system delay constraints and the definitions for bit times and pause_quanta can be found in 80.4 and its references.

Propose to update Table 80-5 to contain a new row after 100G-BASE-R RS-FEC entry.

The new row to contain following cell values:

- * 100GBASE-R RS-FEC-Int
- * 51200
- * 100
- * 512
- * 161.4

Response Response Status C

ACCEPT IN PRINCIPLE.

Update text in 161.4 to following:
The maximum delay contributed by the RS-FEC-Int sublayer (sum of transmit and receive delays at one end of the link) shall be no more than 51200 bit times (100 pause_quanta or 512 ns). A description of overall system delay constraints and the definitions for bit times and pause_quanta can be found in 80.4 and its references.

In Table 80-5, insert a new row after the row for 100G-BASE-R RS-FEC with columns as follows:

- * 100GBASE-P RS-FEC-Int
- * 51200
- * 100
- * 512
- * 161.4

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CI 161 SC 161.5.2.4 P107 L35 # 228
 Ran, Adee Intel
 Comment Type E Comment Status A Bucket
 "EEE is unsupported" is only used here, similar text elsewhere in this draft uses "not supported".
 SuggestedRemedy
 Change to "not supported".
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.2.6 P108 L53 # 103
 Slavick, Jeff Broadcom
 Comment Type TR Comment Status A
 The same alignment marker scheme is used for both CI91 and CI161. So if one direction sends the opposite format from expected, then the FEC engine will Alignment lock but will only get uncorrectable FEC codewords.
 SuggestedRemedy
 Change steps a) through e) to be either:
 Option 1 (Flip-flop AM4-19 M0,1,2 and M4,5,6):
 a) if $x \leq 3$ amp_tx_x<23:0> is set to M0, M1, and M2 as shown in Figure 82-9 (bits 25 to 2) using the values in Table 82-2 for PCS lane number 0. if $x \geq 4$ amp_tx_x<23:0> is set to M4, M5, and M6 as shown in Figure 82-9 (bits 57 to 34) using the values in Table 82-2 for PCS lane number x.
 b) amp_tx_x<31:24> = am_tx_x<33:26>
 c) if $x \leq 3$ amp_tx_x<55:32> is set to M4, M5, and M6 as shown in Figure 82-9 (bits 57 to 34) using the values in Table 82-2 for PCS lane number 0. if $x \geq 4$ amp_tx_x<55:32> is set to M0, M1, and M2 as shown in Figure 82-9 (bits 25 to 2) using the values in Table 82-2 for PCS lane number x.
 d) amp_tx_x<63:56> = am_tx_x<65:58>
 Option 2 (Use CI119 Common Marker instead of CI82 AM0):
 a) if $x \leq 3$ amp_tx_x<23:0> is set to CM0, CM1, and CM2 as shown in Figure 119-4 (bits 23 to 0) using the values in Table 119-1 for PLCS lane number x. if $x \geq 4$ amp_tx_x<23:0> is set to M0, M1, and M2 as shown in Figure 82-9 (bits 25 to 2) using the values in Table 82-2 for PCS lane number x.
 b) amp_tx_x<31:24> = am_tx_x<33:26>
 c) if $x \leq 3$ amp_tx_x<55:32> is set to CM0, CM1, and CM2 as shown in Figure 119-4 (bits 55 to 32) using the values in Table 119-1 for PCS lane number x. if $x \geq 4$ amp_tx_x<55:32> is set to M4, M5, and M6 as shown in Figure 82-9 (bits 57 to 34) using the values in Table 82-2 for PCS lane number x.
 d) amp_tx_x<63:56> = am_tx_x<65:58>
 And update the paragraph that follows to align with the chosen Option.
 Response Response Status C
 ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/slavick_3ck_01_0120.pdf

Change steps a) through e) according to option 1 in the suggested remedy.

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CI 161 SC 161.5.2.6 P109 L20 # 105
 Slavick, Jeff Broadcom
 Comment Type T Comment Status A Bucket
 The process of creating am_txmapped is not optional
 SuggestedRemedy
 Change "may then be" to "is"
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.2.6 P109 L46 # 229
 Ran, Adee Intel
 Comment Type E Comment Status D withdrawn
 The phrase "every 20 x 16 384 66-bit blocks" is hard to read with the space in the number 16384 (and possibly misleading, it can be interpreted as the number 1638466).
 This space does not appear in the similar text in clause 91. The separator convection is not helpful here, and it is not mandatory outside of tables.
 Also applies in some other similar phrases in this subclause and in 161.5.4.3.
 SuggestedRemedy
 Change "16 384" to "16384".
 Apply for other large numbers within the text in this clause.
 Proposed Response Response Status Z
 PROPOSED REJECT.
 This comment was WITHDRAWN by the commenter.

CI 161 SC 161.5.2.6 P109 L47 # 230
 Ran, Adee Intel
 Comment Type E Comment Status D withdrawn
 The "x" in "81 920 x 257-bit blocks" is out of place - "257-bit" is not a number. This is also inconsistent with the text in the previous line, which does not have an "x" before "66-bit blocks".
 Also in the next sentence and in 161.5.3.5.
 SuggestedRemedy
 Delete the "x" occurrences listed.
 Proposed Response Response Status Z
 PROPOSED REJECT.
 This comment was WITHDRAWN by the commenter.

CI 161 SC 161.5.2.6 P109 L48 # 231
 Ran, Adee Intel
 Comment Type E Comment Status A
 The paratraph starting in line 46 seems to be unfinished. The next paragraph starts by repeating what was already stated in this one.
 Perhaps this paragraph should be
 "One group of aligned and reordered alignment markers are mapped every 20 x 16384 66-bit blocks. This group of aligned and reordered alignment markers is called the "alignment marker group" and is labeled am_txmapped<1284:0>. An alognment marker group shall be inserted so it appears in the output stream every 81920 257-bit blocks."
 And then the first line in the next paragraph can be removed.
 SuggestedRemedy
 Modify per comment.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Implement the suggested remedy but correct the spelling of alignment.

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Cl 161 SC 161.5.2.6 P110 L16 # 232

Ran, Adee

Intel

Comment Type T Comment Status A Bucket

In figure 161-3, the labels A and B appear within the amp_tx blocks, but these blocks are not taken _from_ the codewords as the legend states - according to figure 161-5 they are inserted _into_ the stream of symbols that creates the codewords.

Also, the labels do not appear in the tx_scrambled area which contains the real traffic.

SuggestedRemedy

Change the legend to have "to FEC codeword A" and "to FEC codeword B" .

Continue the labeling into symbol in columns 32 and 33.

Response Response Status C

ACCEPT IN PRINCIPLE.

The current wording is confusing.

Change to "FEC codeword A" and "FEC codeword B"

Also add A/B into the 32/33 column.

Cl 161 SC 161.5.2.9 P111 L16 # 233

Ran, Adee

Intel

Comment Type T Comment Status D

If we create four FEC lanes then a PMA(4:1) will be required to create a single-lane PMD interface. This PMA will bit-mux symbols from the four lanes.

Bit muxing of four lanes significantly weakens the RS-FEC in case of error bursts, since bursts are always going to impact more than one symbol. 8 errors in a block of 16 bits (8-UI burst) can corrupt 4 FEC symbols in each of the codewords (A/B). Without bit-muxing, similar corruption would require a bursty block of more than 70 bits (35 UI). This burst length is much less likely, so the probability of uncorrected codewords (and FLR) will be dramatically lower for the same SNR. Alternatively, the same FLR can be achieved with lower SNR, enabling power reduction.

Assuming this new FEC is intended only for single-lane 100G PHYs and that there are no lower-rate AUIs _below_ it, using a single FEC lane (serial output) instead would prevent this degradation of the FEC coding gain. This can be done with the current definitions by simply changing the number of FEC lanes from 4 to 1.

Even if we do want to support bit-muxing below the FEC, e.g. for the near future devices that may not have 100G I/O, we should consider not imposing a large performance penalty for all future products.

We can consider having two modes of the FEC, with either 4 or 1 FEC lanes, in both directions, and choosing between them in auto-negotiation. The additional complexity should be much lower than having both clause 91 and clause 161.

We can also apply a similar choice for the clause 91 RS-FEC if desired.

SuggestedRemedy

Add a management variable to control the number of FEC lanes, either 4 or 1. Add a bit in the AN page for supporting 1 FEC lane - if both sides advertise it, then 1-lane mode will be used (symmetrically).

Proposed Response Response Status Z

REJECT.

This comment was WITHDRAWN by the commenter.

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CI 161 SC 161.5.2.9 P111 L16 # 234
 Ran, Adeel Intel
 Comment Type E Comment Status A Bucket
 Per style manual, in general text, isolated numbers less than 10 should be spelled out.
 Applies here and in several other places in this clause (where numbers are isolated, i.e. with no units following).
 SuggestedRemedy
 Change "4" to to "four". Apply in other places in this clause.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Style manual is not as specific as the commenter states.
 The guideline is as follows:
 "In general text, isolated numbers less than 10 should be spelled out. However, in equations, tables, figures, and other display elements, Arabic numerals should be used. Numbers applicable to the same category should be treated alike throughout a paragraph; numerals should not be used in some cases and spelled out in others."
 Update numbers less than 10 to be consistent with the style manual.

CI 161 SC 161.5.2.10 P112 L13 # 235
 Ran, Adeel Intel
 Comment Type E Comment Status A Bucket
 The number "256" appears on the boundary of the block "tx_scrambled",
 SuggestedRemedy
 Move the number to the interior of the box.
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.3.1 P113 L7 # 106
 Slavick, Jeff Broadcom
 Comment Type TR Comment Status A Bucket
 FEC synchronization FSM is not Figure 161-6
 SuggestedRemedy
 Change "161-6" to "91-8"
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.3.3 P113 L26 # 76
 Gustlin, Mark Cisco Systems
 Comment Type T Comment Status A
 802.3cd added in subclause 91.5.3.3.1 FEC degraded SER (optional) to allow monitoring of the FEC performance. Add this into clause 161.
 SuggestedRemedy
 Add in the equivalent of 91.5.3.3.1 and its related text (variables etc), either by reference or directly.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Implement the suggested remedy with editorial license.

CI 161 SC 161.5.3.3 P113 L34 # 236
 Ran, Adeel Intel
 Comment Type E Comment Status A Bucket
 A cross-reference to the subclause which defines "bypass error indication" would be helpful.
 SuggestedRemedy
 Insert "(see 161.5.3.3.1)" between "If bypass error indication" and "is not supported".
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.3.3 P113 L36 # 81
 Koehler, Daniel MorethanIP
 Comment Type TR Comment Status A Bucket
 Does not reflect that there are 2 codewords to perform error indication for.
 SuggestedRemedy
 replace 'the codeword' with 'the two associated codewords'
 Response Response Status C
 ACCEPT.

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Cl 161 SC 161.5.3.3 P113 L38 # 104
 Slavick, Jeff Broadcom
 Comment Type TR Comment Status A
 There are 40 257b blocks that go into the FEC engine per pair of FEC codewords. So when an uncorrectable codeword occurs, it needs to mark across 40 257b blocks.
 SuggestedRemedy
 Change "20th" to "40th"
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 See the response to comment #82.

Cl 161 SC 161.5.3.3 P113 L39 # 82
 Koehler, Daniel MorethanIP
 Comment Type TR Comment Status A
 As it is two codewords the last 257-bit is the 40th not 20th. Also needs to reflect that there are 2 codewords.
 SuggestedRemedy
 replace 'last ... 11.' with 'last (40th) 257-bit block in the two associated codewords are set to 11.'
 Response Response Status C
 ACCEPT.

Cl 161 SC 161.5.3.3.1 P113 L42 # 237
 Ran, Adeed Intel
 Comment Type T Comment Status A
 802.3cd added the FEC Degraded SER as an optional feature in 91.5.3.3.1. Do we intend to add it in this draft too?
 I am not sure this feature is useful, so I am fine with not having it in this clause. It can be more useful to monitor codewords instead (classify based on number of errors corrected, as was proposed in ran_083017_3cd_adhoc) and this method is being used in practice. This task force may want to reconsider adding it as a standard feature.
 SuggestedRemedy
 If degraded SER is to be supported, the description (based on 91.5.3.3.1) should be placed here, and the corresponding variables and MDI mappings should be added.
 If codeword monitoring is desired, the proposal in ran_083017_3cd_adhoc slides 8-14 can be used as baseline (editorial changes such in clause numbers, etc., will be required).
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 See the response to comment #76.

Cl 161 SC 161.5.3.3.1 P113 L53 # 83
 Koehler, Daniel MorethanIP
 Comment Type T Comment Status A
 The reaction of hi_ser should cause error indication as described in 91.5.3.3 to trigger PCS hi_ber instead using it in Fig. 161-6.
 SuggestedRemedy
 Keep text of line 53 but add new sentence like:
 While hi_ser is asserted, the Reed-Solomon decoder shall cause synchronization header rx_coded<1:0> of each subsequent 66-bit block that is delivered to the PCS to be assigned a value of 00 or 11. As a result, the PCS sets hi_ber=true, which inhibits the processing of received packets. When Auto-Negotiation is supported and enabled, assertion of hi_ber causes Auto-Negotiation to restart.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Implement the suggested remedy with editorial license.

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CI 161 SC 161.5.4.1 P115 L10 # 238
 Ran, Adee Intel
 Comment Type E Comment Status A Bucket
 "Comprised on" is arguable language. 802.3bs used "composed of", other projects used "contains" or omitted this paragraph altogether (since 21.5 already states that state diagrams take precedence over text).
 I suggest "composed of".
 SuggestedRemedy
 Change "comprised" to "composed".
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.4.2.1 P115 L25 # 117
 Nicholl, Shawn Xilinx
 Comment Type ER Comment Status A Bucket
 Need to remove some editorial text related to cw_bad
 SuggestedRemedy
 Remove the text:
 No cw_bad variable, instead we have:
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Change: "No cw_bad variable, instead we have:"
 To: "cw_bad -- This variable is not defined"

CI 161 SC 161.5.4.2.3 P116 L3 # 78
 Gustlin, Mark Cisco Systems
 Comment Type T Comment Status A
 Remove redundancy from counters, make references instead.
 SuggestedRemedy
 amp_bad_count - refer to 91.5.4.2.3, cwA_bad_count and cwB_bad_count, refer to 119.2.6.2.4
 Response Response Status C
 ACCEPT.

CI 161 SC 161.5.4.3 P117 L1 # 75
 Gustlin, Mark Cisco Systems
 Comment Type T Comment Status D
 Replace figure 161-6 with a reference to figure 119-13.
 SuggestedRemedy
 Add that some signals change name: align_status -> fec_align_status, pcs_enable_status -> fec_enable_status. If this change is not made, then there is one correction to be made in 161-6, one instance of pcs_enable_deskew s/b fec_enable_deskew.
 Proposed Response Response Status Z
 REJECT.
 This comment was WITHDRAWN by the commenter.

CI 161 SC 161.5.4.3 P117 L2 # 84
 Koehler, Daniel MorethanIP
 Comment Type T Comment Status A
 hi_ser should be removed, not to cause LOSS_OF_ALIGNMENT. Its behavior is defined in 161.5.3.3.1 (see other comment) relying on the hi_ber feature of the PCS same as the Clause 91 RSFEC does.
 SuggestedRemedy
 remove '+ hi_ser' at top of figure.
 Response Response Status C
 ACCEPT.

CI 161 SC 161.7.3 P122 L6 # 239
 Ran, Adee Intel
 Comment Type T Comment Status A Bucket
 Item "**KR1" is marked "optional", but there is no another option (this sublayer is only used for CR1/KR1 PHYs), and no PICS item is defined as conditional on this feature. I don't see the purpose of this item.
 SuggestedRemedy
 Remove item "**KR1".
 Response Response Status C
 ACCEPT.

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CI 161 SC 161.7.4.2 P124 L19 # 240

Ran, Adeel Intel
 Comment Type T Comment Status A Bucket

The method of indicating errors has a "shall ensure" (161.5.3.3) but there is no corresponding PICS item.

Compare to item RF8 in clause 91 which states "Error indication function | 91.5.3.3 | Corrupts 66-bit block synchronization headers for uncorrected errored codewords (...)

SuggestedRemedy

Add PICS item based on the quoted RF8.

Response Response Status C

ACCEPT IN PRINCIPLE.

Change the feature name of RF4 to "Error indication function"

CI 162 SC 162.1 P125 L27 # 241

Ran, Adeel Intel
 Comment Type T Comment Status D FEC AN

The PHY defined in this clause can use either RS-FEC or RS-FEC-int. This is the first time The difference between the two is not described and readers may find it hard to decide which one should be used. Compare with clause 110 (100.1 Overview) where the FEC choice affects the cable reach.

The differences between the FEC sublayers may seem obvious for participants of the task force but we are writing the standard for other people too.

In this clause we should indicate that the interleaved FEC provides better FEC protection but has a larger delay associated with it. It would be good to also relate the choice to the auto-negotiation.

Also applies to clause 163.

SuggestedRemedy

Add text in the overview that describes the differences between RS-FEC and RS-FEC-Int when forming a 100GBASE-CR1 PHY, and note that the choice between the two can be done in auto-negotiation.

Proposed Response Response Status Z

REJECT.

This comment was WITHDRAWN by the commenter.

CI 162 SC 162.1 P125 L35 # 242

Ran, Adeel Intel
 Comment Type E Comment Status A bucket

Table 162-1 is carried over into the next page, but the continuation is not marked as such, as required by the style manual.

Also in Table 162-3 and perhaps other tables will turn out to be broken in future drafts.

There is also a customary "thin line at bottom" rule. We can perhaps defer applying this one to the last draft or to publication (it is not required in the style manual).

SuggestedRemedy

Add the "continued table" option for all tables.

Response Response Status C

ACCEPT.

CI 162 SC 162.1 P125 L45 # 133

Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status D FEC AN

Tables 162-1 list two FEC types (RS-FEC and RS-FEC-Int) that might be used by a 100GBASE-CR1 PHY, but never explains the criteria for selecting one or the other, how that selection is made, nor the implications (e.g., conversion from RS-FEC to RS-FEC-Int).

SuggestedRemedy

Add a subclause to explain the relationship of the two FEC types, how an FEC type is selected, and the implications of the selection.

Proposed Response Response Status Z

REJECT.

This comment was WITHDRAWN by the commenter.

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Cl 162 SC 162.1 P125 L45 # 137
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status A FEC AN
 In Table 162-1, the Clause 161 RS-FEC-Int is specified as TBD rather than Required or Optional in the second column.
SuggestedRemedy
 Specify RS-FEC-Int as either "Optional" or "Required".
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 As a consequence of the response to comment #77 change TBD to "Required".

Cl 162 SC 162.1 P126 L15 # 31
 Dudek, Mike Marvell
 Comment Type T Comment Status R
 The inverse RS-FEC is also required to change between RS-FEC (528,514) and RS-FEC (544,514)
SuggestedRemedy
 Add to footnote b. "and between RS-FEC (528,514) and RS-FEC (544,514)"
 Response Response Status C
 REJECT.
 Clause 152 inverse FEC is included to convert from CL91 RS-FEC to the CL161 FEC. Any other application is outside the scope of this clause.

Cl 162 SC 162.2 P127 L53 # 32
 Dudek, Mike Marvell
 Comment Type T Comment Status A bucket
 FEC is also used in "FEC symbol error rate" etc. where it also refers to the FEC within the 200 and 400G PCS.
SuggestedRemedy
 Add to the sentence "for 100GBASE-CR1 or the RS-FEC within the Clause 119 PCS for 200GBASE-CR2 and 400GBASE-CR4".
 Response Response Status C
 ACCEPT.

Cl 162 SC 162.5 P129 L45 # 243
 Ran, Adeed Intel
 Comment Type T Comment Status A
 The assumed maximum one way delay through the medium was 20 ns in clause 136, where the longest medium was a 3 meter cable. Now with 2 meters the number should be scaled down to 14 ns.
 There is a motivation for decreasing the assumed cable medium delay - it would allow more delay in the PMD, which is currently left with only 20.96 ns. This can help with some PMD implementations, with no penalty to upper layers which still assume 40.96 ns as in previously defined PHYs.

This can also be applied to the specifications of backplane PMDs. Although the physical length of the backplane is not specified, the existing medium delay matches the delay for cable assemblies, and the same numbers were used in previous backplane/cable PMDs. So a similar change should be made in 163.5.
 These changes should also be applied in the new rows in tables 80-5 and 116-5.

SuggestedRemedy
 Change the maximum delay through the medium from "20 ns" to "14 ns" here, in 163.5, and in the new rows in tables 80-5 and 116-5.
 Response Response Status C
 ACCEPT.

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Cl 162 SC 162.7 P134 L # 244

Ran, Adeo Intel
 Comment Type T Comment Status A

802.3cd added management registers for the control/status fields. The LP (Link Partner) registers are mapped in tables 162-5 and 162-6 so the link partner's training messages can be observed.

However, The PAM4 PMD training LD (Local Device) control and PAM4 PMD training LD status registers, defined in 45.2.1.137a and 45.2.1.138a respectively (Register 1.1120 through 1.1123 and Register 1.1420 through 1.1423), do not appear in tables 162-5 and 162-6. These registers allow control and observation of the local messages (visibility is required for both sides of the protocol).

These registers should be R/W or RO as listed in clause 45.

The LD mappings are also missing from clause 136, this should be considered in maintenance.

SuggestedRemedy

Add rows corresponding to registers in subclauses 45.2.1.137a and 45.2.1.138a.

Response Response Status C
 ACCEPT.

Cl 162 SC 162.8.1 P136 L2 # 33

Dudek, Mike Marvell
 Comment Type E Comment Status A bucket

The cable assembly specifications are in 162.11 not 162.10

SuggestedRemedy

Change the clause cross-reference from 162.10 to 162.11. Also on line 3 and line 19

Response Response Status C
 ACCEPT.

Cl 162 SC 162.8.7 P137 L33 # 245

Ran, Adeo Intel
 Comment Type T Comment Status R

I wonder why lane-by-lane Tx disable is optional, when AN is mandatory and requires the ability to disable all but one lane. A PMD in a PHY that supports AN as specified must include implementation of LBLTD in some way.

Digging into history - LBLTD was mandatory in 10GBASE-KX4 but optional in all subsequent multi-lane PMDs... I don't know the reasoning. It seems to me that the MDIO implementation should be optional, but LBLTD should be mandatory, similar to the lane-by-lane signal detect in 162.8.5.

I am considering maintenance request for making it mandatory in existing PMD clauses that support AN. But I think this should better be initially discussed in 802.3ck.

Applies also to 163.8.9.

SuggestedRemedy

Remove the (optional) in the heading and change the text to make it mandatory.

Add a paragraph:

"If the MDIO interface is implemented, then PMD_transmit_disable_i shall be mapped to the corresponding PMD transmit disable i bit as specified in 45.2.1.8."

Response Response Status C
 REJECT.

AN does not specify how the Tx is disabled per the AN state machine. The intent of this register is for external management control.

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CI 162 SC 162.8.11 P138 L22 # 246

Ran, Adeel Intel

Comment Type T Comment Status A

The list of exceptions to the PMD control definition in 136.8.11 should include two more exceptions:

In clause 136, Table 136-9 and Table 136-10 define the encoding for coefficient selection, between c(-2) and c(+1), but don't have an encoding for c(-3) which is required in 162.

Also the text in 136.8.11.2.4 "Coefficient request" defines the effect of "no equalization" for c(-2) to c(+1) but does not mention c(-3).

Suggested Remedy

Add the following items:

d) The Coefficient select bits in the Control field (Table 136-9) and the Coefficient select echo bits in the Status field (Table 136-10) have an additional combination, 1 0 1, for selecting c(-3).

e) The "No equalization" value (see 136.8.11.2.4) of c(-3) is 0.

Response Response Status C

ACCEPT IN PRINCIPLE.

Implement with editorial license.

CI 162 SC 162.8.11 P138 L32 # 247

Ran, Adeel Intel

Comment Type T Comment Status D

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).

Suggested Remedy

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 W

PROPOSED REJECT.

Comment alludes to a future proposal. Propose deferring discussion of this topic until the proposal is presented. Request that commenter use the ad hoc for this purpose.

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CI 162 SC 162.9.3 P139 L6 # 168
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A measurement filter
 Transmitter BW is TBD
 SuggestedRemedy
 Replace TBD with 39.8 GHz
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Commenter is referring to transmitter measurement bandwidth.
 Change the measurement BW from TBD to 40 GHz at the following locations
 Page 139, line 6
 Page 172, line 26 (clause 163)

CI 162 SC 162.9.3 P139 L27 # 3
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 For task for discussion.

CI 162 SC 162.9.3 P139 L31 # 6
 Mellitz, Richard Samtec
 Comment Type TR Comment Status A CR Vf
 TBD for Vf min may be determined since the baseline for device package was accepted. If Nv=200 is accepted for Vf then Vf min will be Av minus dc host and HCB losses.
 SuggestedRemedy
 Set the TBD Transmitter steady-state voltage, vf (min.) to 0.387 V as suggested for Av in mellitz_3ck_01b_0919
 Response Response Status C
 ACCEPT.

CI 162 SC 162.9.3 P139 L34 # 8
 Mellitz, Richard Samtec
 Comment Type TR Comment Status A CR Vf
 TBD for the peak value of p(k) may be determined since the baseline for device package was accepted. If Nv=200 is accepted. If The peak value of p(k) in terms Vf may be determined based on the collection of posted channels as suggested in mellitz_3ck_01b_0919.
 SuggestedRemedy
 Change entry for the Linear fit pulse peak (min.) peak value to 0.397 x vf.
 Response Response Status C
 ACCEPT.

CI 162 SC 162.9.3 P140 L8 # 248
 Ran, Adeo Intel
 Comment Type T Comment Status A
 The maximum step size for c(1) is 0.05, while for all other coefficient it is 0.02. From implementation point of view, there is no benefit from having c(1) with a larger step size than all others.
 Training algorithms can be made simpler if the steps are equal for all coefficients, so that decrements/increments in c(1) have the same effect on signal swing as other coefficients.
 SuggestedRemedy
 Change step size limits for c(1) to align with all other coefficients.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Resolve using the response to comment #35.

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Cl 162 SC 162.9.3 P140 L9 # 35

Dudek, Mike Marvell

Comment Type T Comment Status A

The abs step size for c(1) max in table 162-8 is 0.05 which is different from the other taps but does match the value in the COM tab162-15 and is not specified in section 162.9.3.1.4. It is 0.02 in the C2C spec in 120F

SuggestedRemedy

Either Change 0.05 to 0.02 here and in table 162-15 and in 162.9.3.1.4 change "-3,-2 or -1" to "-3,-2,-1 or 1" (and make the equivalent change in clause 163 see separate comment) Or. Add an extra paragraph in 162.9.3.1.4 stating "When coef_sel is 1, the change in the normalized transmit equalizer coefficient c(coef_sel) corresponding to a request to "increment" shall be between 0.005 and 0.05, and the change in the normalized transmit equalizer coefficient c(coef_sel) corresponding to a request to "decrement" shall be between -0.05 and -0.005.

Response Response Status C

ACCEPT IN PRINCIPLE.

Commenter has provided two options to resolve this comment, however the first option had more support.

Implement the following with editorial license:
Change 0.05 to 0.02 here and in table 162-15.
In 162.9.3.1.4 change "-3,-2 or -1" to "-3,-2,-1 or 1".

Cl 162 SC 162.9.3 P140 L10 # 249

Ran, Adeo Intel

Comment Type T Comment Status D

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 W

PROPOSED REJECT.

All analysis to date has used 2% step size. The commenter proposes increasing step size to 2.5% but does not provide evidence that it does not adversely affect the performance of contributed channels.

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Cl 162 SC 162.9.3 P140 L20 # 250

Ran, Adee Intel

Comment Type T Comment Status A

The reference for SNDR (min) is 120D.3.1.6. The method there includes a reference to the linear fit procedure in 120D.3.1.3, which has $D_p = 2$ and coefficient calculations (in 92.8.3.5.1) suitable for a 3-tap equalizer. An exception should be made to use the fitting procedure in 162.9.3.1.1 (which is suitable for a 5-tap equalizer) instead. A table footnote can be used.

A similar change may also be required in clauses 136 and 137 (maintenance).

SuggestedRemedy

Add the following sentence as a footnote to the referenced subclause:

The measurement uses the method described in 120D.3.1.6 with the exception that the linear fit procedure in 162.9.3.1.1 is used.

Response Response Status C

ACCEPT IN PRINCIPLE.

Implement the suggested remedy in 162.9.3 and 163.9.2.

Cl 162 SC 162.9.3 P140 L20 # 251

Ran, Adee Intel

Comment Type T Comment Status A

SNDR (min) is currently TBD.

As an initial proposal for this value, I suggest re-using the values from 802.3cd: 32.5 dB for backplane/C2C and 32.2 dB for cable assembly.

The effect of SNDR is known so further analysis is not required. These values are more challenging to meet and to measure at 53 GBd, but it should not be impossible.

SuggestedRemedy

Change SNDR from TBD to values in the comment, here and in 163.9.2.

Response Response Status C

ACCEPT IN PRINCIPLE.

Based on strawpoll #9, there is sufficient consensus to close this comment with the following:

For 162.9.3, set SNDR to 32.2 dB.

For 163.9.2, set SNDR to 32.5 dB.

Strawpoll #9

I support addressing comment #251 against Draft 1.0 with the following:

For 162.9.3, set SNDR to 32.2 dB.

For 163.9.2, set SNDR to 32.5 dB.

Yes: 9

No: 8

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CI 162 SC 162.9.3 P140 L24 # 252

Ran, Adee Intel
 Comment Type T Comment Status D

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 W

PROPOSED REJECT.

Commenter proposes a new parameter that has not been discussed previously. A methodology and definition has not been provided.

For task force discussion.

CI 162 SC 162.9.3 P141 L39 # 253

Ran, Adee Intel
 Comment Type T Comment Status A

The addition of coefficient c(-3) requires several changes in the fitting procedure:

1. D_p should be changed from 3 to 4
2. The dimensions of R_m should be M*N_p-by-5 (instead of by-4)
3. l runs from -3 to 1 (instead of -2 to 1)
4. In equation 162-1, the left-hand term should be R_m(j, i+4) (instead of i+3).

SuggestedRemedy

Change per comment.

Response Response Status C

ACCEPT IN PRINCIPLE.

Implement with editorial license.

CI 162 SC 162.9.3.1.1 P141 L50 # 34

Dudek, Mike Marvell
 Comment Type T Comment Status A bucket

There are three pre-cursors.

SuggestedRemedy

Change "-2 to 1" to "-3 to 1"

Response Response Status C

ACCEPT.

CI 162 SC 162.9.3.1.2 P142 L38 # 5

Mellitz, Richard Samtec
 Comment Type TR Comment Status D CR Vf

TBD for Vf min may be determined since the baseline for device package was accepted. If Nv=200 is accepted for Vf then Vf min will be Av minus dc host and HCB losses.

SuggestedRemedy

Set the TBD Vf min 0.387 V as suggested for Av in mellitz_3ck_01b_0919

Proposed Response Response Status Z

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

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CI 162 SC 162.9.3.1.2 P142 L38 # 4

Mellitz, Richard Samtec
 Comment Type TR Comment Status A CR Vf

The dependence of Vf on Nv is has proved to be confusing. Since we specify that ratio of Pmax to Vf there really is no good reason not to make Nv more like a real steady state voltage. See Mellitz_3ck_01b_0919 for reference.

SuggestedRemedy

Add exception in the exception list for this subclause setting Nv to 200 for the determination of Vf.
 Refer to clause "136.9.3.1 Transmitter output waveform" : Change k = -2 to 1 to k = -3 to 1
 Refer to clause "120D.3.1.3 Linear fit to the measured waveform": Change Dp= 3 to Dp= 4
 See Mellitz_3ck_01b_0919 for reference.

Response Response Status C
 ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

CI 162 SC 162.9.3.1.2 P142 L42 # 254

Ran, Adee Intel
 Comment Type E Comment Status A bucket

Missing space after v_f

SuggestedRemedy

Add space.

Response Response Status C
 ACCEPT.

CI 162 SC 162.9.3.1.2 P142 L42 # 7

Mellitz, Richard Samtec
 Comment Type TR Comment Status A CR Vf

TBD for the peak value of p(k) may be determined since the baseline for device package was accepted. If Nv=200 is accepted. If The peak value of p(k) in terms Vf may be determined based on the collection of posted channels as suggested in mellitz_3ck_01b_0919.

SuggestedRemedy

Change to line 42 to: The peak value of p(k) shall be greater than $0.397 \times v_f$ after the transmit equalizer initial condition has been set to preset 1 (no equalization). See slide 15 mellitz_3ck_01b_0919

Response Response Status C
 ACCEPT.

CI 162 SC 162.9.3.1.3 P143 L5 # 255

Ran, Adee Intel
 Comment Type T Comment Status A

The tolerances in Table 162-9 should correspond to the maximum step size of each coefficient in Table 162-8.

Currently all should be +/-0.02 except c(1) which is 0.05 (but subject to another comment may also be 0.02).

SuggestedRemedy

Change all values after the +/- signs per comment.

Response Response Status C
 ACCEPT IN PRINCIPLE.

Implement the suggested remedy in conjunction with the response to comment #35.

CI 162 SC 162.9.3.1.4 P143 L15 # 256

Ran, Adee Intel
 Comment Type T Comment Status A

"When coef_sel is -3, -2, or -1, (...) between 0.005 and 0.02"

According to Table 162-8 c(0) has the same maximum step size. c(1) subject to another comment may be changed to also have the same maximum.

SuggestedRemedy

Change "or -1" to "-1, or 0".

If my other comment is accepted, also add 1 to the list.

Response Response Status C
 ACCEPT IN PRINCIPLE.

Commenter is referring to comment #248.

Resolve using the response to comment #35.

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CI 162 SC 162.9.3.1.4 P143 L20 # 257

Ran, Adeel

Intel

Comment Type T Comment Status A

"When coef_sel is 0, the change in the normalized transmit equalizer coefficient c(-2)"

Should be "coef_sel is 1" and "coefficient c(+1)". But I suggest in another comment to make c(1) have the same steps as all others.

SuggestedRemedy

If my other comment is accepted, delete this paragraph. Otherwise, change per comment.

Response Response Status C

ACCEPT IN PRINCIPLE.

Commenter is referring to comment #248.

Implement suggested remedy in conjunction with the response to comment #35.

CI 162 SC 162.9.3.1.5 P143 L39 # 36

Dudek, Mike

Marvell

Comment Type T Comment Status A

The max/min values in this section need to match those in table 162-8 and those in the COM table 162-15

SuggestedRemedy

on line 39 change -0.25 to -0.2, on line 42 change -0.25 to -0.34, on line 46 change 0.1 to 0.12.

Response Response Status C

ACCEPT.

CI 162 SC 162.9.3.1.5 P143 L49 # 258

Ran, Adeel

Intel

Comment Type T Comment Status A bucket

This paragraph specifies the maximum value of c(-3) when it is set to the minimum setting.

But the text says "and c(-2) having received sufficient "increment" requests so that it is at its maximum value"

which is incorrect.

SuggestedRemedy

Change to "and c(-3) having received sufficient "decrement" requests so that it is at its minimum value".

Response Response Status C

ACCEPT.

CI 162 SC 162.9.3.4 P144 L18 # 37

Dudek, Mike

Marvell

Comment Type T Comment Status A

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 TP2 test fixture" to from the measurement point TP2 to the beginning of the TP2 test fixture MDI connector". Make the equivalent change in section 162.9.4.5 for the Receiver ERL.

Response Response Status C

ACCEPT.

CI 162 SC 162.9.3.4 P144 L26 # 9

Mellitz, Richard

Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

CI 162 SC 162.9.4 P145 L15 # 10
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D ERL
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 For task force discussion.

CI 162 SC 162.9.4.3.1 P146 L9 # 170
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A
 Replace IL TBD test case 2
 SuggestedRemedy
 Min=28 dB, Max=29 dB
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Based upon task force discussion and other closed comments use different values than
 suggested.
 For test case 2, replace TBD as follows:
 minimum IL: 23.625 dB
 maximum IL: 24.625 dB
 Implement with editorial license to address other values in the table.

CI 162 SC 162.9.4.3.1 P146 L9 # 169
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A
 Replace IL TBD test case 1
 SuggestedRemedy
 Min=19.84 dB, Max=21.84 dB, Delta Loss Between Test channel and cable assembly =
 2(10.975-6.6)
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 For test case 1, replace TBD as follows:
 minimum IL: 10.5 dB
 maximum IL: 11.5 dB

CI 162 SC 162.9.4.3.3 P146 L37 # 38
 Dudek, Mike Marvell
 Comment Type T Comment Status A
 Table 162-12 only provides the COM value not all the parameters.
 SuggestedRemedy
 Change to the equivalent wording of clause 136 "The COM parameters are as modified by
 Table 162-12.
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Change the sentence to:
 "The COM parameters are as modified by Table 162-12."

CI 162 SC 162.9.4.3.5 P147 L1 # 259
 Ran, Adeo Intel
 Comment Type E Comment Status A bucket
 "per-lane FEC symbol error counters (see 91.6)"
 this refers to RS-FEC, but RS-FEC-Int can be used instead.
 SuggestedRemedy
 Change to "per-lane FEC symbol error counters (see 91.6 or 161.6)".
 Response Response Status C
 ACCEPT.

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Cl 162 SC 162.9.4.5 P148 L48 # 11

Mellitz, Richard Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

Cl 162 SC 162.11 P149 L26 # 39

Dudek, Mike Marvell

Comment Type T Comment Status A

Sentence does not make sense.

SuggestedRemedy

Delete "The are" if other MDI's are allowed, or just delete "are" if the MDI's are restricted to those in Annex 162C

Response Response Status C

ACCEPT IN PRINCIPLE.

Delete "are possible" in sentence

The possible MDIs are defined in Annex 162C.

Cl 162 SC 162.11.2 P150 L3 # 79

Palkert, Tom Molex

Comment Type T Comment Status D

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 W

PROPOSED REJECT.

The cable assembly Channel Operating Margin (COM) for each lane is derived from measurements of the cable assembly signal, near-end crosstalk and far-end crosstalk paths. COM is computed using the path calculations defined in 162.11.7.1 and the procedure in 93A.1.

The cable assembly signal and crosstalk paths are impacted by the parameters requested to be removed. We have an explicit bound on these parameters with the expectation that a cable assembly meeting ERL, IL, and these specification parameters will pass COM i.e., cable assembly specification parameters independent of COM. At least one benefit of the specification parameters is to enable characterization of the cable assembly by direct measurement.

For task force discussion.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

CI 162 SC 162.11.2 P150 L6 # 276

DiMinico, Christopher

MC Communications

Comment Type T Comment Status D Late

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 W

PROPOSED ACCEPT IN PRINCIPLE.

Use ILchmin and ILcamin versus ILch0.5m and ILca0.5m equation 162A-2 and Table162A-1.

Change values In Table 162–13—Cable assembly characteristics summary [Minimum insertion loss at 26.56GHz 162.11.2 change 11.09 dB to 13 dB. In Table 162A–1—Insertion loss budget values at 26.56 GHz [ILcamin change 11.09 dB to 13 dB. See diminico_3ck_2_0220.pdf

CI 162 SC 162.11.3 P150 L8 # 13

Mellitz, Richard

Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

Resolve with comment #12

CI 162 SC 162.11.3 P150 L22 # 40

Dudek, Mike

Marvell

Comment Type T Comment Status A ERL

The delay being removed from the measurement should be better specified.

SuggestedRemedy

Change "delay associated with the specific cable assembly test fixture" to "delay from Tp1 or TP4 to the connector of the specific cable assembly test fixture"

Response Response Status C

ACCEPT.

CI 162 SC 162.11.3 P150 L39 # 12

Mellitz, Richard

Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

A presentation (mellitz_3ck_04_1119) relating to this comment is anticipated at the January meeting.

For task force discussion.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

CI 162 SC 162.11.4 P150 L43 # 260

Ran, Adee Intel

Comment Type T Comment Status R

The conversion parameter specifications were defined in clause 92 and re-used for all the cable assembly specs at rates where the Nyquist frequencies were about 13 GHz. This project needs new specs for the first time since 802.3bj.

My proposal in the suggested remedy creates similar shapes but with frequencies scaled by approximately the signaling rate ratio ($2^{68/66}$).

If this proposal is not accepted, numbers can be left as TBDs and figures can be empty as placeholders.

SuggestedRemedy

Copy the text and equations from clause 92 and apply the following changes:

D2CRL (162.11.4): based on equation 92-28 changing frequencies: 25.78 to 53.135, 12.89 to 26.5625, and 19 to 39.

D2CCL (162.11.5): based on equation 92-29 changing frequencies: 12.89 to 26.5625, 15.7 to 32.4 and 19 to 40.

C2CRL (162.11.6): based on equation 92-30 (2 dB) changing frequencies: 19 to 40.

Add Figures with updated graphs.

Response Response Status C

REJECT.

The commenter is correct that the project needs new specs for the first time since 802.3bj. Table 162-13-Cable assembly characteristics summary does not reference 92.

As we need new specifications seems prudent to support them with measurements or analysis.

The commenter mentions differential to common mode return loss. The draft has TBDs for differential to common mode conversion loss.

CI 162 SC 162.11.7 P151 L24 # 200

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status R COM burst penalty

COM table and analysis does not include penalty due to burst error, current COM code on some weired channel

SuggestedRemedy

http://www.ieee802.org/3/ck/public/19_03/anslow_3ck_01_0319.pdf page has 2 dB of SNR penalty with pre-coding on for tap weights [0.85, 0.05, 0.25, -0.05, 0.15], the Anslow analysis showed that non of the 115 channels would be as bad but how can we gurantee some weired channel will not in the mix that passes 3 dB COM but would fail due to burst error? Assuming there is interest we can bring a proposal in future task force meeting for an analytical burst error estimator that can be added to COM.

Response Response Status C

REJECT.

The reference receiver is defined as an idealized DFE for purposes of analysis. Implemented PMD receivers may or may not include a DFE and may or may not create error bursts as analyzed in the referenced [anslow_3ck_01_0319](http://www.ieee802.org/3/ck/public/19_03/anslow_3ck_01_0319.pdf).

The BER requirements for PHYs as defined in 162.1 and 163.1 are stated explicitly "assuming errors are sufficiently uncorrelated", and "If the PMD and PMA create errors that are not sufficiently uncorrelated, the BER is required to be lower as appropriate to maintain a frame loss ratio lower than (the maximum FLR)". In both clauses, the requirements apply to a signal "that has passed through a compliant channel".

In other words, it is the PHY implementer's responsibility to compensate for any correlated errors caused by the receiver, including bursts due to DFE error propagation (if the receiver indeed creates such bursts with a compliant channel), by having low enough BER or improved SNR to cover the penalty. The way this is to be achieved is implementation dependent.

Since implemented receivers are expected to perform as if errors are uncorrelated, channel compliance does not need to account for possible correlated errors in the reference receiver.

Note that the referenced work showed that even with a very pessimistic error propagation model (which exceeds the reference receiver's results for all of the contributed channels), the "SNR penalty" with interleaved RS-FEC and precoding was limited to less than 1.5 dB.

The presentation that proposed the bit error ratio specifications is as follows: http://www.ieee802.org/3/cd/public/July16/anslow_3cd_01_0716.pdf

Commenter has not provided changes to the draft.

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Cl 162 **SC 162.11.7** **P152** **L33** # **14**

Mellitz, Richard Samtec

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

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** **W**

PROPOSED ACCEPT IN PRINCIPLE.

Presentations (mellitz_3ck_03_1119 and lim_3ck_01_1119) relating to this comment are anticipated at the January meeting.

For task force discussion.

Cl 162 **SC 162.11.7** **P152** **L38** # **150**

Dawe, Piers Mellanox

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

Slide 6 of heck_3ck_01_0919 shows that the DFE taps are never strongly negative, yet the draft would allow such untypical/hypothetical channels.

SuggestedRemedy

Remember that a tap weight limit isn't a hard pass-fail limit; channels can go outside it but don't get a free pass for the excess ISI noise that they cause, and that cable channels are smoother than backplane channels.

Add a minimum tap weight limit of -0.03 or greater for all taps, including the floating taps.

Response **Response Status** **C**

REJECT.

The commenter has not provided sufficient evidence to justify the proposed change.

A minimum tap weight is specified as -0.3 for tap 2 and -0.2 for the remaining fixed taps, and -0.05 for the floating taps.

Some analysis is required to show that the proposed change would not result in good channels being rejected.

For task force discussion.

Cl 162 **SC 162.11.7** **P152** **L39** # **261**

Ran, Adee Intel

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

b_max(n) for n=2 was changed from the baseline proposal value 0.2 to 0.3. This change was accepted by Motion #13 in the November 2019 meeting without sufficient technical discussion on the benefits or costs. According to the minutes there was only 6 minutes of discussion just before the meeting closing time, and the motion was not announced beforehand.

The original 0.2 was the value which was used in all presentations and made the candidate channels work.

Allowing a large coefficient such as 0.3 for n=2 combined with the even higher limit (0.85) for n=1 results in a situation that the ISI the DFE has to cope with is >100% of the desired signal. This means that the receiver needs to have large dynamic ranges and low internal noises (including detection sensitivity). These parameters are not included in COM, but the implications are becoming impractical for real implementations, especially ADC/DSP based ones which are considered likely.

In order to match channel compliance with actual operation, we should make the reference receiver close to the expected performance of actual implementation, and not make it too capable. Real receivers will likely use linear equalization (Tx or CTLE) to cope with most of the loss-related ISI, if the reference Tx equalization and CTLE leave too much ISI, maybe they should be made more flexible and capable, rather than leave the ISI to a DFE with large taps. For example, we could add another zero-pole pair in the CTLE or another coefficient in the Tx.

This change was hasty and should be reverted, until a technical discussion (that did not take place in November) is conducted, including options, benefits and consequences.

SuggestedRemedy

Set b_max(2) back to 0.2.

Response **Response Status** **C**

ACCEPT IN PRINCIPLE.

The change in value was made as a result of a successful motion (Motion #13 at the November 2019 meeting).

There is no consensus to make any changes.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

CI 162 SC 162.11.7 P152 L45 # 151

Dawe, Piers Mellanox

Comment Type TR Comment Status D

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 W

PROPOSED REJECT.

The commenter has not provided sufficient evidence for the proposed change.

For task force discussion.

CI 162 SC 162.11.7 P152 L48 # 262

Ran, Adeo Intel

Comment Type T Comment Status R

The bound on sigma_tmax is practically making the DFE floating taps not worth implementing. Which is a good thing, because the power cost of this method is prohibitive with the very challenging power budgets demanded by real applications, and it requires automatic optimization of the placement of taps - another challenge that may not be easy to handle in practice.

The reference receiver should represent a minimum receiver implementation. A floating-tap DFE as modeled here isn't what a minimum implementation will likely have, and most practical future channels will not need it. Therefore it should not be included in the reference receiver.

Applications that need better receivers may look for better than minimum ones, for example, ones that implement floating taps (since that seems to solve a specific problem), or that need less than 3 dB of COM.

SuggestedRemedy

Remove the floating tap banks from the reference receiver - including the new parameters related to it and all the new text in 93A.1.6.

Response Response Status C

REJECT.

Prior analysis, (heck_3ck_01_0519, kareti_3ck_01a_1118.pdf) showed that floating taps were required for critical channels to pass COM. kasapi_3ck_01_1119.pdf limits tail taps to prevent channels with worse ISI from passing. Comment does not provide evidence to support the proposed change.

Based on the result of strawpoll #8 there is no consensus to make changes per the suggested remedy.

Strawpoll #8

For comment #262, I support accepting the suggested remedy as a resolution to the comment.

Yes: 9

No: 15

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CI 162 SC 162.11.7 P152 L48 # 149

Dawe, Piers Mellanox

Comment Type TR Comment Status A

This DFE floating tap tail root-sum-of-squares limit is 0.03. For the worst of 7 borderline channels in kasapi_3ck_01_1119 slide 12 (kareti1, which is an outlier and probably should not be supported), the value is 0.022. Even for this channel with the most unlucky combination of package lengths including out-of-scope ones, it's ≤ 0.025 (slide 13). We should not encourage even worse channels than this, such as the failing channels on slides 16-17, and cable channels are smoother than backplane channels.

SuggestedRemedy

Remember that this parameter isn't a hard pass-fail limit; channels can exceed the limit but don't get a free pass for the excess ISI noise that they cause. Change 0.03 to 0.02 or less.

Response Response Status C

ACCEPT IN PRINCIPLE.

Change the value from 0.03 to 0.02.

See also comment #152.

CI 162 SC 162.11.7 P152 L50 # 171

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status R

The DFE taps for RSS is on different line and not clear

SuggestedRemedy

Combine the requirement of DFE location and RSS limit in the single line. Here is a suggested wording "DFE floating tail taps [25-40] root-sum-of-squares limit

Response Response Status C

REJECT.

These two terms are representing two separate terms which must be specified separately.

CI 162 SC 162.11.7 P153 L4 # 15

Mellitz, Richard Samtec

Comment Type TR Comment Status A

Eta_0 needs to include the effects of host NEXT noise. Thus cannot be the same as for KR COM.

SuggestedRemedy

Replace $8.2e-9 V^2/GHz$ with $9e-9 V^2/GHz$ as in slide 8 of mellitz_3ck_03_1119 and slide 9 of lim_3ck_01_1119 in Table 162-15.

Response Response Status C

ACCEPT IN PRINCIPLE.

Based on the result of strawpolls #10 and #11 make the following change:
Replace $8.2e-9 V^2/GHz$ with $1E-8 V^2/GHz$

Strawpoll #10

WRT comments #15 and #146, I support increasing the value of eta_0 at this time.

Yes: 15

No: 5

Strawpoll #11

WRT comments #15 and #146, I support changing eta_0 value to:

A: $9.0E-9$

B: $1E-8$

A: 6 B: 9

CI 162 SC 162.11.7 P153 L6 # 146

Dawe, Piers Mellanox

Comment Type T Comment Status A

One-sided noise spectral density of $8.2e-9 V^2/GHz$ is extremely aggressive and optimistic, being half that for 50GBASE-CR, and was chosen to make particular backplane channels with issues pass COM. As high loss cable channels are smoother than backplanes, we should not be so desperate in this clause.

SuggestedRemedy

Change to $1e-8$, which is 61% of 50GBASE-CR.

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #15.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

CI 162 SC 162.11.7.1 P153 L28 # 17
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 Implement suggested remedy with editorial license.

CI 162 SC 162.11.7.1 P153 L28 # 16
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 Implement suggested remedy with editorial license.

CI 162 SC 162.11.7.1.2 P153 L51 # 18
 Mellitz, Richard Samtec
 Comment Type TR Comment Status D
 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 W
 PROPOSED ACCEPT IN PRINCIPLE.
 [Editor's note: Changed subclause from 162.11.7.2 to 162.11.7.1.2]

CI 162 SC 162.14.4.2 P159 L23 # 263
 Ran, Adeel Intel
 Comment Type T Comment Status A bucket
 In Item PC4, The reference should be 162.8.11 and the value/comment should include the exceptions listed in 162.8.11 for including c(-3).
 Item PC5 has a reference to a subclause in 162 that does not exist 0 it should point to clause 136.
 SuggestedRemedy
 Per comment.
 Response Response Status C
 ACCEPT.

CI 162 SC 162.14.4.5 P160 L50 # 264
 Ran, Adeel Intel
 Comment Type E Comment Status A bucket
 In item CA3, spaces should be inserted between numbers and units.
 SuggestedRemedy
 Per comment.
 Response Response Status C
 ACCEPT.

CI 162A SC 162A.5 P231 L20 # 205
 Kocsis, Sam Amphenol
 Comment Type ER Comment Status A
 Eq. 162A-1 defines Ilchmax using Ilcamax, but Eq. 162A-2 defines ILch0.5m using Ilcamin.
 SuggestedRemedy
 Change notation of "ILch0.5m" to be "ILchmin"
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Change ILCh0.5m (162A-2) to Ilchmin and in Table 162A-1.
 Add note that this is with minimum CA IL and maximum host IL with editorial license.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

CI 162A SC 162A.5 P231 L47 # 206

Kocsis, Sam Amphenol

Comment Type TR Comment Status A

Table 162A-1, Parameter Ilcamin is based on an incorrect assumption from diminico_3ck_01a_0719. Ilch0.5m is derived from Ilcamin, so it is also invalid.

SuggestedRemedy

Change Ilcamin to TBD, pending future contribution recommendation and motion. Change Ilch0.5m to TBD, pending future contribution recommendation and motion.

Response Response Status C

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
diminico_3ck_2_0120.pdf

The presentation proposes 13 dB. However, discussion and further analysis led to consensus on 11 dB.

Change Ilcamin to 11 dB in Table 162-13 P150 L6 and in Table 162A-1 P231 L46 and change channel minimum using CA minimum.

CI 162A SC 162A.5 P232 L10 # 203

Kocsis, Sam Amphenol

Comment Type TR Comment Status A

Figure 162A-1 has "MCB Via" included in the MCB allocated budget of 2.3dB.

SuggestedRemedy

Remove the markers including the "MCB Via" in the MCB allocated budget of 2.3dB. There is an additional 0.2dB via allowance for an MCB implementation, per adopted diminico_3ck_01a_0719 contribution.

Response Response Status C

ACCEPT IN PRINCIPLE.

In Figure 162A-1 move arrow associated with MCB IL of 2.3 dB not to include MCB via as illustrated in adopted baseline - diminico_3ck_01_1119.pdf and use text of note in same revised as follows.

Note: 2.3 dB MCB PCB IL includes the RF connector (up to the RF connector calibration plane). The MCB Via allowance is 0.2 dB.

See diminico_3ck_2_0120.pdf

CI 162A SC 162A.5 P232 L30 # 204

Kocsis, Sam Amphenol

Comment Type TR Comment Status A

Figure 162A-1 has an incorrect note regarding the MCB implementation

SuggestedRemedy

Change wording, per adopted diminico_3ck_01a_0719 contribution. "NOTE - MCB PCB includes test point IL. Allowance for MCB via IL is 0.2dB.

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #203.

CI 162A SC 162a.5 P232 L32 # 80

Palkert, Tom Molex

Comment Type T Comment Status A

Need to clarify that insertion loss values include the sma connector on the compliance board

SuggestedRemedy

Add a note or modify diagrams in Fig 162A-1 to make it clear that insertion loss values include loss of sma connectors on compliance boards.

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #203.

CI 162B SC 162B.1.1.1 P234 L46 # 183

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status A

The test fixture PCB frequency max of 40 GHz too low

SuggestedRemedy

Replace 40 GHz with 53 GHz

Response Response Status C

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #184.

IEEE P802.3ck D1.0 100/200/400 Gb/s Electrical Interfaces Task Force 1st Task Force review comments

Cl **162B** SC **162B.1.2.1** P**225** L**46** # **184**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **A**
 The test fixture PCB frequency max of 40 GHz too low
 SuggestedRemedy
 Replace 40 GHz with 53 GHz
 Response Response Status **C**
 ACCEPT IN PRINCIPLE.
 The commenter changed the request from 53 GHz to 50 GHz.
 Strawpoll #7
 Use 50 GHz for the upper frequency limit for all MTF specifications other than ICN.
 A: Yes
 B: No
 A: 20 B: 4
 Change the upper frequency limit for all MTF specifications other than ICN from 40 GHz to 50 GHz.

Cl **162B** SC **162B.1.3** P**235** L**24** # **277**
 DiMinico, Christopher MC Communications
 Comment Type **TR** Comment Status **D** Late
 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 **W**
 PROPOSED ACCEPT IN PRINCIPLE.
 See diminico_3ck_1_0220.pdf.
 Slide 6: 162B.1.3.1 Mated test fixtures differential insertion loss Equation (162B-3) and Equation (162B-5). Slide 9: 162B.1.3.3 Mated test fixtures common-mode conversion insertion loss Equation (162B-9). Slide 8: 162B.1.3.5 Mated test fixtures common-mode to differential mode return loss Equation (162B-10).
 Consider with ghiasi_3ck_01_0120.

Cl **162B** SC **162B.1.3** P**235** L**28** # **67**
 Dudek, Mike Marvell
 Comment Type **T** Comment Status **A**
 It is confusing to just refer to 92.11.3 where there are multiple specifications that don't apply.
 SuggestedRemedy
 Change to "92.11.3 as modified by 162B.1.3.1 to 162B.1.3.6"
 Response Response Status **C**
 ACCEPT IN PRINCIPLE.
 Replace sentence: The mated test fixtures specifications are listed in 92.11.3 and using the multi-lane integrated crosstalk noise in 162B.1.3.6.
 With: The mated test fixtures specifications are given below.

Cl **162B** SC **162B.1.3.1** P**235** L**32** # **185**
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type **TR** Comment Status **A**
 Mated text fixture loss need slight adjustment and min and max loss TBD need to be replaced with proposed limits
 SuggestedRemedy
 Nom IL=
 $0.9503*(0.471*\text{SQRT}(A3)+0.141*A3+0.0012*A3^2)$
 Max Loss=(0.??+0.471xV??+0.141x??)x0.???????? ???? 0.????=?=26.55 GHz
 $6.905+0.562x??$ 26.55<??=50 GHz
 MIN IL =(0.0656*SQRT(A2)+0.164*A2)
 See ghiasi_3ck_01_0120
 Response Response Status **C**
 ACCEPT IN PRINCIPLE.
 Use the equations in slide 6 of
 diminico_3ck_01_0220.pdf extended to 50 GHz.
 Also see comment 184.

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Cl 162B SC 162B.1.3.2 P237 L35 # 188

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status R

Differential return loss is TBD

SuggestedRemedy

DRL=20-9*f from 0.01<f<=3.1 GHz
 = 18-0.32*f dB 3.1 GHz <f<=32.5 GHz
 = 5 dB 32.5<f<=50 GHz
 see ghiasi_3ck_01_0120

Response Response Status C

REJECT.

The following presentation was reviewed by the task force:
 ghiasi_3ck_01b_0120

There was no consensus to make any changes.

However, the commenter is encouraged to develop the proposal further.

Cl 162B SC 162B.1.3.3 P237 L1 # 129

Brown, Matt Huawei Technologies Canada

Comment Type T Comment Status A

What is meant by common-mode conversion insertion loss? Is this common-mode to differential insertion loss?

SuggestedRemedy

Change "common-mode conversion insertion loss" to "common-mode to differential insertion loss". 4 instances

Response Response Status C

ACCEPT IN PRINCIPLE.

With editorial license, make it clear in the text that this parameter represents conversion from common-mode to differential.

Cl 162B SC 162B.1.3.4 P237 L32 # 130

Brown, Matt Huawei Technologies Canada

Comment Type T Comment Status A

No units specified.

SuggestedRemedy

Change "common-mode return loss" to "common-mode return loss in dB".

Response Response Status C

ACCEPT.

Cl 162B SC 162B.1.3.5 P237 L30 # 187

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status R

Common mode to differential transfer is TBD

SuggestedRemedy

CMCIL=30+0.935*f from 0.01<f<=15 GHz
 = 16 dB 15 GHz <f<=50 GHz
 see ghiasi_3ck_01_0120

Response Response Status C

REJECT.

The following presentation was reviewed by the task force:
 ghiasi_3ck_01b_0120

There was no consensus to make any changes.

However, the commenter is encouraged to develop the proposal further.

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CI 162B SC 162B.1.3.5 P237 L30 # 186
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A
 Common mode to differential RL is TBD
 SuggestedRemedy
 CMDRL=30+30*f/25.78 from 0.01<f<=12.89 GHz
 = 17.85+0.225*f dB 12.89 GHz <f<=35 GHz
 = 10 dB 35<f<=50 GHz
 see ghiasi_3ck_01_0120
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 For CM to differential RL, use the equations in slide 9 of ghiasi_3ck_01b_0120.
 For CM RL, use the equations in slide 10 of diminico_3ck_01_0120 extended to 50 GHz.
 Also see comment 184.

CI 162B SC 162B.1.3.6 P239 L20 # 131
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status A
 In Table 162B-4, there are a few issues with the second column. The table title indicates that the table is for integrated crosstalk noise for multi-lane mated test fixture; so the title of the second column should be "Value" or similar. The values specified include text "less than"; this is typically indicated with the text "(max.)" in the parameter column.
 SuggestedRemedy
 Change the title of column 2 to "Value".
 For the values in column 2 remove "less than".
 For each parameter in column 1 add "(max.)".
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Change the title of column 2 to "Value".
 Less than a number does not include the number. Less than is used elsewhere for this parameter as in Table 162B-2.

CI 162C SC 162C P242 L14 # 207
 Kocsis, Sam Amphenol
 Comment Type ER Comment Status A
 The adopted baseline at
 "http://www.ieee802.org/3/ck/public/18_09/palkert_3ck_01_0918.pdf" should include relevant details from
 "http://www.ieee802.org/3/ck/public/18_09/mcsorley_3ck_01a_0918.pdf" for the DSFP MDI
 SuggestedRemedy
 Update Table162C-3, with details in Sheet1
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 Update Table 162C-3 with details in slide 2 of
 http://www.ieee802.org/3/ck/public/20_01/kocsis_3ck_01_0120.pdf

CI 162C SC 162C.1 P243 L5 # 68
 Dudek, Mike Marvell
 Comment Type E Comment Status A
 Incorrect references
 SuggestedRemedy
 Change 146.9 and 146.10 to 162.9 and 162.10
 Response Response Status C
 ACCEPT.

CI 162C SC 162C.1 P243 L12 # 28
 Dudek, Mike Marvell
 Comment Type T Comment Status A
 The TBD in the title of table 162C-2 isn't necessary (compare table 136C-2)
 SuggestedRemedy
 Delete the (TBD) in the title of table162C-2
 Response Response Status C
 ACCEPT.

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Cl 162C SC 162C.2.5 P249 L41 # 29
 Dudek, Mike Marvell
 Comment Type E Comment Status A
 Wrong reference
 SuggestedRemedy
 Change Table 136C-3 to Table 162C-3. Also on page 250 line 43
 Response Response Status C
 ACCEPT.

Cl 163 SC 163 P162 L13 # 265
 Ran, Adeo Intel
 Comment Type T Comment Status R
 Too many comments already just from reviewing 162.
 SuggestedRemedy
 Apply changes from accepted comments against clause 162 to clause 163 where necessary, and vice versa.
 Response Response Status C
 REJECT.
 The commenter has made a very general statement and provided no specific remedy. The application of comments for Clause 162 to Clause 163 and vice versa will not be applicable for most comments. The commenter is encouraged to indicate which comments may apply to both clauses during comment resolution.

Cl 163 SC 163.1 P162 L15 # 138
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status A FEC AN
 In Table 163-1, the Clause 161 RS-FEC-Int is specified as TBD rather than Required or Optional in the second column.
 SuggestedRemedy
 Specify RS-FEC-Int as either "Optional" or "Required".
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 As a consequence of the response to comment #77 change TBD to "Required".

Cl 163 SC 163.1 P162 L15 # 134
 Brown, Matt Huawei Technologies Canada
 Comment Type T Comment Status D FEC AN
 Tables 163-1 list two FEC types (RS-FEC and RS-FEC-Int) that might be used by a 100GBASE-KR1 PHY, but never explains the criteria for selecting one or the other, how that selection is made, nor the implications (e.g., conversion from RS-FEC to RS-FEC-Int).
 SuggestedRemedy
 Add a subclause to explain the relationship of the two FEC types, how an FEC type is selected, and the implications of the selection. Reference to a similar subclause in Clause 162 might be sufficient.

Proposed Response Response Status Z
 REJECT.
 This comment was WITHDRAWN by the commenter.

Cl 163 SC 163.1 P163 L32 # 41
 Dudek, Mike Marvell
 Comment Type T Comment Status R
 The inverse RS-FEC is also required to change between RS-FEC (528,514) and RS-FEC (544,514)
 SuggestedRemedy
 Add to footnote b. "and between RS-FEC (528,514) and RS-FEC (544,514)"
 Response Response Status C
 REJECT.
 CL152 inverse RS-FEC is only to convert between CL91 and CL161 FEC. The application in this comment is out of scope.
 The Clause 152 inverse RS-FEC supports only the RS(544,514) encoding.

Cl 163 SC 163.1 P165 L11 # 42
 Dudek, Mike Marvell
 Comment Type T Comment Status A bucket
 This paragraph is for 400G as well.
 SuggestedRemedy
 Change "200GAUI-n" to "200GAUI-n or 400GAUI-n" (this is how this is done in clause 162)
 Response Response Status C
 ACCEPT.

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Cl 163 SC 163.2 P165 L33 # 43
 Dudek, Mike Marvell
 Comment Type T Comment Status A bucket
 FEC is also used in "FEC symbol error rate" etc. where it also refers to the FEC within the 200 and 400G PCS.
 SuggestedRemedy
 Add to the sentence "for 100GBASE-KR1 or the RS-FEC within the Clause 119 PCS for 200GBASE-KR2 and 400GBASE-KR4".
 Response Response Status C
 ACCEPT.

Cl 163 SC 163.9.1 P169 L25 # 172
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A
 TP0 upper frequency for equation 93-1 and 93-2 is TBD
 SuggestedRemedy
 Replace TBD with 50 GHz and following equations
 $RLd(f) = \{(20-?? \text{ ???} \quad 0.05=??=5 \text{ ?????} \quad 15 \text{ ???} \quad 5<??=25 \text{ ?????} \quad 22. 5-0.3?? \text{ ???}, \quad 25<??=50 \text{ ?????} \quad llref(f)=-0.0015+0.1V??+0.035?? \quad 0.05=??=50 \text{ ?????} \}$
 See ghiasi_3ck_01_0120.pdf
 Response Response Status C
 ACCEPT IN PRINCIPLE.
 The task force review the presentation
http://www.ieee802.org/3/ck/public/20_01/ghiasi_3ck_01b_0120.pdf
 The response for comment #19 provides a new equation in place of Equation 93-1 but does not specify an upper frequency limit.
 For that equation use an upper frequency limit of fb.
 Replace the reference to equation 93-2 with the equation on slide 4 of the reviewed presentation, but use an upper frequency limit of fb.

Cl 163 SC 163.9.1 P169 L26 # 19
 Mellitz, Richard Samtec
 Comment Type TR Comment Status A
 Figure 93-3 and Figure 93-4 are not appropriate for the Nyquist sampling frequency and baud rate. Moving from 25 Gbps NRZ to 50 Gbps only incrementally changed the Nyquist frequency. 100 Gbps doubles it. In addition, specifying device fixtures to around 60 GHz may have new challenges which need to be comprehended in the standard
 SuggestedRemedy
 Either re-write 93-8.1.1 in terms of probational to Fb or replace 163.9.1 with new equations and figures. See presentation
 Response Response Status C
 ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf
 Replace the reference to Equation 93–1 with a new equation per slide 8 in the reviewed presentation. Also provide a related figure. Implement with editorial license.

Cl 163 SC 163.9.1 P169 L30 # 173
 Ghiasi, Ali Ghiasi Quantum/Inphi
 Comment Type TR Comment Status A
 TP5 upper frequency for equation 93-1 and 93-2 is TBD
 SuggestedRemedy
 Replace TBD with 50 GHz and following equations
 $RLd(f) = \{(20-?? \text{ ???} \quad 0.05=??=5 \text{ ?????} \quad 15 \text{ ???} \quad 5<??=25 \text{ ?????} \quad 22. 5-0.3?? \text{ ???}, \quad 25<??=50 \text{ ?????} \quad llref(f)=-0.0015+0.1V??+0.035?? \quad 0.05=??=50 \text{ ?????} \}$
 See ghiasi_3ck_01_0120.pdf
 Response Response Status C
 ACCEPT IN PRINCIPLE.

Replace the reference to equation 93-1 and equation 93-2 in the same was as the reponse to comment #172. Implement with editorial license. Also, remove the related editor's note.

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CI 163 SC 163.9.2 P170 L10 # 25

Mellitz, Richard Samtec

Comment Type TR Comment Status A

The dependence of Vf on Nv is has proved to be confusing. The result is that a single device with a C2C and KR transmitter may have two specification which is confusing for performing tests. Since we specify that ratio of Pmax to Vf there really is no good reason no to make Nv more like a real steady state voltage. See Mellitz_3ck_01b_0919 for reference.

SuggestedRemedy

Add a subsection detailing "Transmitter output waveform" similar to 163.9.3.1. Add exception and exception list for this subclause setting Nv to 200 for the determination of Vf. Refer to clause "136.9.3.1 Transmitter output waveform" : Change k = -2 to 1 to k = -3 to 1 Refer to clause "120D.3.1.3 Linear fit to the measured waveform": Change Dp= 3 to Dp= 4 See Mellitz_3ck_01b_0919 for reference.

Response Response Status C

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf

Implement the suggested remedy with editorial license.

CI 163 SC 163.9.2 P170 L18 # 44

Dudek, Mike Marvell

Comment Type T Comment Status D

See a comment on the abs step size for c(1) max in table 162-8 suggesting a possible change to the value from 0.02 to 0.05

SuggestedRemedy

If the change is made in clause 162 then Change 0.05 to 0.02 here and on line 52 page 174 in the COM table.

Proposed Response Response Status Z

REJECT.

This comment was WITHDRAWN by the commenter.

CI 163 SC 163.9.2 P170 L30 # 45

Dudek, Mike Marvell

Comment Type T Comment Status A bucket

In footnote b "The loss of the host channel doesn't make sense as there is no "host" for the backplane.

SuggestedRemedy

Change "Loss of host channel" to "loss of Transmitter package and TP0 to TP0a test fixture."

Response Response Status C

ACCEPT.

CI 163 SC 163.9.2.1 P171 L5 # 20

Mellitz, Richard Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf

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Cl 163 SC 163.9.2.1 P171 L5 # 69

Wu, Mau-Lin MediaTek

Comment Type T Comment Status D ERL

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 W

PROPOSED REJECT.

This topic has been discussed at an ad hoc and there appeared to be no consensus for the proposed change.

A presentation related to this comment is anticipated at the January meeting.

For task force discussion

Cl 163 SC 163.9.2.1 P171 L10 # 21

Mellitz, Richard Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

http://www.ieee802.org/3/ck/public/20_01/mellitz_3ck_01a_0120.pdf

Cl 163 SC 163.9.3.1 P171 L44 # 22

Mellitz, Richard Samtec

Comment Type TR Comment Status D ERL

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 W

PROPOSED ACCEPT IN PRINCIPLE.

For task force discussion.

Cl 163 SC 163.10 P174 L14 # 201

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type TR Comment Status R COM burst penalty

COM table and analysis does not include penalty due to burst error, current COM code on some weired channel

SuggestedRemedy

http://www.ieee802.org/3/ck/public/19_03/anslow_3ck_01_0319.pdf page has 2 dB of SNR penalty with pre-coding on for tap weights [0.85, 0.05, 0.25, -0.05, 0.15], the Anslow analysis showed that non of the 115 channels would be as bad but how can we gurantee some weired channel will not in the mix that passes 3 dB COM but would fail due to burst error? Assuming there is interest we can bring a proposal in future task force meeting for an analytical burst error estimator that can be added to COM.

Response Response Status C

REJECT.

Resolve using the response to comment 200.

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Cl 163 **SC 163.10** **P175** **L25** # **23**

Mellitz, Richard Samtec

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

SNR_Tx of 33 dB has been used for much recent data presented in the ad-hocs, plenaries, and interima for making decisions. No new data have been presented otherwise.

SuggestedRemedy
Change the TBD for SNR_Tx to 33 dB.

Response **Response Status** **C**

ACCEPT IN PRINCIPLE.

Note that comment #251 was resolved to use 32.5 dB for transmitter SNDR.

Implement the suggested remedy.

Cl 163 **SC 163.10** **P175** **L31** # **153**

Dawe, Piers Mellanox

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

Slide 6 of heck_3ck_01_0919 shows that the DFE taps are never strongly negative, yet the draft would allow such untypical/hypothetical channels.

SuggestedRemedy
Remember that a tap weight limit isn't a hard pass-fail limit; channels can go outside it but don't get a free pass for the excess ISI noise that they cause. Add a minimum tap weight limit of -0.03 for all taps, including the floating taps.

Response **Response Status** **C**

REJECT.

The commenter has not provided sufficient evidence to justify the proposed change.

A minimum tap weight is specified as -0.3 for tap 2 and -0.2 for the remaining fixed taps, and -0.05 for the floating taps.

The referenced presentation shows tap values exceeding -0.03 so good channels would be affected.

Cl 163 **SC 163.10** **P175** **L40** # **174**

Ghiasi, Ali Ghiasi Quantum/Inphi

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

The DFE taps for RSS is on different line and not clear

SuggestedRemedy
Combine the requirement of DFE location and RSS limit in the single line. Here is a suggested wording "DFE floating tail taps [25-40] root-sum-of-squares limit

Response **Response Status** **C**

REJECT.

Resolve using the response to comment #171.

Cl 163 **SC 163.10** **P175** **L40** # **152**

Dawe, Piers Mellanox

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

This DFE floating tap tail root-sum-of-squares limit is 0.03. For the worst of 7 borderline channels in kasapi_3ck_01_1119 slide 12 (kareti1, OACH4, which is an outlier and probably should not be supported), the value is 0.022. Even for this channel with the most unlucky combination of package lengths including out-of-scope ones, it's <= 0.025 (slide 13). We should not encourage even worse channels than this, such as the failing channels on slides 16-17, and we should not indulge this one so much.

SuggestedRemedy
Remember that this parameter isn't a hard pass-fail limit; channels can exceed this but don't get a free pass for the excess ISI noise that they cause.
Change 0.03 to 0.02.

Response **Response Status** **C**

ACCEPT IN PRINCIPLE.

Based upon the result of strawpoll #12, implement the suggested remedy.

Strawpoll #12
I support closing comment #152 using the suggested remedy.
Yes: 13
No: 3

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Cl 163 SC 163.10 P175 L46 # 147

Dawe, Piers Mellanox

Comment Type T Comment Status R

One-sided noise spectral density of $8.2e-9 \text{ V}^2/\text{GHz}$ is extremely aggressive and optimistic, being half that for 50GBASE-KR, and was chosen to make particular backplane channels with issues pass COM. Backplane channels are very varied, so sweating this will benefit few channels at a cost to all. New backplane connectors will provide better channels.

SuggestedRemedy

Change to $1e-8$, which is 61% of 50GBASE-CR.

Response Response Status C

REJECT.

The commenter has not provided sufficient evidence for the propose change.

There is no consensus to make the suggested change at this time.

Cl 163 SC 163.10.1 P175 L52 # 46

Dudek, Mike Marvell

Comment Type E Comment Status A bucket

Equation should be a hot link. Also Equation 163-1 is for calculation of Add

SuggestedRemedy

Change the equation to 163-3 and make it a hot link

Response Response Status C

ACCEPT.

Cl 163 SC 163.10.1 P176 L46 # 175

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type T Comment Status A

Beyond 50 GHz with loss >75 doesn't matter

SuggestedRemedy

Limit max frequency to 50 GHz instead of fb.

Response Response Status C

ACCEPT IN PRINCIPLE.

There was consensus to use an upper limit of 45 GHz.

Change the upper frequency limit to 45 GHz.

Also, remove the related editor's note.

Cl 163 SC 163.10.2 P177 L13 # 24

Mellitz, Richard Samtec

Comment Type TR Comment Status D ERL

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: $\beta_x=2.4 \text{ GHz}$, $\rho_x=.19$

Proposed Response Response Status W

PROPOSED ACCEPT.