Cl **FM** *SC* **FM** *P* **1** *L* **10** # 229

Grow, Robert RMG Consulting

Comment Type **E** *Comment Status* **A** *(bucket1)*

From the amendment list starting at line 28, it appears the TF is planning to be included in the current revision project.

SuggestedRemedy

Add assigned amendment number 16.

Response *Response Status* **C**

ACCEPT.

Cl **FM** *SC* **FM** *P* **4** *L* **8** # 230

Grow, Robert RMG Consulting

Comment Type **E** *Comment Status* **A** *(bucket1)*

IEEE style has changed (2020 IEEE Standards Style Manual, 11.1).

SuggestedRemedy

Delete 2nd paragraph of the Editor's Note.

Response *Response Status* **C**

ACCEPT.

Cl **FM** *SC* **FM** *P* **8** *L* **21** # 231

Grow, Robert RMG Consulting

Comment Type **E** *Comment Status* **A** *(bucket1)*

The ballot group is now known.

SuggestedRemedy

Add WG members list at start of P802.3ck WG ballot.

Response *Response Status* **C**

ACCEPT.

Cl **FM** *SC* **FM** *P* **11** *L* **4** # 232

Grow, Robert RMG Consulting

Comment Type **E** *Comment Status* **A** *(bucket1)*

Amendment title missing.

SuggestedRemedy

Replace "Amendment title (copy from PAR)" with the title.

Response *Response Status* **C**

ACCEPT.

Cl **FM** *SC* **0** *P* **3** *L* **2** # 226

Wu, Mau-Lin MediaTek Inc.

Comment Type **ER** *Comment Status* **A** *(bucket1)*

Annex 163A through Annex 163B are lost here.

SuggestedRemedy

Change the setence to
"This amendment to IEEE Std 802.3-2018 adds Clause 161 through Clause 163, Annex 120F, Annex 120G, Annex 162A through Annex 162D, and Annex 163A through Annex 163B."

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed clause from 00 to FM.]
Resolve using the response to comment #93.

Cl **FM** *SC* **0** *P* **3** *L* **2** # 93

Kabra, Lokesh Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Abstract does not mention addition of Annex 163A and 163B

SuggestedRemedy

Annex 120F, Annex 120G, Annex 162A through Annex 162D, Annex 163A and Annex 163B

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed clause from 00 to FM.]
Change the first sentence in the abstract to: "This amendment to IEEE Std 802.3-2018 adds Clause 161 through Clause 163, Annex 120F, Annex 120G, Annex 162A through Annex 162D, Annex 163A, and Annex 163B."

Cl **00** *SC* **0** *P* **0** *L* **0** # 71

Wienckowski, Natalie General Motors

Comment Type **E** *Comment Status* **A** *(bucket1)*

For all additions to tables, if there are rows before or after the rows shown in the spec, there needs to be a blank, merged row with an elipses in it to indicate all places where there are additional rows not shown. Search for "unchanged rows not shown" to find places where this is needed.

SuggestedRemedy

Add additional rows, merged row with an elipses in it, to the top and/or bottom of tables as needed to indicate additional rows that are not shown.

Response *Response Status* **C**

ACCEPT.

Cl **00** *SC* **0** *P* **0** *L* **0** # 19

Brown, Matt — Huawei

Comment Type **ER** *Comment Status* **D** *withdrawn*

In various clauses and annexes we specify various insertion loss, conversion loss, and return loss characteristics. The wording to identify and the variable names used to define these characteristcs is inconsistent.

SuggestedRemedy

Use consistent terminology and variable names to describe and specify the various terms. A presentation will be provided to explain further and provide proposals.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **FM** *SC* **0** *P* **13** *L* **29** # 94

Kabra, Lokesh — Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Abstract does not mention addition of Annex 163A and 163B

SuggestedRemedy

Annex 120F, Annex 120G, Annex 162A through Annex 162D, Annex 163A and Annex 163B

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed clause from 00 to FM and page from 13 to 14.]
Change the first sentence to: "This amendment includes changes to IEEE Std 802.3-2018 and adds Clause 161 through Clause 163, Annex 120F, Annex 120G, Annex 162A through Annex 162D, Annex 163A, and Annex 163B."

Cl **FM** *SC* **0** *P* **14** *L* **29** # 227

Wu, Mau-Lin — MediaTek Inc.

Comment Type **ER** *Comment Status* **A** *(bucket1)*

Annex 163A through Annex 163B are lost here.

SuggestedRemedy

Change the setence to
"This amendment to IEEE Std 802.3-2018 adds Clause 161 through Clause 163, Annex 120F, Annex 120G, Annex 162A through Annex 162D, and Annex 163A through Annex 163B."

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed clause from 00 to FM.]
Resolve using the response to comment #94.

Cl **1** *SC* **1.1.3.2** *P* **31** *L* **18** # 74

Huber, Tom — Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar: "For each of chip-to-chip and chip-to-module interfaces, four widths of CAUI-n/100GAUI-n are defined…".

SuggestedRemedy

The introductory clause seems unnecessary since the preceding sentence already establishes the use of CAUI-n/100GAUI-n for C2C and C2M interfaces. Change to "Four widths of CAUI-n and 100GAUI-n are defined…"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #68.

Cl **1** *SC* **1.1.3.2** *P* **31** *L* **18** # 165

Zimmerman, George — CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **E** *Comment Status* **A** *(bucket1)*

"For each of chip-to-chip and chip-to-module interfaces" awkward wording, subject/verb agreement - also leaves open whether the definition is different if other than chip-to-chip or chip-to-module interfaces are used here - which does not seem to be the case. Seems it would be cleaner and clearer just to say "for each interface" and the extra words are unnecessary. This same problem exists 6 places on page 31 lines 18, 35, and 50; page 33, lines 5 and 33, and page 34 line 5

SuggestedRemedy

Change "For each of chip-to-chip and chip-to-module interfaces" to "For each interface" in all 6 instances (page 31 lines 18, 35, 50; page 33 lines 5 & 33; and page 34 line 5)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comments #68, #75, and #76.

Cl **1** *SC* **1.1.3.2** *P* **31** *L* **18** # 68

Wienckowski, Natalie General Motors

Comment Type **E** *Comment Status* **A** *(bucket1)*

Subject/verb agreement (each is singular) & grammer ("of" does not belong).

SuggestedRemedy

Change: For each of chip-to-chip and chip-to-module interfaces
To: For each chip-to-chip and chip-to-module interface
The same change is needed on P31L35 & P31L50.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The current wording was intended to convey that chip-to-module and chip-to-chip interfaces are not necessarily the same. However, the wording could be improved.
Change: "For each of chip-to-chip and chip-to-module interfaces"
To: "For chip-to-chip interfaces and for chip-to-module interfaces"

Cl **1** *SC* **1.1.3.2** *P* **31** *L* **34** # 75

Huber, Tom Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar: "For each of chip-to-chip and chip-to-module interfaces, three widths of 200GAUI-n are defined…".

SuggestedRemedy

The introductory clause seems unnecessary since the preceding sentence already establishes the use of 200GAUI-n for C2C and C2M interfaces. Change to "Three widths of 200GAUI-n are defined…"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The current wording was intended to convey that chip-to-module and chip-to-chip interfaces are not necessarily the same. However, the wording could be improved.
Change: "For each of chip-to-chip and chip-to-module interfaces"
To: "For chip-to-chip interfaces and for chip-to-module interfaces"

Cl **1** *SC* **1.1.3.2** *P* **31** *L* **50** # 76

Huber, Tom Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar: "For each of chip-to-chip and chip-to-module interfaces, three widths of 400GAUI-n are defined…".

SuggestedRemedy

The introductory clause seems unnecessary since the preceding sentence already establishes the use of 400GAUI-n for C2C and C2M interfaces. Change to "Three widths of 400GAUI-n are defined…"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The current wording was intended to convey that chip-to-module and chip-to-chip interfaces are not necessarily the same. However, the wording could be improved.
Change: "For each of chip-to-chip and chip-to-module interfaces"
To: "For chip-to-chip interfaces and for chip-to-module interfaces"

Cl **1** *SC* **1.4.36** *P* **33** *L* **5** # 69

Wienckowski, Natalie General Motors

Comment Type **E** *Comment Status* **A** *(bucket1)*

Subject/verb agreement (each is singular) & grammer ("of" does not belong).

SuggestedRemedy

Change: For each of chip-to-module and chip-to-chip interconnections
To: For each chip-to-module and chip-to-chip interconnection
The same change is needed on P33L33 & P34L5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the responses to comments #77, #78, and #79.

Cl **1** *SC* **1.4.36** *P* **33** *L* **5** # 77

Huber, Tom
Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar: "For each of chip-to-chip and chip-to-module interfaces, four widths of CAUI-n/100GAUI-n are defined…".

SuggestedRemedy

The introductory clause seems unnecessary since the preceding sentence already establishes the use of CAUI-n/100GAUI-n for C2C and C2M interfaces. Change to "Four widths of CAUI-n and 100GAUI-n are defined…"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The current wording was intended to convey that chip-to-module and chip-to-chip interfaces are not necessarily the same. However, the wording could be improved.
Change: "For each of chip-to-chip and chip-to-module interfaces"
To: "For chip-to-chip interfaces and for chip-to-module interfaces"

Cl **1** *SC* **1.4.36** *P* **33** *L* **10** # 95

Kabra, Lokesh
Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Remove full-stop before closing brace

SuggestedRemedy

for 100GAUI-1)

Response *Response Status* **C**

ACCEPT.

Cl **1** *SC* **1.4.87** *P* **33** *L* **33** # 78

Huber, Tom
Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar: "For each of chip-to-chip and chip-to-module interfaces, three widths of 200GAUI-n are defined…".

SuggestedRemedy

The introductory clause seems unnecessary since the preceding sentence already establishes the use of 200GAUI-n for C2C and C2M interfaces. Change to "Three widths of 200GAUI-n are defined…"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The current wording was intended to convey that chip-to-module and chip-to-chip interfaces are not necessarily the same. However, the wording could be improved.
Change: "For each of chip-to-chip and chip-to-module interfaces"
To: "For chip-to-chip interfaces and for chip-to-module interfaces"

Cl **1** *SC* **1.4.87** *P* **33** *L* **37** # 96

Kabra, Lokesh
Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Remove full-stop before closing brace

SuggestedRemedy

200GAUI-2)

Response *Response Status* **C**

ACCEPT.

Cl **1** *SC* **1.4.111** *P* **34** *L* **5** # 79

Huber, Tom
Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar: "For each of chip-to-chip and chip-to-module interfaces, three widths of 400GAUI-n are defined…".

SuggestedRemedy

The introductory clause seems unnecessary since the preceding sentence already establishes the use of 400GAUI-n for C2C and C2M interfaces. Change to "Three widths of 400GAUI-n are defined…"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The current wording was intended to convey that chip-to-module and chip-to-chip interfaces are not necessarily the same. However, the wording could be improved.
Change: "For each of chip-to-chip and chip-to-module interfaces"
To: "For chip-to-chip interfaces and for chip-to-module interfaces"

Cl **1** *SC* **1.4.111** *P* **34** *L* **9** # 97

Kabra, Lokesh
Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Remove full-stop before closing brace

SuggestedRemedy

400GAUI-4)

Response *Response Status* **C**

ACCEPT.

Cl **1** *SC* **1.5** *P* **34** *L* **18** # 159

Zimmerman, George — CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **E** *Comment Status* **A** *(bucket1)*

"FEC AM lock" While the abbreviation "AM" has been used for "Alignment Marker" in many multi-lane PHYs, it somehow was never entered in the abbreviations list (at least not that I can find, having checked 802.3-2018, where it is used, and 802.3cd). Because it has other common meanings, and this one is specific to IEEE Std 802.3, it shoudl be in the list... (simple things like FEC are). I plan to submit maintenance on this just to make it clear - but since it is an issue in this draft, you can fix it here...

SuggestedRemedy

Add "AM Alignment Marker" to the list of abbreviations in 1.5 (page 34 of draft)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed clause, subclause, page, line from {45,0,44,22} to {1,1.5,34,18}.]
The acronym AM is rarely used in text in 802.3-2018, 802.3cd-2018, and 802.3ck D2.0. Nor is the acronym ever properly introduced in the subclauses that use it. Normally, the full phrase "alignment marker" is used. So rather than adding yet another acronym to the list, the full phrase should be used in place of the acronym. However, changing instances of AM in Clause 45 would result in differences in nomenclature between Clause 45 and some sublayer clauses in the base specification and amendments.
In Clause 161 change 1 instance (Figure 161-5) of "AM" with "alignment marker".
[Editor's note: CC: 1, 45, 161.]

Cl **30** *SC* **30.5.1.1.2** *P* **35** *L* **17** # 70

Wienckowski, Natalie — General Motors

Comment Type **E** *Comment Status* **A** *(bucket2)*

Inconsistent wording for the cable type
P32L30, P33L17, P33L44, P73L31, P73L35: shielded balanced copper cabling
P35L17, P35L27, P35L37: shielded copper balanced cable

SuggestedRemedy

Change: shielded copper balanced cable
To: shielded balanced copper cabling
on P35L17, P35L27, & P35L37.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In the following locations P35L17, P35L27, & P35L37...
Change: "shielded copper balanced cable"
To: "shielded balanced copper cable"

Cl **30** *SC* **30.5.1.1.16** *P* **35** *L* **48** # 157

Zimmerman, George — CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **T** *Comment Status* **A** *(bucket1)*

"RS-FEC-Int enabled RS-FEC-Int enabled" - gives absolutely NO useful information in the description. Please at least expand a little or give a cross reference to give the reader a clue. (other places where this abbreviation are used, such as 45.2.1.110.ab, generally do give more information)

SuggestedRemedy

Change the description "RS-FEC-Int enabled" to "Clause 161 Codeword-interleaved Reed-Solomon Forward Error Correction enabled".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #89

Cl **30** *SC* **30.5.1.1.16** *P* **35** *L* **50** # 89

Slavick, Jeff Broadcom

Comment Type **T** *Comment Status* **A** *(bucket1)*

aFECmode was updated to include an enumeration for the Interleave FEC found in Cl161, but the text has not been updated.

SuggestedRemedy

Change the BEHAVIOR DEFINED AS: to read as follows:

A read-write value that indicates the mode of operation of the FEC sublayer for forward error correction (see 65.2, Clause 74, Clause 91, Clause 108, and Clause 161).

A GET operation returns the current mode of operation of the PHY. A SET operation changes the mode of operation of the PHY to the indicated value. The enumerations “BASE -R enabled”, “RS-FEC enabled” and "RS-FEC-Int enabled" are only used by PHYs which support more than one type of FEC operation. For 25GBASE-CR, 25GBASE CR-S, 25GBASE-KR, and 25GBASE-KR-S PHYs operation in the no-FEC mode maps to the enumeration “disabled”, operation in the BASE-R FEC mode maps to the enumeration “BASE-R enabled”, and operation in the RS-FEC mode maps to the enumeration “RS-FEC enabled” (see 110.6 and 111.6). For 100GBASE-CR1 and 100GBASE-KR1 PHYs operation in RS-FEC mode maps to the enumeration "RS-FEC enabled" (see 91.6.2f) and operation in interleaved RS-FEC mode maps to the enumeration "RS-FEC-Int enabled" (see 161.6.23).

When Clause 73 Auto-Negotiation is enabled for a 25GBASE-R PHY, a SET operation is not allowed and a GET operation maps to the variables FEC_enable in Clause 74 and FEC_enable in Clause 108. When Clause 73 Auto-Negotiation is enabled for a non-25GBASE-R PHY supporting Clause 74 FEC a SET operation is not allowed and a GET operation maps to the variable FEC_enable in Clause 74. When Clause 73 Auto-Negotiation is enabled for a 100GBASE--R PHY supporting Clause 161 FEC a SET operation is not allowed and a GET operation maps to the variable 100G_RS_FEC_enable in Clause 91 and 100G_RS_FEC_Int_enable in Clause 161.

If a Clause 45 MDIO Interface is present, then this attribute maps to the appropriate FEC control register based upon the PHY type and the FEC operating mode (see 45.2.10.3, 45.2.1.102 and 45.2.1.110).

Response *Response Status* **C**

ACCEPT.
[Editor's note: Changed comment type from TR to T.]

Cl **30** *SC* **30.5.1.1.17** *P* **36** *L* **35** # 90

Slavick, Jeff Broadcom

Comment Type **T** *Comment Status* **A** *(bucket1)*

aFECCorrectedBlocks needs to add the RS-FEC-Int into the laundry list of FEC types

SuggestedRemedy

Bring in the last paragraph of 30.5.1.1.17 and change "RS-FEC" to "RS-FEC and RS-FEC-Int"

Response *Response Status* **C**

ACCEPT.
[Editor's note: Changed comment type from TR to T.]

Cl **30** *SC* **30.5.1.1.18** *P* **36** *L* **35** # 91

Slavick, Jeff Broadcom

Comment Type **T** *Comment Status* **A** *(bucket1)*

aFECUncorrectedBlocks needs to add the RS-FEC-Int into the laundry list of FEC types

SuggestedRemedy

Bring in the last paragraph of 30.5.1.1.18 and change "RS-FEC" to "RS-FEC and RS-FEC-Int"

Response *Response Status* **C**

ACCEPT.
[Editor's note: Changed comment type from TR to T.]

Cl **30** *SC* **30.6.1.1.5** *P* **36** *L* **32** # 5

Hajduczenia, Marek Charter Communications

Comment Type **E** *Comment Status* **A** *(bucket1)*

"as specified in Clause 73 (see 73.6.5) and" - I see very little value in adding Clause and then subclause information - subclause information is sufficient

SuggestedRemedy

Change to "as specified in 73.6.5 and"

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.110** *P* **43** *L* **13** # 158

Zimmerman, George — CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **E** *Comment Status* **A** *(bucket1)*

Description text indicating Clause 91 and Clause 161 should be cross references (2 instances of each)

SuggestedRemedy

Change "Clause 91" and "Clause 161" text in descriptions to active cross references.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.115a** *P* **46** *L* **13** # 1

Anslow, Pete — Independent

Comment Type **E** *Comment Status* **A** *(bucket1)*

When a new subclause is inserted between two existing subclauses of the same level (e.g., between 45.2.114 and 45.2.115) the new subclause number is the same as the lower of the two with "a" added. This is 45.2.114a in the example. See 2020 IEEE SA Style manual: https://mentor.ieee.org/myproject/Public/mytools/draft/styleman.pdf#page=40
The same principle applies to inserted tables.
This needs to be corrected for 45.2.1.115a, Table 45–93a, 45.2.1.126a, Table 45–100a

SuggestedRemedy

Change the numbering of 45.2.1.115a, Table 45–93a, 45.2.1.126a, and Table 45–100a to be 45.2.1.114a, Table 45–92a, 45.2.1.125a, and Table 45–99a, respectively.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.115a** *P* **46** *L* **37** # 6

Hajduczenia, Marek — Charter Communications

Comment Type **E** *Comment Status* **R** *(bucket1)*

Lots of unnecessary empty lines in between subclauses, tables, and text blocks.

SuggestedRemedy

Please remove all unnecessary white (empty) lines between (for example) 45.2.1.115 and 45.2.1.117 - these continue until at least page 54

Response *Response Status* **C**

REJECT.
The editorial policy in the 802.3ck project is to insert one empty line between each pair of editorial amendments. This is consistent throughout this draft. The intent is make a clear delineation between each new instruction AND to be consistent.

Cl **45** *SC* **45.2.1.126a** *P* **53** *L* # 214

He, Xiang — Huawei

Comment Type **T** *Comment Status* **R** *counter size*

32-bit counter may be too short for some of the codeword error bins. A brief calculation below shows the saturation time for the lower bins for 400 Gb/s rate, if the overall BER is 2E-4 (random).

Bin#	Minutes to saturate
1	2.5
2	4.6
3	12.7
4	46.9
5	217

...
If considering burst errors, bin 2 and 3 will saturate even faster.
Bins saturated too early may not be able to provide useful information.

SuggestedRemedy

Increase the size of counters for bin 1~3, if not for all, to 48 bits.

Response *Response Status* **C**

REJECT.
Implementing 48-bit codeword error bin registers may not be straightforward, so there needs to be good justification for making this change.
For system debug, it is the uppermost 3-4 codeword error bins that are not zero which are of greatest interest, these bin counters increment slowly.
The important information for predicting the uncorrectable codeword ratio is in the high bins. Even if the first 3 lower bins are saturated, there are 12 more bins that contain enough information to extrapolate.
If the lower order bins are seen to be saturated, for debug purposes reading the registers every two minutes is reasonable.

Cl **45** *SC* **45.2.1.135a** *P* **55** *L* **11** # 2

Anslow, Pete Independent

Comment Type **E** *Comment Status* **A** *(bucket1)*

Changes for table footnotes b and c are not shown correctly.
Similar issues in Tables 45-103b, 45-103c, and 45-103d.

SuggestedRemedy

In Table 45-103a:
in the row for 1.1120.4:2 underline the added "c"
Underline the whole of table footnotes b and c
In Table 45-103b:
in the row for 1.1220.5:3 underline the added "b"
Underline the whole of table footnote b
In Table 45-103c:
in the row for 1.1320.4:2 underline the added "c"
Underline the whole of table footnotes b and c
In Table 45-103d:
in the row for 1.1420.5:3 underline the added "b"
Underline the whole of table footnote b

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.135a** *P* **55** *L* **12** # 72

Wienckowski, Natalie General Motors

Comment Type **T** *Comment Status* **A** *(bucket1)*

Unused bit combinations should be "reserved"

SuggestedRemedy

add a row with "0 1 x =Reserved" and
add a row with "1 0 0 =Reserved"
This also needs to be done on P56L7, P57L13, P58L7, & P152L23.

Response *Response Status* **C**

ACCEPT.
[Editor's note: CC: 45, 162 (Table 162-9).]

Cl **45** *SC* **45.2.1.137a** *P* **56** *L* **41** # 3

Anslow, Pete Independent

Comment Type **E** *Comment Status* **A** *(bucket1)*

Table 45-103c concerns register 1.1320, but there are 4 instances of 1.1120 in the table.

SuggestedRemedy

Change 1.1120 to 1.1320 in four places.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.7.12a.a** *P* **60** *L* **52** # 92

Slavick, Jeff Broadcom

Comment Type **T** *Comment Status* **A** *(bucket1)*

The RS-FEC-Int negotiated field is valid for all 100GBASE-P PHYs that supporting negotiating it. But text some "some" so

SuggestedRemedy

Align the text with how RS-FEC negotiated reads. Change the last sentence to read "This bit is set only when RS-FEC-Int operation been negotiated for a 100GBASE-P PHY supporting negotiation of RS-FEC-Int operation."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change last sentence to: "This bit is set only if RS-FEC-Int operation has been negotiated for a 100GBASE-P PHY supporting negotiation of RS-FEC-Int operation."

Cl **69** *SC* **69.1.2** *P* **63** *L* **6** # 80

Huber, Tom Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

The editing instruction indicates that unchanged items are not included, yet items i) and j) have no changes indicated

SuggestedRemedy

Remove items i) and j), or change the editing instruction to indicate that 'some unmodified items are not included'.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In the editorial instruction change "(unchanged list items not shown):" to "(some unchanged list items not shown):"

Cl **69** *SC* **69.2.3** *P* **63** *L* **43** # 98

Kabra, Lokesh — Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Typo-error; 200Gb/s mentioned as 100Gb/s

SuggestedRemedy

the PMD defined in Clause163, and specifies 200Gb/s operation using 4-level PAM over two differential

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change: "The 200GBASE-KR2 embodiment employs the PCS defined in Clause 119, the PMA defined in Clause 120, and the PMD defined in Clause 163, and specifies 100 Gb/s operation using 4-level PAM over two differential paths in each direction."
To: "The 200GBASE-KR2 embodiment employs the PCS defined in Clause 119, the PMA defined in Clause 120, and the PMD defined in Clause 163, and specifies 200 Gb/s operation using 4-level PAM over two differential paths in each direction."

Cl **69** *SC* **69.2.3** *P* **64** *L* **48** # 81

Huber, Tom — Nokia

Comment Type **T** *Comment Status* **A** *(bucket1)*

Not part of the new text for table 69-3b, but the title of clause 137 is incorrect in the table

SuggestedRemedy

Change 100GBASE-KR4 PMD to 200GBASE-KR4 PMD

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.4** *P* **73** *L* **47** # 7

Hajduczenia, Marek — Charter Communications

Comment Type **E** *Comment Status* **A** *(bucket1)*

Dead link "Clause 91 or Clause 161"

SuggestedRemedy

Add live hyperlink for these two clause numbers

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.6** *P* **85** *L* **26** # 82

Huber, Tom — Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

The newly inserted row is not marked as such. Other tables with a mix of inserted rows and existing rows have underlined text for the new rows.

SuggestedRemedy

Underline the text of the new row.

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.6.2f** *P* **86** *L* **5** # 160

Zimmerman, George — CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **E** *Comment Status* **A** *(bucket1)*

"For PHYs supporting RS-FEC-Int operation" should have a reference, especially because it would send the reader searching this clause (RS-FEC) for RS-FEC-Int, and not find it.

SuggestedRemedy

change "RS-FEC-Int operation" to "RS-FEC-Int operation (see Clause 161)" similar to other references, where Clause 161 is a cross-ref.

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.6.2f** *P* **86** *L* **7** # 83

Huber, Tom — Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Awkward grammar - "When 100G_RS_FEC_Enable variable is set…"

SuggestedRemedy

Add 'the' in front of 10G_RS_FEC_Enable: "When the 100G_RS_FEC_Enable variable is set…"

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.7.3** *P* **87** *L* **38** # 161

Zimmerman, George CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **T** *Comment Status* **A** *(bucket1)*

*FINT indicates RS-FEC-Int and should reference clause 161 as the relevant clause for the capability

SuggestedRemedy

Add cross-ref to clause 161 under subclause

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.6** *P* **85** *L* **28** # 26

Laubach, Mark IEEE Member / Self

Comment Type **E** *Comment Status* **A** *(bucket1)*

Line breaking of "threshold" after the "t" doesn't look good.

SuggestedRemedy

Perhaps resizing the columns can make it look better or forcing a newline before the "t"?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Reformat so there is no break in the "threshold".

Cl **93A** *SC* **93A.1.2.3** *P* **209** *L* **47** # 111

Ran, Adee Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

"unless alternate values are provided by the clause that invokes this method"

The word "alternate" seems odd here, I think "alternative" is more common for this meaning. It can also be simply "other".

(Note: in section 6, "alternative" appears 13 times and "alternate" appears 3 times, both with the same meaning. This may be handled by maintenance)

SuggestedRemedy

Change "alternate" to "alternative".

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.2.4** *P* **211** *L* **9** # 112

Ran, Adee Cisco

Comment Type **E** *Comment Status* **A** *figure legend (bucket1)*

Figure 93A–2 includes network elements which represent components of the package and device model, but there is no description of these elements; the definitions are scattered through 93A.1.2 and its subclauses (some of which are not in this amendment). To an unexperienced reader it will be much harder than necessary to understand what each element is.

The suggested remety is to add a legend to the figure. Alternatively, labels and arrows can be used instead.

SuggestedRemedy

Add a legend to Figure 93A–2, with text based on the following:

S^(d) = scattering parameters corresponding to C_d
S^(l) = scattering parameters corresponding to a transmission line with length z_p
S^(s) = scattering parameters corresponding to L_s

(and so on)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

Cl **93A** *SC* **93A.5.2** *P* **214** *L* **34** # 113

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **A** *(bucket1)*

This amendment uses T_fx as a parameter of ERL calculation.

T_fx originally appears in Equation (93A–62), which is not included in this amendment (added by 802.3cd), with the text

"T_fx is twice the propagation delay in ns associated with the test fixture, obtained by measurement or inspection"

This text does not hold for the cases where the ERL is defined in this amendment; in some cases T_fx is defined as 0 or 0.2 ns (regardless of the test fixture), in other cases it is twice the delay between two specified test points (e.g. TP0 and TP0v).

SuggestedRemedy

Add 93A.5.2 and change the text following Equation (93A–62), adding after the quoted sentence:

", unless its value is specified by the clause that invokes this method"

Response *Response Status* **W**

ACCEPT.

Cl **116** *SC* **116.1.2** *P* **90** *L* **44** # 84

Huber, Tom Nokia

Comment Type **E** *Comment Status* **A** *(bucket1)*

The last part of the text that is new, "for 400GBASE-KR4", is not shown as changed text (with an underline)

SuggestedRemedy

Underline "for 400GBASE-KR4" so all changed text is identified.

Response *Response Status* **C**

ACCEPT.

Cl **116** *SC* **116.1.4** *P* **92** *L* **54** # 191

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *(bucket1)*

The Optical PMD's are not listed using the new chip to chip and chip to module AUI's

SuggestedRemedy

bring the tables for the 200G and 400G from clause 116 into the document and add the new AUI interfaces to the tables.

Response *Response Status* **C**

ACCEPT.

Cl **119** *SC* **119.6.4.12** *P* **99** *L* **41** # 27

Laubach, Mark IEEE Member / Self

Comment Type **E** *Comment Status* **A** *(bucket1)*

Line break of "status" after "stat" doesn't loook good.

SuggestedRemedy

Perhaps forcing a newline before "status"?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Reformat so there is no break in "status".

Cl **120** *SC* **120.5.2** *P* **102** *L* **11** # 101

Ran, Adee Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

"when the number of physical lanes is 2 or 4" is inconsistent with the remainder of this sentence which has "8 or 4", and with the first paragraph of 120.5.

Other places with "2 or 4" are 120.5.5 (P102 L25), 120.5.7.1 (P103 L12 and L20), and 120.5.11.2 (P104 L16) - in those cases the corresponding 400G PMA is stated as having "4 or 8" lanes. That is an inconsistency in the base document, which may be fixed in the revision project, so I'm not proposing changing those cases now.

SuggestedRemedy

Change "2 or 4" to "4 or 2", at this point only in 102.5.2.

Response *Response Status* **C**

ACCEPT.

Cl **120** *SC* **120.7.3** *P* **106** *L* **30** # 102

Ran, Adee Cisco

Comment Type **ER** *Comment Status* **A** *(bucket1)*

In items UNAUI and DNAUI, "through Annex 120G" is a newly inserted text.

SuggestedRemedy

Mark with underline in both cases.

Response *Response Status* **W**

ACCEPT.

Cl **120F** *SC* **120F.3.1** *P* **219** *L* **10** # 114

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **A** *CM voltage*

The common mode voltage limits for C2C transmitter should have been changed to 1.0 V max and 0.2 V min, as in the KR transmitter (Table 163–5).

This change has been requested in comment #58 against D1.1, which was resolved with AIP, but for some reason the resolution was implemented only in clause 163 and not here.

(the response to that comment was:
ACCEPT IN PRINCIPLE.
The following presentation was reviewed by the task force:
http://www.ieee802.org/3/ck/public/20_03/ran_3ck_01a_0320.pdf
Implement the changes proposed on slides 4 and 5 in the referenced presentation, except set the cutoff frequency to 50 kHz and maximum common mode voltage of 1V. Implement with editorial license.")

SuggestedRemedy

Change the common mode limits to 1 V and 0.2 V, as in Table 163–5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In Table 120F-1…
Change "Common-mode voltage (max)" value to 1 V.
Change "Common-mode voltage (min)" value to 0.2 V.

Cl **120F** *SC* **120F.3.1** *P* **219** *L* **16** # 60

Brown, Matt Huawei

Comment Type **E** *Comment Status* **A** *(bucket1)*

Align terminology with other clauses.

SuggestedRemedy

Change "Common-mode return loss" to "Common-mode to common-mode return loss" in Table 120F-1 and in PICS item TC8 in 120F.5.4.1.

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.3.1** *P* **219** *L* **22** # 215

He, Xiang Huawei

Comment Type **E** *Comment Status* **A** *abbreviations*

A dot is added to the abbreviated word "abs" in this table but not in the others.

SuggestedRemedy

Change "abs." to "abs" or add the dot for all other occurances.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
In addition to the concern expressed in the comment the grammar in this parameter name is not good.
In Table 120F-1, change "abs." to "absolute value of".
In Table 162-10 and Table 163-5, change "abs" to "absolute value of".
[Editor's note: CC: 120F, 162, 163]

Cl **120F** *SC* **120F.3.1.1** *P* **220** *L* **22** # 54

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *ERL example (bucket3)*

No reference to Annex 163B which provide referene ERL

SuggestedRemedy

Please provide reference to CL 163B and explain that dERL of -3 dB would mean in case of reference package ERL 9.95 dB

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
This subclause references the appropriate test methodology in 163A.3.2.2. The test fixture specification in 163.9.2.1, as referenced from 120F.2, points to the example test fixture in Annex 163B.
However, it might be helpful to refer to the reference parameters examples in Annex 163B from Annex 163A, as well.
After the first paragraph in 163A.3 and 163A.4, add a new paragraph as follows:
"An example test fixture and its reference values are provided in 163B.3."
See slides 12 and 13 in
https://www.ieee802.org/3/ck/public/21_05/sun_3ck_01b_0521.pdf
Implement with editorial license.
[Editor's note: CC: 120F, 163]

Cl **120F** *SC* **120F.3.2** *P* **222** *L* **38** # 10

Brown, Matt — Huawei

Comment Type **TR** *Comment Status* **A** *RX signalling rate (bucket3)*

For the C2C receiver, there is no requirement specified to meet the specifications over the entire signaling rate range. See 162.9.4.1 for a relevant example.

SuggestedRemedy

Add a new sublcause before 120F.3.2.1 with heading "Receiver signaling rate" and content as follows:
"The receiver shall comply with the requirements of 120F.3.2.3 and 120F.3.2.4 for any signaling rate in the range 53.125 GBd ± 100 ppm."
Add a new row in Table 120F-4 specifying the signaling rate range and reference the new subclause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.
Comment #9, #10, #11, and #12 make similar proposals KR, CR, C2C, and C2M.
[Editor's note: CC: 120F, 120G, 163]

Cl **120F** *SC* **120F.3.2.2** *P* **223** *L* **2** # 61

Brown, Matt — Huawei

Comment Type **E** *Comment Status* **A** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 120F-1 and in the variable list that follows, change variable name RL_dcm to Return_Loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Per straw poll #16 and #17, there is consensus to change all return loss variable names to the form of option 2 on slide 9 of brown_3ck_01a_0521.

Change all return loss variable names to the form of option 2 on slide 9 of brown_3ck_01a_0521.

Straw poll #16 (Chicago Rules)
Straw poll #17 (Pick one)
For all return loss variable names I support:
A: Option 1 per slide 9 of brown_3ck_01a_0521 (return_loss)
B: Option 2 per slide 9 of brown_3ck_01a_0521 (e.g., RLdd)
C: Option 3 per slide 9 of brown_3ck_01a_0521 (e.g., RLDD)
D: RLxx where xx is DD, DC, CD, CC as subscript
E: No changes to return loss variable names
Straw poll #16
A: 3 B: 26 C: 14 D: 12 E: 2
Straw poll #17
A: 1 B: 22 C: 3 D: 4 E: 1

Cl **120F** *SC* **120F.3.2.3** *P* **224** *L* **2** # 135

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **A** *RIT jitter (CC)*

Equation (120D-10) and (120D-11) referred from 120F.3.2.3 step e are not accurate, because the dual-dirac jitter distributuion estimated by these equations does not match well with the original distributuion even if the original distributuion is pure dual-dirac distributuion. For instance, J4u of the estimated dual-dirac jitter distribution is always significantly smaller than the measured J4u. I propose to change these equations.

SuggestedRemedy

Add the following equations after step j, and change references to Equation (120D-10) and (120D-11) in step e with the new equations:

D4d = (Q4d^2 + 1) * (J_RMS^2) - (J4u / 2)^2

If D4d >= 0,
A_DD = (J4u / 2 + Q4d * sqrt(D4d)) / (Q4d^2 + 1)
sigma_RJ = (J4u / 2 - A_DD) / Q4d

If D4d < 0,
Qx = sqrt((J4u / 2 / J_RMS)^2 - 1)
A_DD = (J4u / 2) / (Qx^2 + 1)
sigma_RJ = sqrt((J_RMS^2) - (A_DD^2))

where
Q4d = 3.7190

Add the following Note after the equation:

Note 1 -- Q4d is an approximated solution of Q(Q4d) = 1 x 10^(-4), where the Q function is defined in Equation (95-1).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #209.

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

Cl **120F** *SC* **120F.3.2.4** *P* **225** *L* **1** # 15

Brown, Matt — Huawei

Comment Type **TR** *Comment Status* **A** *jitter tolerance (bucket3)*

In the exception list in 120F.3.2.4, the last exception (item d) is a repeat of an exception (item i) in 120F.3.2.3. Since 120F.3.2.4, is referencing 120F.3.2.3, the exception in item d is not required.

SuggestedRemedy

In 120F.3.2.4, delete the last exception (item d).

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.3.2.5** *P* **225** *L* **22** # 115

Ran, Adee — Cisco

Comment Type **E** *Comment Status* **A** *variable table (bucket1)*

Table 120F–6 has a "reference" column that has identical values for all rows (136.8.11.7.1). This reference is repeated in the text following the table, so it is redundant. Note that the similar Table 120F–3 does not have this column.

If the reference column is omitted, the "management access" column can be widened to prevent breaking its title, as in Table 120F–3.

SuggestedRemedy

delete the "reference" column and adjust the width of remaining columns.

Response *Response Status* **C**

ACCEPT.

Cl **120F** *SC* **120F.4** *P* **225** *L* **48** # 153

Kochuparambil, Beth — Cisco

Comment Type **E** *Comment Status* **A** *channel summary (bucket3)*

There is no overview paragraph in the channel characteristics

SuggestedRemedy

Insert a similar paragraph to 163.10 with appropriate modifications. "Channels are recomments to meet… Channels shall meet..."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #16.

Cl **120F** *SC* **120F.4** *P* **225** *L* **49** # 16

Brown, Matt — Huawei

Comment Type **ER** *Comment Status* **A** *nel summary (CC) (bucket3)*

It would be beneficial to include a specification summary table for the C2C channel similar to the Tables for C2C TX (Table 120F-1), C2C RX (Table 120G-4), and CR Channel (Table 162-16).

SuggestedRemedy

Create a new table similar to Table 162-16 to summarize the C2M channel characteristics including related introductory text.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment #17 proposes similar changes in Clause 163.
Implement the suggested remedy with editorial license based on slide 11 of the following presentation:
https://www.ieee802.org/3/ck/public/21_05/sun_3ck_01b_0521.pdf
Also, since the channel insertion loss is a recommendation, change the title of 120F.4.2 to "Channel insertion loss (recommended)"
[Editor's note: CC: 163, 120F]

Cl **120F** *SC* **120F.5.4.1** *P* **232** *L* **39** # 116

Ran, Adee — Cisco

Comment Type **TR** *Comment Status* **A** *(bucket1)*

Item TC13 feature is "Transmitter precoder request" with no comment, and its status is M. However, the referenced 120F.1 says "Precoding may be enabled and disabled using the precoder request mechanism specified in 135F.3.2.1." (P218 L28), and this mechanism is explicitly optional. So requesting through this mechanism can't be mandatory.

It may be preferable to add the transmitter precoder request as a major (optional) feature, as done in annex 135F (802.3cd).

SuggestedRemedy

Change TC13 status from "M" to "O". Consider moving it to 120F.5.3.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Change TC13 status from "M" to "O".

Cl **120F** *SC* **120F.5.4.1** *P* **232** *L* **40** # 117

Ran, Adee — Cisco

Comment Type **TR** *Comment Status* **A** *TX EQ control (bucket1)*

Item TC14 is optional and points to 120F.3.1.2, which points to 120F.3.1.4, which is pointed to by item TC15 (mandatory). These two items are one and the same.

The transmitter control interface is mandatory; only its usage is described with the word "may", but it is not an optional feature. So TC15 is the correct one.

SuggestedRemedy

Remove item TC14.

Response *Response Status* **W**

ACCEPT.

Cl **120G** *SC* **120G.1** *P* **235** *L* **36** # 221

Wu, Mau-Lin — MediaTek Inc.

Comment Type **E** *Comment Status* **A** *OIF reference (bucket1)*

The sentence below refers to CEI-112G-VSR-PAM4 defined in OIF-CEI-05.0 [B55a].
"The C2M interface is defined using a specification and test methodology that is similar to that used for CEI-112G-VSR-PAM4 defined in OIF-CEI-05.0 [B55a]."
However, OIF-CEI-05.0 doesn't exist yet.

SuggestedRemedy

Propose to remove this sentence

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
With respect to CEI-112G-VSR-PAM4, past OIF liaisons request that IEEE "acknowledge the OIF in any derivative work". For reference, a URL to the latest liaison letter is provided here:
https://www.ieee802.org/3/ck/private/OIF_liaison_letter_IEEE802.3_08Apr21_CEI_Projects.pdf
Add an editor's note in 120G.1 indicating that the referenced CEI document is expected and that the reference is to be removed at 802.3ck publication time if the CEI document is not yet published.
In Annex A, change the editor's note to indicate only that the document is expected to be published by OIF and that the bibliography entry is to be removed if the reference in 120G.1 is removed.

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

Dawe, Piers — Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

There is no consensus to implement the proposed.

Cl **120G** *SC* **120G.3.1** *P* **237** *L* **13** # 118

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **R** *AC CM noise*

Host output "AC common-mode output voltage (max, RMS)" is specified in Table 120G–1 as 17.5 mV.

This value is tighter than what is allowed for CR transmitter measured at the same point (30 mV) and also tighter than the specification for KR/C2C.

Analysis of the effect of 17.5 mV vs. 30 mV has not been provided. Devices with higher AC CM output have been demonstrated to operate with real receivers at acceptable BER on a variety of channels.

Unless evidence is provided that 30 mV is unacceptable with real receivers, the limit should be aligned with the CR specification.

Applies similarly to Module output characteristics in Table 120G–3.

SuggestedRemedy

Change the value for AC common-mode output voltage (max, RMS) from 17.5 to 30, in Table 120G–1 and Table 120G–3.

Response *Response Status* **C**

REJECT.

Per straw poll #10, there is no consensus to make the proposed change.

[Editor's note: Line number changed from blank to 13.]

Straw poll #9 (pick one)
For module output and host output, I support changing the AC CM voltage (max) from 17.5 to 30 mV.
A: Yes
B: No
C: Need more information
D: Abstain
A: 11 B: 10 C: 7 D: 2

Straw poll #10 (pick one, decision)
To close comment 118, for module output and host output, I support changing the AC CM voltage (max) from 17.5 to 30 mV.
A: Yes
B: No
A: 12 B: 16

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

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

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

Cl **120G** *SC* **120G.3.1** *P* **237** *L* **17** # 14

Brown, Matt — Huawei

Comment Type **ER** *Comment Status* **A** *terminology (bucket3)*

The eye height is defined by the measurement method in 120G.3.1.5 and it is not necessary to qualify it as being "differential". If so, the VEC should also be qualified as "differential".

SuggestedRemedy

Change "Eye height, differential (min)" to "Eye height (min)"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Further to the comment…
Most (if not all) waveform parameters are measured on the differential signal. Including the word differential with Eye Height and not all others, could be interpreted to imply something different from other waveform measurements.

Implement the suggested remedy.

Cl **120G** *SC* **120G.3.1.1** *P* **237** *L* **36** # 181

Dawe, Piers — Nvidia

Comment Type **E** *Comment Status* **R** *TP1 RLCD*

In other specs such as CEI-56G-VSR-PAM4 and CEI-56G-VSR-PAM4, the output differential to common-mode return loss is 3 dB better than the input common-mode to differential mode return loss at low frequency, for a good reason, but in this annex they are the same.

SuggestedRemedy

Unless we find a reason not to, offset the specs in the usual way.

Response *Response Status* **C**

REJECT.
The comment does not provide sufficient justification for the proposed changes nor does the suggested remedy provide sufficient detail to implement.

Cl **120G** *SC* **120G.3.1.1** *P* **237** *L* **36** # 62

Brown, Matt — Huawei

Comment Type **E** *Comment Status* **A** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 120G-1 and in the variable list that follows, change variable name RLDC to Return_Loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #61.

Cl **120G** *SC* **120G.3.1.2** *P* **238** *L* **41** # 185

Dudek, Mike — Marvell

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

Investigations of the effect of the Time-gated propagation delay on practical HCB's has shown that the input RF connector is affecting the ERL unless the 200 ps is increased to approx 300ps. 300ps is still adequately short to not affect the measurement of the device under test. i.e. The value used for Tfx does not sufficiently mitigate the effects of reflections from the test connector. See dudek_3ck_adhoc_01a_041421

SuggestedRemedy

Change the value from 0.2ns to 0.3ns also on page 242 line 41

Response *Response Status* **C**

ACCEPT.

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

Dawe, Piers — Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

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

Cl **120G** *SC* **120G.3.1.5** *P* **239** *L* **8** # 20

Brown, Matt — Huawei

Comment Type **ER** *Comment Status* **A** *terminology (bucket3)*

An acronym for vertical eye closure (VEC) is defined in the first sentence of 120G.3.1.5. However, the acronym is rarely used in 120G and the full name is normally used. Since this acronym was not defined in 120E, where the base methodology is defined, 120G should continue to use the full name only.

SuggestedRemedy

Delete all instance of the acronym VEC in 120G.
Alternately, where appropriate, replace all instances of "vertical eye closure" with the acronym VEC.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

With editorial license, replace all instances of "vertical eye closure" with "VEC", where appropriate.

Cl **120G** *SC* **120G.3.1.5** *P* **239** *L* **10** # 222

Wu, Mau-Lin — MediaTek Inc.

Comment Type **TR** *Comment Status* **A** *(bucket1)*

Vertical eye opening is not used as a specification in 120G, vertical eye closure is used instead. Therefore, the following sentence is not appropriate.
"Eye height and Vertical eye opening are measured according to the method described in 102G.5.2."

SuggestedRemedy

Change "vertical eye opening" to "vertical eye closure".

Response *Response Status* **W**

ACCEPT.

Cl **120G** *SC* **120G.3.2** *P* **240** *L* **8** # 187

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *TP3 DPPV*

The 900mV output amplitude allowed for the module is larger than necessary for a short channel and makes it more difficult for the host receiver to avoid being overloaded.

SuggestedRemedy

Provide two rows for Differential peak-to-peak output voltage (max) one for "long mode" and one for "short mode". Leave the "long mode" at 900mV. Make the "short mode" 600mV

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #206.

Cl **120G** *SC* **120G.3.2** *P* **240** *L* **8** # 206

Healey, Adam — Broadcom Inc.

Comment Type **TR** *Comment Status* **A** *TP3 DPPV*

The maximum differential peak-to-peak output voltage for the "short" module output mode should be reduced. A lower output amplitude for "short" mode would reduce the input dynamic range that the host receiver needs to support. This was part of the original proposal for multiple module output modes. However, the feature has not yet been included in the standard.

SuggestedRemedy

Change the maximum differential peak-to-peak output voltage to 600 mV for the "short" module output mode.

Response *Response Status* **C**

ACCEPT.

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

Dawe, Piers Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

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

Ghiasi, Ali Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

There was no consensus to make the proposed changes.

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

Cl **120G** *SC* **120G.3.2.1** *P* **240** *L* **27** # 175

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **R** *odule output modes (bucket3)*

The module output doesn't have to "support" two modes (e.g. receive, co-operate, enable, or similar), it has to actually do them. They are abilities of the module.

SuggestedRemedy

Change "The module output shall support two modes: short and long." to "There are two module output modes: short and long."

Response *Response Status* **C**

REJECT.
The proposed changes to wording do not improve the quality of the draft.

Cl **120G** *SC* **120G.3.2.1** *P* **240** *L* **27** # 56

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **T** *Comment Status* **A** *odule output modes (bucket3)*

Short and long are not very descriptive

SuggestedRemedy

Please replace short and long with "lower loss hosts" and "higher loss hosts"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The interpretation of short and long modes is implicit in the test methodology specified in 120G.3.2.2. The suggested remedy is not generally accurate. Use of a concise label for each mode is helpful. However, the closed response to comment #40 changes the reference to 120G.3.2.2.1 which provides more relevant information.
Resolve using the response to comment #40.

Cl **120G** *SC* **120G.3.2.1** *P* **240** *L* **37** # 223

Wu, Mau-Lin MediaTek Inc.

Comment Type **TR** *Comment Status* **R** *odule output modes (bucket3)*

In Table 120G-4, Module output mode mapping, there are 100GAUI-1-S C2M, 100GAUI-1-L C2M, and etc. defined for "Host electrical interface". However, no definitions of those "Host electrical interface" were found in the whole specification. Based on that, the information provided by this Table may be confusing for the readers.

SuggestedRemedy

We shall either add the definitions of 100GAUI-1-S & 100GAUI-1-L C2M or remove Table 120G-4.

Response *Response Status* **W**

REJECT.
Table 120G-4 map familiar 802.3ck parameters in columns 1 and 2 to a label in column 3 to be used within other standards documents, not within 802.3ck. The label is defined by the contents of columns 1 and 2.

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

Ghiasi, Ali Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

Please reference table 120G-5

Response *Response Status* **C**

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

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

Cl **120G** *SC* **120G.3.2.2** *P* **241** *L* **13** # 188

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *TP3 XTALK*

It is unlikely that a host that is asking for a "long mode" will have a fast risetime, and therefore the crosstalk will be less, helping the module achieve better VEC and VEO

SuggestedRemedy

Change to "transition time of 10ps with short mode and 15ps with long mode". Also in table 120G-1 Change the existing row to be for "when requesting short mode" and add another row with value 15ps for "transition time (min 20% to 80%) when requesting long mode." and on page 245 line 53 change to "and transition time of 10ps with short mode and 15ps with long mode as measured at TP1a"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Slide 6 of the following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/adhoc/jan06_21/wu_3ck_adhoc_02_010621.pdf

Implement the suggested remedy with editorial license.

Cl **120G** *SC* **120G.3.2.2.1** *P* **242** *L* **10** # 41

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *TP3 host PCB*

Table 120G-5 PCB length are for the reference MCB but based on construction the MCB loss may vary

SuggestedRemedy

Add note to the table that above PCB length assumes an MCB loss of 2.4 dB, please also list the PCB losses in dB instead of every reader trying to calculate
80 mm = 3.1 dB
160 mm = 6.6 dB
244.7 mm = 9.6 dB
To account for any difference in MTF loss from 6.6 dB it would be beter to list the dB value for the trace+MTF and list the PCB lenghts as reference, in that case then
80 mm becomes = 3.1+6.6 = 9.7 dB
160 mm becomes = 6.6+6.6 dB=13.2 dB
244.7 mm 9.6 + 6.6 dB=16.2 dB
Looking at Ghiasi_3ck_01_0421 there are several issues with above limits:
1. Max trace loss need to be reduced from 244.7 mm to 239.7 mm so the max loss is 16 dB
2. Current 160 mm max range for short results in excess VEC propose to reduce 132.6 mm (5.2 dB)
The proposed optimized new limits become:
Short 6.6 - 11.8 dB (inlcude 6.6 dB MTF loss)
Long 9.7 - 16 dB (include 6.6 dB MTF loss)

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed subclause from 120G.3.2.2 to 120G.3.2.2.1.]
The following related presentation was reviewed by the task force at a previous ad hoc meeting:
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ghiasi_3ck_adhoc_01a_042121.pdf
The location of the measurement host PCB is not shown Figure 120G-8, but should be part of the measurement receiver between the MCB and the reference receiver.
There was no consensus to include the loss numbers in the table nor to change the PCB length for long mode.
Change short-far-end PCB length to 133 mm.
In Figure 120G-7, change "reference receiver" to "additional host PCB and reference receiver".
Implement with editorial license.

Cl **120G** *SC* **120G.3.3** *P* **243** *L* **25** # 11

Brown, Matt — Huawei

Comment Type **TR** *Comment Status* **A** *nput signalling rate (bucket3)*

For the C2M host input, there is no clear requirement to meet the specifications over the entire signaling rate range. See 162.9.4.1 for a relevant example.

SuggestedRemedy

Add a new sublcause before 120G.3.3.1 with heading "Host input signaling rate" and content as follows:
"The host input shall comply with the requirements of 120G.3.3.3 for any signaling rate in the range 53.125 GBd ± 100 ppm."
In Table 120G-7 add a reference to the new subclause for the signaling rate row.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.
Comment #9, #10, #11, and #12 make similar proposals KR, CR, C2C, and C2M.
[Editor's note: CC: 120F, 120G, 163]

Cl **120G** *SC* **120G.3.3.1** *P* **243** *L* **34** # 63

Brown, Matt — Huawei

Comment Type **E** *Comment Status* **A** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 120G-2 and in the variable list that follows, change variable name RLCD to Return_Loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #61.

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

Mellitz, Richard Samtec

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

Cl **120G** *SC* **120G.3.3.3** *P* **244** *L* **46** # 233

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **A** *TP3/TP4 XTALK (bucket1)*

It would be better to put the crosstalk parameters in the stressed input parameters tables rather than scattered through the text.

SuggestedRemedy

Move the peak-to-peak voltage and transition time numbers from the text of 120G.3.3.3.1 and 120G.3.4.1.1 to Table 120G-8 and 120G-11

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

Cl **120G** *SC* **120G.3.3.3.1** *P* **245** *L* **33** # 13

Brown, Matt Huawei

Comment Type **TR** *Comment Status* **A** *TP4 SJ*

In previous drafts we aligned KR, CR, and C2C such that they share the same jitter tolerance table, Table 162-15 and added a new frequency point at 0.4 MHz. The same table should be used for C2M.

SuggestedRemedy

Delete Table 120G-9.
At page 245 line 1, change the sentence to: "Sinusoidal jitter is applied with frequency and peak-to-peak amplitude according to each case in Table 162-15.
At page 248 line3, change the sentence to: "The amount of applied peak-to-peak sinusoidal jitter used for the module stressed input test is given in Table 162-15."
In Table 120G-8 and Table 120G-11, change "Table 120G-9" to "Table 162-15".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Changed subclause from 120G.3.3.3 to 120G.3.3.3.1.]

Implement suggested remedy with editorial license.

Cl **120G** *SC* **120G.3.3.3.1** *P* **244** *L* **53** # 119

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **R** *TP4 additive noise*

In the host input stressed eye calibration procedure, "The stressed signal is generated by adding sinusoidal jitter, random jitter, and bounded uncorrelated jitter to a clean pattern".

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

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

SuggestedRemedy

Add a wideband noise source to the diagram in Figure 120G–9, between the pattern generator and the HCB.

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

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

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

Response *Response Status* **U**

REJECT.
Comment #123 proposes a similar change to the module stressed input configuration.
Additive amplitude noise is not the same as BUJ and so it is not an inter-changeable alternative.
The suggested remedy is not sufficiently complete to implement.

Cl **120G** *SC* **120G.3.3.3.1** *P* **245** *L* **25** # 43

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **T** *Comment Status* **A** *TP4 SJ*

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

SuggestedRemedy

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

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #13.

Cl **120G** *SC* **120G.3.3.3.1** *P* **245** *L* **41** # 120

Ran, Adee Cisco

Comment Type **E** *Comment Status* **A** *TP4 SIT wording*

In the host stressed input test procedure there is a "block" paragraph of 18 lines, which contains some 13 sentences, dealing with the bounded uncorrelated jitter (purpose, definition), calibration of jitter (BUJ and random), and crosstalk signal requirements and calibrations, with great detail and no clear list of requirements. This is painful to read (many times).

The paragraph should be broken to shorter paragraphs and possibly a list of requirements, to make it more legible, and separate requirements from informative explanations.

SuggestedRemedy

Rephrase and reformat as necessary.

If required, I can create a detailed proposal, but I trust the editors to be able to improve this paragraph by inspection.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment relates to the host input stressed input test procedure. Comment #122 proposes similar changes to the module input stressed input test.

Update the organization and wording of the host stressed input test procedure in a similar manner to the the adopted resolution to comment #122 with editorial license.

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

Ran, Adee Cisco

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

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

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

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

SuggestedRemedy

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

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

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

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

Response *Response Status* **U**

REJECT.

Resolve in conjunction with comment #124.

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

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

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

Mellitz, Richard Samtec

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

Cl **120G** *SC* **120G.3.3.3.1** *P* **246** *L* **13** # 208

Healey, Adam Broadcom Inc.

Comment Type **TR** *Comment Status* **A** *TP4 SIT eye opening*

The stressed input signal calibration procedure states that "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–7) to result in the eye height for all three eyes given in Table 120G–8 with the setting of the CTLE that minimizes the vertical eye closure." The term "output levels" is ambiguous. It could be interpreted to be "pattern generator output amplitude" or "individual PAM-4 signal levels". This needs to be clarified.

SuggestedRemedy

Change:
"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–7) to result in the eye height for all three eyes given in Table 120G–8 with the setting of the CTLE that minimizes the vertical eye closure."
To:
"Random jitter and the pattern generator differential peak-to-peak output voltage are adjusted so that the height of the smallest eye matches the value in Table 120G-8. The differential peak-to-peak input voltage tolerance given in Table 120G-7 is not exceeded."

Make a similar change to 120G.3.4.1.1 (page 249, line 10).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

Cl **120G** *SC* **120G.3.4** *P* **247** *L* **27** # 12

Brown, Matt Huawei

Comment Type **TR** *Comment Status* **A** *nput signalling rate (bucket3)*

For the C2M module input, there is no clear requirement to meet the specifications over the entire signaling rate range. See 162.9.4.1 for a relevant example.

SuggestedRemedy

Add a new subclause before 120G.3.4.1 with heading "Module input signaling rate" and content as follows:
"The module input shall comply with the requirements of 120G.3.4.1 for any signaling rate in the range 53.125 GBd ± 100 ppm."
In Table 120G-10 add a reference to the new subclause in the signaling rate row.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.
Comment #9, #10, #11, and #12 make similar proposals KR, CR, C2C, and C2M.
[Editor's note: CC: 120F, 120G, 163]

Cl **120G** *SC* **120G.3.4.1** *P* **247** *L* **46** # 46

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **D** *TP4 SIT EH/VEC*

Table 120G-10 needs to be updated now that measurements are with 50 mUI window

SuggestedRemedy

See ghiasi_3ck_01_0121 and reduce eye height window from 15 mV to 9.5 mV
See ghiasi_3ck_01_0121 and reduce eye height window from 7.5 dB to 14+/- 0.5 dB

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

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

Ghiasi, Ali Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

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

See comment #39.

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

Mellitz, Richard — Samtec

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

Cl **120G** *SC* **120G.3.4.1.1** *P* **247** *L* **53** # 21

Brown, Matt — Huawei

Comment Type **ER** *Comment Status* **A** *(bucket1)*

Grammar

SuggestedRemedy

Change "Eye height vertical eye closure are measured"
To "Eye height and vertical eye closure are measured"

Response *Response Status* **C**

ACCEPT.
[Editor's note: Changed line from 43 to 53.]

Cl **120G** *SC* **120G.3.4.1.1** *P* **247** *L* **49** # 122

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **A** *TP4 SIT calibration*

The instructions for calibrating the module stressed input are unclear and unstructured, and there are missing parts, such as when and how VEC is optimized.

It would be better to write it as procedure separated to steps, as done for example in 120G.5.2, and in other receiver test procedures such as 110.8.4.2.1 through 110.8.4.2.5, or annex 93C.

SuggestedRemedy

A proposal for restructuring will be provided in a presentation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment relates to the module input stressed input test procedure.
Comment #120 proposes similar changes to the host input stressed input test.

The following contribution was reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/ran_3ck_01c_0521.pdf

Implement the changes in ran_3ck_01c_0521 with editorial license.

Cl **120G** *SC* **120G.3.4.1.1** *P* **247** *L* **50** # 131

Ben Artsi, Liav — Marvell Technology

Comment Type **TR** *Comment Status* **A** *CRU description (bucket1)*

Defining a corner frequency for a clock recovery unit (CRU) can be ambiguous due to possible actual implementations of CRU implementations

SuggestedRemedy

Change the definition of a CRU unit with a definition of the effect expected from the CRU. The effect expected is a high frequency filter applied on the jitter of the measured signal. A reference for the wording can be found in 93.8 "The effect of a single-pole high-pass filter with a 3 dB frequency of XMHz is applied to the jitter"

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Change: "A reference CRU with a corner frequency of 4 MHz and slope of 20 dB/decade is used to calibrate the stressed signal using a PRBS13Q pattern."
To: "A reference CRU acting as a high-pass jitter filter with a 3 dB corner frequency of 4 MHz and slope of 20 dB/decade is used to calibrate the stressed signal using a PRBS13Q pattern."
[Editor's note: CC: 162, 120G]

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

Ran, Adee Cisco

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

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

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

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

SuggestedRemedy

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

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

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

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

Response *Response Status* **U**

REJECT.
Resolve using the response to comment #121.

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

Ran, Adee Cisco

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

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

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

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

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

SuggestedRemedy

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

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

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

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

Response *Response Status* **U**

REJECT.
Resolve using the response to comment #119.

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

Mellitz, Richard — Samtec

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

Cl **120G** *SC* **120G.3.4.1.1** *P* **248** *L* **17** # 140

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **T** *Comment Status* **A** *ERL TP*

It says "The ERL of the test system as measured at TP1 meets the specification given in 120G.3.1.2."
120G.3.1.2 measures the host output ERL at TP1a rather than TP1.
Hence, the ERL of the test system is measured at TP1a, not at TP1.

SuggestedRemedy

Change
"The ERL of the test system as measured at TP1 meets the specification given in 120G.3.1.2."

to

"The return loss of the test system at TP1 meets the ERL specification given in 120G.3.1.2 when measured at TP1a."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Also, in Figure 120G-10 and figure 120G-9, the connections of the HCB and module under test to the MCB are incorrect.

Change
"The ERL of the test system as measured at TP1 meets the specification given in 120G.3.1.2."
To
"The test system meets the ERL specification given in 120G.3.1.2 when measured at TP1a."

In Figure 120G-9 connect the dashed line from the HCB TP1a path to the MCB TP1 path and connect the module under test input path to the MCB TP4 path.
In Figure 120G-10 connect the dashed line from the MCB TP4 path to the HCB TP4a path and connect the host under test input path to the HCB TP1a path.
Implement with editorial license.

Cl **120G** *SC* **120G.3.4.1.1** *P* **248** *L* **44** # 125

Ran, Adee Cisco

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

"For the high loss case, pre-emphasis capability is likely to be required in the pattern generator to meet the TP1a eye height and vertical eye closure specifications."

It is not specified what kind of pre-emphasis the pattern generator should include. In presentations to the task force, there were some assumptions about a CR host transmitter (3 precursors and 1 postcursor); it is reasonable to assume similar capabilities for a C2M host output.

Also, it should be explicitly permissible to use pre-emphasis for both high-loss and low-loss cases.

SuggestedRemedy

Delete "For the high-loss case,"

Add after this sentence: "The pattern generator is expected to be able to apply pre-emphasis equivalent to the Transmit equalizer functional model specified in 162.9.3.1. Pre-emphasis may be set separately for the high-loss and low-loss cases".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The intent of the statement is meant as a helpful warning that it may need preemphasis (or as permission to use preemphasis) rather than to specify that preemphasis shall be required and if so how.

There was no consensus to add the additional sentences.
However, the statement should apply to both long and short loss cases.

Change:
For the high loss case, pre-emphasis capability is likely to be required in the pattern generator to meet the TP1a eye height and vertical eye closure specifications.
To:
Pre-emphasis capability is likely to be required in the pattern generator to meet the TP1a eye height and vertical eye closure specifications.

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

Wu, Mau-Lin MediaTek Inc.

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

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

Cl **120G** *SC* **120G.3.4.1.1** *P* **249** *L* **10** # 126

Ran, Adee Cisco

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

Here it is specified that "Random jitter and the pattern generator output levels are adjusted (...) to result in the eye height for all three eyes given in Table 120G–11"

But:

The random jitter level has already been adjusted in a prior step (P248 L15) "such that the output of the pattern generator approximates the output jitter profile given by maximum JRMS and maximum J4u".

Random jitter cannot satisfy both conditions. Adding higher jitter than J4u/JRMS specifications is an overstress (since host output should not have such higher jitter). Unlike low EH, high jitter cannot be compensated by simple Rx circuitry.

Eye height should be adjustable by pattern generator output level (after VEC has been obtained by other means; this is the subject of another comment) but not using random jitter.

SuggestedRemedy

Delete "Random jitter and".

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

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

Dawe, Piers Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

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

Dawe, Piers Nvidia

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

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

SuggestedRemedy

Create separate limits for TP4 short and long output modes.

Response *Response Status* **U**

REJECT.

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

Cl **120G** *SC* **120G.5.2** *P* **252** *L* **16** # 44

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *RR CTLE*

gDC max value may result in very large VEC > 20 dB when module are tuned in the middle of range if plugged into min loss host.

SuggestedRemedy

Suggest reducing gDC from -2 to -1 and see ghiasi_3ck_01_0421

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

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

In Table 120G-12, change TP4 near-end g_DC maximum value from -2 to -1 dB.

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

Dawe, Piers Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

Cl **120G** *SC* **120G.5.2** *P* **252** *L* **32** # 127

Ran, Adee Cisco

Comment Type **T** *Comment Status* **R** *RR CTLE*

The reference receiver parameters fz, fp1, fp2, and gDC create CTLE transfer functions that are not necessarily passive (up to 0 dB across the spectrum) for all combinations.

This is different from the reference receiver used in the previous C2M specification (Annex 120E). Although 120E uses different equation and parameters, the resulting CTLE combinations always have combinations of the parameters Z1 and G that create 0 dB gain at the peaking frequency.

(The reference receiver CTLE in 120E is essentially similar to the one used in the COM method in all CR/KR specifications, in that the peaking is created by varying the zero while keeping the poles constant, with the zero being equal to fp1 for zero peaking; 120E has an addition of a flat gain G to create 0 dB maximum gain; this gain has no effect on COM, but does affect the eye height).

There was no indication or claim that the CTLE in this annex has better performance or better matches real designs than a CTLE similar to Annex 120E (with different peaking frequency). In fact, with the addition of a DFE to the reference receiver, a CTLE similar to the one in Annex 120F (C2C) may be more adequate, as the equalization at Nyquist frequency can utilize the DFE.

It is suggested to modify the reference receiver transfer functions to be similar to those of 120E. This requires a minor change in the definition of the CTLE in Annex 93A (COM).

SuggestedRemedy

Bring 93A.1.4.3 (Receiver equalizer) into the draft, and change Equation 93A–22 to include an additional factor G. Add a description of G below the equation:

"where G is a gain factor, whose value depends of the variable norm_ctle as follows:

- If norm_ctle is 1, G is set based on g_DC, f_z, g_DC2, f_LF, f_p1, and fp2, such that the maximum of H_ctf(f) across f is equal to 1.
- If norm_ctle is 0 or is not provided by the clause that invokes this method, G is set to 1."

In Table 120G–12, change the values of f_z and f_p1 to f_b/2.5, change the value of f_p2 to f_b, and add the parameter norm_ctle with value 1.

A presentation with the effect of the proposed change will be provided.

Response *Response Status* **C**

REJECT.

[Editor's note: Straw poll information was added 2021/5/25.]

The following related presentation was reviewed by the task force at a previous ad hoc meeting:
https://www.ieee802.org/3/ck/public/adhoc/apr21_21/ran_3ck_adhoc_01_042121.pdf

A straw poll relating to this proposal is reproduced here:
Straw Poll #1 (April 21 ad hoc meeting)
For the reference CTLE of Annex 120G (choose one):
A. I would support the proposed change if it does not degrade VEC/EH compared to the current parameters.
B. I would support the proposed change if it improves VEC/EH compared to the current parameters, and change the max VEC / min EH accordingly.
C. I am interested in the proposed change but some modifications are required.
D. I would not support the proposed change (even with modifications).
E. I need more information.
F. I don't have an opinion.
Results: A: 3 , B: 3 , C: 3 , D: 12 , E: 10 , F: 8

The comment does not provide sufficient evidence to make the proposed changes. All of the simulations and related specifications thus far have been based upon the current CTLE pole-zero and gain parameters. Any changes to these parameters would require all related specifications to be revisited.

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

Dawe, Piers Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

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

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

Cl **135** *SC* **135.1.4** *P* **109** *L* **15** # 103

Ran, Adee — Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

In Figure 135-2, in "PMA (4:n)" the letter "n" is not italicized (it is italic everywhere else).

Also, in "PMA (n:p)", "n" is italic but "p" is not (but p is italic in the legend).

Also applies to Figure 120A–8 in 120A.5 where p and n are used but not italicized.

SuggestedRemedy

Change the format of the "n" and "p" to italic, across both figures.

Response *Response Status* **C**

ACCEPT.

Cl **135** *SC* **135.1.4** *P* **109** *L* **27** # 104

Ran, Adee — Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

The term "PHY" does not appear in the new Figure 135-2, so it is not required in the legend.

SuggestedRemedy

Delete "PHY = PHYSICAL LAYER DEVICE".

Response *Response Status* **C**

ACCEPT.

Cl **135** *SC* **135.7.3** *P* **113** *L* **6** # 105

Ran, Adee — Cisco

Comment Type **TR** *Comment Status* **A** *(bucket1)*

PICS item NLA in 802.3cd has only the options 2, 4, or N/A for 100G. This project adds 100GAUI-1 for which the value should be 1.

SuggestedRemedy

Bring in item NLA and add 1 as an optional value.

Response *Response Status* **W**

ACCEPT.

Cl **136** *SC* **136.8.11** *P* **115** *L* **29** # 24

Marris, Arthur — Cadence Design Systems

Comment Type **TR** *Comment Status* **R** *control function (bucket1)*

Need to point out that the Clause 136 control function is not just for 50G lane PMDs

SuggestedRemedy

Add the following extra paragraph to the end of 136.8.11:
“The PMD control function specified in this clause is not only used by 50 Gb/s per lane PMDs, but also by other PMDs, such as the 100 Gb/s per lane PMDs specified in Clause 162.”

Response *Response Status* **W**

REJECT.
By precedent, many subclauses for one PMD are reused or recycled by clauses for other concurrent or later PMDs without any reference to those other clauses. The control function defined in 802.3cd-2018 Clause 136 (CR) does not point out that it is also used by Clause 137 (KR). Clause 162 and Clause 163 do not technically use Clause 136 control function but rather define a new control function with the Clause 136 control function as a starting point and modified with exceptions.

Cl **136** *SC* **136.8.11.7.2** *P* **116** *L* **10** # 106

Ran, Adee — Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

Missing space after "=".

SuggestedRemedy

Insert space.

Response *Response Status* **C**

ACCEPT.

Cl **136** *SC* **136.8.11.7.2** *P* **117** *L* **37** # 128

Law, David HPE

Comment Type **T** *Comment Status* **A** *(bucket1)*

The action 'start_holdoff_timer' in the QUIET state should read 'start holdoff_timer', that is the underscore between start and holdoff_timer should be a space. See timer conventions in 14.2.3.2 and 'start holdoff_timer' in TIMEOUT state.

SuggestedRemedy

Change 'start_holdoff_timer' to read 'start holdoff_timer'.

Response *Response Status* **C**

ACCEPT.

Cl **136** *SC* **136.8.11.7.3** *P* **116** *L* **14** # 107

Ran, Adee Cisco

Comment Type **TR** *Comment Status* **A** *(bucket1)*

In the base document (802.3cd), 136.8.11.7.3 defines holdoff_timer as being started only when entering the TIMEOUT state.

In this project we added a holdoff_timer also when entering QUIET.

SuggestedRemedy

Bring in 136.8.11.7.3 and insert "or the QUIET state" after "the TIMEOUT state".

Response *Response Status* **W**

ACCEPT.

Cl **136** *SC* **136.9** *P* **118** *L* **1** # 108

Ran, Adee Cisco

Comment Type **ER** *Comment Status* **A** *(bucket1)*

The table to be modified is in 136.14.4.1 "PMD functional specifications", so the current subclause numbering is incorrect.

SuggestedRemedy

Change the 1st-level subclause number from 9 to 14, including the editorial instruction.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Change subclause number 136.9 to 136.14 and update the editorial instruction appropriately.

Cl **152** *SC* **152.6.2a** *P* **119** *L* **29** # 109

Ran, Adee Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

in 802.3 the word "sublayer" is conventionally used with no hyphen.

SuggestedRemedy

change "sub-layer" to "sublayer".

Response *Response Status* **C**

ACCEPT.

Cl **161** *SC* **161.5.2.6** *P* **122** *L* **52** # 162

Zimmerman, George — CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **TR** *Comment Status* **A** *(bucket1)*

"The alignment markers shall be mapped to am_txmapped<1284:0> in a manner that yields the same result as the following process." Where the process begins and ends isn't really clear in the text since the text just runs in paragraphs of descriptive text intermingled with the text and multiple sets of either pseudocode or alphabetic steps. I THINK it ends at P 123 line 38, but that was only after first thinking it ended at other places a few times. This section is technically quite important and needs to be crystal clear, hence my comment is technical, as it is currently not clear to those outside the group.

Descriptive, non-process text should be set out, and the process itself should be either all in steps or all in pseudocode, and set out by its own section. (in my remedy I have used the existing text and put it all in text).
Being a little confused by the text, take caution, as I may have gotten it wrong in my proposed remedy.

SuggestedRemedy

Change "same result as the following process" to "same result as the process in 161.5.2.6.1." Insert new section "161.5.2.6.1 Alignment Marker Mapping Process" following line 54, with content from page 123 lines 1 through 10, and add step e) using text from page 123 lines 18 through 21, and step f) using the text at lines 23 ("The variable am_txmapped...) through line 33. Add step g) with text at page 123 lines 34 through 38.

Move descriptive (and non-process requirement) text at page 123 lines 12-17 and page 123 lines 39 -page 124 line 46 (end of the existing section) ahead of the new section with just the process.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

[Editor's note: Proposed response updated on 2021/5/5.]

After some offline discussion and further review, the commenter indicated that the description is clear as is.

However, it was noticed that the wrong variable is being referenced in the text. The variable name should be tx_scrambled_am rather than am_txmapped. In addition, it would be clearer if we referred to a set of processes in the clause instead of a single process.

Change:"The alignment markers shall be mapped to am_txmapped<1284:0> in a manner that yields the same result as the following process."
To: "The alignment markers shall be mapped to tx_scrambled_am<1284:0> in a manner that yields the same result as the processes described in the remainder of this subclause."

Cl **161** *SC* **161.5.2.6** *P* **123** *L* **41** # 73

Wienckowski, Natalie — General Motors

Comment Type **T** *Comment Status* **A** *(bucket2)*

I believe there is a typo as it doesn't make sense to transmit PCS lane 0 on both FEC lanes 0 and 1. The second "0" should be "1" on FEC lane 1. This change also makes it match with Figure 161-3.

SuggestedRemedy

Change: the alignment marker payloads corresponding to PCS lanes 0, 5, 9, 13, and 17 are transmitted on FEC lane 1,
To: the alignment marker payloads corresponding to PCS lanes 1, 5, 9, 13, and 17 are transmitted on FEC lane 1,

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
A large portion of the alignment marker payloads are repeated as described in the variable mapping in subclause 161.5.2.6, but not all; for example the BIP fields are not repeated across the lanes. So the statement in Draft 2.0 is not correct as currently written.
Make the following changes to simplify the text and remove the incorrect statement.
Change:
"The result of the alignment marker mapping function is a deterministic mapping between alignment marker payloads and FEC lanes. The alignment marker payloads corresponding to PCS lanes 0, 4, 8, 12, and 16 are transmitted on FEC lane 0, the alignment marker payloads corresponding to PCS lanes 0, 5, 9, 13, and 17 are transmitted on FEC lane 1, and so on (see Figure 161–3)."
To:
"The result of the alignment marker mapping function is a deterministic mapping between alignment marker payloads and FEC lanes (see Figure 161–3)."

Cl **161** *SC* **161.5.2.6** *P* **123** *L* **41** # 85

Huber, Tom — Nokia

Comment Type **T** *Comment Status* **A** *(bucket2)*

Incorrect list of PCS lanes for FEC lane 1: 0, 5, 9, 13, and 17

SuggestedRemedy

Change 0 to 1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #73.

Cl **161** *SC* **161.5.2.9** *P* **125** *L* **8** # 163

Zimmerman, George CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **E** *Comment Status* **A** *(bucket1)*

"has been FEC encoded, two FEC codewords… each FEC lane… Once the data has been Reed-Solomon encoded and interleaved… FEC lanes… highest FEC lane." - use consistent nomenclature. You go from FEC, to Reed-Solomon, and as much as I love to remember Gus Solomon by name, it suggests there may be 2 different things youre talking about here.
I didn't name it in my remedy, but the editor may wish to review instances of FEC where RS-FEC is meant to be clear - the same thing shows up in 161.5.3.1, 161.5.3.2, and 161.5.3.3. (note RS-FEC is an abbreviation in 802.3-2018 for Reed-Solomon Forward Error Correction)

SuggestedRemedy

Suggest replace instances on lines 8 through 22 of "FEC" with "RS-FEC", and "Reed-Solomon encoded" on line 21 with "RS-FEC encoded".
Additionally suggest editor review usage of "FEC" for possible replacement with RS-FEC elsewhere in clause 161 (I note this doesn't look globally feasible)

Response *Response Status* **C**

ACCEPT.

Cl **161** *SC* **161.5.3.3** *P* **127** *L* **31** # 164

Zimmerman, George CME Consulting/ADI, APL Gp, Cisco, CommScope,

Comment Type **T** *Comment Status* **A** *(bucket1)*

"The probability that the decoder fails to indicate a codeword with t+1 errors as uncorrected is
not expected to exceed 10–16." This statement is not technically correct without reference to an underlying raw symbol error rate. The probability of a failed decode can be anything if the raw symbol error rate is left unpinned. Since this subclause stands alone and could be reused with different PHYs in different scenarios, it isn't appropriate to pin the raw SER. Additionally, the descriptive sentence is unnecessary.

SuggestedRemedy

Delete the last two sentences of the 2nd paragraph of 161.5.3.3 ("The probability…").

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The symbol error rate of the system dictates the rate at which a codeword with t+1 or more errors occur. The last two sentences constrain the behavior of the decoder when a codeword with t+1 or more errors is seen.
Change:
The probability that the decoder fails to indicate a codeword with t+1 errors as uncorrected is not expected to exceed 10–16. This limit is also expected to apply for t+2 errors, t+3 errors, and so on.
To:
The probability that the decoder fails to indicate a codeword as uncorrected, given t+1 or more errors, is not expected to exceed 10–16.

Cl **162** *SC* **162.1** *P* **140** *L* **7** # 238

Zhang, Bo Inphi

Comment Type **E** *Comment Status* **R** *wording (bucket1)*

When -CRx interfaces are first introduced in the overview section of clause 162. It's not clear the definition is properly referenced.

SuggestedRemedy

Suggest provide linkage of the definition of -CRx with -CRx interfaces when they are first introduced.

Response *Response Status* **C**

REJECT.
It is not clear what the comment is concerned with. The nomenclature used here is consistent with other PMD clauses.

Cl **162** *SC* **162.1** *P* **140** *L* **13** # 154

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **A** *wording (bucket1)*

Annex 162D is the only description that restates the PMD. CR1, CR2, and CR4 seem to already be implied.

SuggestedRemedy

Remove "100GBASE-CR1, 200GBASE-CR2, and 400GBASE-CR4" which would leave "Annex 162D describes host and cable assembly types."

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.1** *P* **140** *L* **26** # 99

Kabra, Lokesh Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Typo-error for Clause number corresponding to RS/CGMII functions

SuggestedRemedy

Correct Clause number to "81" instead of "80" in row 1 and row 2 of Table 162-1

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.1** *P* **140** *L* **31** # 155

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **D** *withdrawn*

I may just be confused, but seems odd that both RS-FEC and RS-FEC-Int are required, but the Inverse RS-FEC is optional, however required to convert between the other 2 required interfaces.

SuggestedRemedy

Make Inverse RS-FEC required

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.1** *P* **141** *L* **23** # 176

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **R** *PMD tables (bucket1)*

Tables 162-2 and 162-3 are essentially the same, and it benefits the reader to see that.

SuggestedRemedy

Combine into one table with columns for clause/annex no., description for 200G, description for 400G, and required/optional status. Similarly for tables 163-2 and 3.

Response *Response Status* **C**

REJECT.
Combining the two tables results in a less readable format since for most sublayers there is a unique row for each rate. Only RS and AN rows are common to both. The suggested remedy does not improve the quality of the draft.
[Editor's note: CC: 162, 163]

Cl **162** *SC* **162.1** *P* **142** *L* **41** # 156

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

MAC = MEDIA ACCESS CONTROL is listed twice in the key.

SuggestedRemedy

Remove 1 of the MAC definitions

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.3** *P* **143** *L* **43** # 143

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **D** *withdrawn*

The PMD does not reside ON the MDI.

SuggestedRemedy

Change "on" to "for"

Resulting text would read "The PMD converts these streams of symbols into appropriate signals for the MDI."

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.7** *P* **146** *L* **28** # 193

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **A** *(bucket1)*

Draft should be consistent format for the PMD control and status registers.

SuggestedRemedy

Delete the "to" to match table 162-5.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.7** *P* **147** *L* **34** # 192

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **A** *(bucket1)*

Improve English

SuggestedRemedy

change "provide" to "provided"

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.8.11** *P* **151** *L* **24** # 144

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **R** *control function (bucket1)*

Current text: "The terminal count of max_wait_timer as specified in 136.8.11.7.3 is 12s." Given a value is specified within the clause/statement makes the phrase "specified in 136[. . .]" incorrect.

SuggestedRemedy

Change "specified" to "defined" or "described"
This is a semi-pervasive issue.

Response *Response Status* **C**

REJECT.
Clause 162 is specifying a value that is different from the value specified in Clause 136.

Cl **162** *SC* **162.9.3** *P* **154** *L* **7** # 23

Brown, Matt Huawei

Comment Type **T** *Comment Status* **A** *unit interval (bucket3)*

In Table 162-10, the nominal unit interval is specified. This seems unecessary and redundant (since it can easily be derived from the nominal signaling rate). It is not specified for KR, C2C, or C2C. For consistency with sister Clauses/Annexes, this specification should be removed.

SuggestedRemedy

In Table 162-10, remove row specifying the "Unit interval (nominal)".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In addition to the justifications provided in the comment, Table 162-10 provides normative specifications for the CR transmitter. The unit interval (nominal) specification is informative and thus does not belong in this table.

Implement the suggested remedy.

Cl **162** *SC* **162.9.3** *P* **154** *L* **21** # 167

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **A** *TX vf*

Clumsy "x vf" way of defining linear fit pulse peak (min)

SuggestedRemedy

Use "Linear fit pulse peak ratio" as in 163 and 163A.3.2.1. Note the unit in the table changes to V/V.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy with editorial license.

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

Dawe, Piers Nvidia

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

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

SuggestedRemedy

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

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

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

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

Response *Response Status* **U**

REJECT.

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

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

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

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

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

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

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

Cl **162** *SC* **162.9.3.1** *P* **155** *L* **31** # 194

Dudek, Mike Marvell

Comment Type **T** *Comment Status* **A** *(bucket1)*

There are now five preset conditions

SuggestedRemedy

Change "three" to "five"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment 136.

Cl **162** *SC* **162.9.3.1** *P* **155** *L* **31** # 136

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **T** *Comment Status* **A** *(bucket1)*

The number of initial conditions was increased from three to five.

SuggestedRemedy

Change "three initial conditions" to "five initial conditions".

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.3.1.1** *P* **155** *L* **47** # 145

Kochuparambil, Beth — Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

"M should be an integer not less than 32"
May be easier for the reader to avoid the double negative.

SuggestedRemedy

Change "not less than"
to "greater than or equal to"

Response *Response Status* **C**

ACCEPT.
[Editor's note: Change page from 154 to 155.]

Cl **162** *SC* **162.9.3.1.1** *P* **155** *L* **44** # 132

Ben Artsi, Liav — Marvell Technology

Comment Type **TR** *Comment Status* **A** *CRU description (bucket1)*

Defining a corner frequency for a clock recovery unit (CRU) can be ambiguous due to possible actual implementations of CRU implementations

SuggestedRemedy

Change the definition of a CRU unit with a definition of the effect expected from the CRU. The effect expected is a high frequency filter applied on the jitter of the measured signal. A reference for the wording can be found in 93.8 "The effect of a single-pole high-pass filter with a 3 dB frequency of XMHz is applied to the jitter"

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment 129.
[Editor's note: This appears to be a duplicate of comment 129.]

Cl **162** *SC* **162.9.3.1.1** *P* **155** *L* **44** # 129

Ben Artsi, Liav — Marvell Technology

Comment Type **TR** *Comment Status* **A** *CRU description (bucket1)*

Defining a corner frequency for a clock recovery unit (CRU) can be ambiguous due to possible actual implementations of CRU implementations

SuggestedRemedy

Change the definition of a CRU unit with a definition of the effect expected from the CRU. The effect expected is a high frequency filter applied on the jitter of the measured signal. A reference for the wording can be found in 93.8 "The effect of a single-pole high-pass filter with a 3 dB frequency of XMHz is applied to the jitter"

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Change "A reference CRU with a corner frequency of 4 MHz and slope of 20 dB/decade is used to calibrate the stressed signal using a PRBS13Q pattern." to "A reference CRU acting as a high-pass jitter filter with a high-pass 3 dB corner frequency of 4 MHz and slope of 20 dB/decade is used to calibrate the stressed signal using a PRBS13Q pattern."
[Editor's note: CC: 162, 120G]

Cl **162** *SC* **162.9.3.1.3** *P* **157** *L* **6** # 146

Kochuparambil, Beth — Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

Initial is capitalized mid sentence, however is lower case in Table 162-11's title.

SuggestedRemedy

Make "Initial" lower case

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.3.4** *P* **158** *L* **34** # 236

Li, Mike — Intel

Comment Type **TR** *Comment Status* **A** *PRBS9Q*

PRBS9Q pattern definition is incomplete, and PRBS9Q symbol transition definition for EOJ measurement is missing.

SuggestedRemedy

1.) change "PRBS9Q is defined in a similar way to
PRBS13Q (see 120.5.11.2.1) except that the polynomial in Table 68-6 is used instead of the polynomial
in Equation 94-3." to "PRBS9Q is defined in 162.9.3.4.1, a similar way to
PRBS13Q (see 120.5.11.2.1), except that the polynomial in Table 68-6 is used instead of the polynomial
in Equation 94-3."; 2.) Add a new sentence of "The symbol transition definition for jitter measurement and even-odd jitter calculation with PRBS9Q is provided in 162.9.3.4.1; 3.) Create a new section 162.9.3.4.1 entiled "EOJ measuement with PRBS9Q", with contents from slides 5, 6 of li_3ck_01_0521

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment #133 proposes an alternate set of transition locations.
Resolve using the response to comment #133.

Cl **162** *SC* **162.9.3.4** *P* **158** *L* **34** # 141

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **A** *PRBS9Q*

A detail definition of PRBS9Q with the entire sequence is recommended to avoid implementation errors.

This is re-submission of my comment #109 to draft D1.4.

SuggestedRemedy

Define PRBS9Q as a new clause in clause 120.5.11.2 using clause 120.5.11.2.1 as a template.

In the new clause, modify the second paragraph of the template (120.5.11.2.1) as follows:

When the PRBS9Q test pattern enabled, it replaces the signal on the output lane(s) for which it is enabled. The PRBS9Q test pattern is a repeating 511-symbol sequence formed by Gray coding pairs of bits from two repetitions of the PRBS9 pattern into PAM4 symbols as described in 120.5.7. The PRBS pattern generator produces the same result as the implementation shown in Figure XX–X, which implements the generator polynomial shown in Equation (YY–Y). Since the PRBS9 pattern is an odd number of bits in length, bits which are mapped as the first bit of a PAM4 symbol during one repetition of the PRBS9 sequence are mapped as the second bit of a PAM4 symbol during the next repetition of the PRBS9 sequence, and bits which are mapped as the second bit of a PAM4 symbol are mapped as the first bit of the following symbol in the next repetition of the PRBS9 sequence. For example, if the PRBS9 generator used to create the PRBS9Q sequence is initialized to a seed value of 111111111 (with the leftmost bit in S0 and the rightmost in S8), the PRBS9Q sequence is the following Gray coded PAM4 symbols, transmitted left to right:
00123223032313100103312133022022313201110302302133323031303030 00
10030200312033320021233132310110033210222131031132220313331313 00
02013110133112221011302332032022012212100133213232001133223333 30
01103322032323001202331022112110103013120032213202100232200222 23
00221220112020300311023210123122021303331012013211120102010100 00
30101301023111130132210212030330111331223203103212231021102020 00
13020330210322233032012113113123022323300211321213003211221111 00
03311123112120002312103123323330310020230112321313301212301222 2.

Draw Figure XX-X "PRBS9 pattern generator" similar to Figure 94-6 but according to polynomial 1 + x^5 + x^9.

Define Equation (YY-Y) as G(x) = 1 + x^5 + x^9 or make a reference to the polynomial in Table 68-6.

Make a reference to the new clause from 162.9.3.4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.
Create an equation for the polynomial but include text referring back to Clause 68.

Cl **162** *SC* **162.9.3.4** *P* **158** *L* **34** # 133

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **A** *PRBS9Q*

A detail definition of twelve edges in PRBS9Q is recommended to improve reproducibility of even-odd jitter measurement.

This is re-submission of my comment #110 to draft D1.4.

SuggestedRemedy

Add a new table "PRBS9Q pattern symbols used for even-odd jitter measurements" similar to Table 120D-4, but replacing the values as follows:

Label: Description : Gray coded PAM4 symbol : first : TR begins : TR ends : last
REF : Reference : 33333 : 1 : - : - : 5
R03 : 0 to 3 rise : 1000 331 : 260 : 263 : 264 : 266
F30 : 3 to 0 fall : 233333 001 : 511 : 5 : 6 : 8
R12 : 1 to 2 rise : 3111 23 : 265 : 268 : 269 : 270
F21 : 2 to 1 fall : 1222 10 : 466 : 469 : 470 : 471
R01 : 0 to 1 rise : 2000 13 : 195 : 198 : 199 : 200
F10 : 1 t0 0 fall : 21111 0003 : 256 : 260 : 261 : 264
R23 : 2 to 3 rise : 3222 330 : 210 : 213 : 214 : 216
F32 : 3 to 2 fall : 0333 20 : 401 : 404 : 405 : 406
R02 : 0 to 2 rise : 2000 23 : 275 : 278 : 279 : 280
F20 : 2 to 0 fall : 12222 001 : 321 : 325 : 326 : 328
R13 : 1 to 3 rise : 0111 331 : 166 : 169 : 170 : 172
F31 : 3 to 1 fall : 0333 10 : 107 : 110 : 111 : 112

Add an exception to use the new table instead of Table 120D-4, when PRBS9Q is used as the test pattern for even-odd jitter measurement.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment #236 proposes an alternate set of transition locations.
The following presentations were reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/li_3ck_01b_0521.pdf
https://www.ieee802.org/3/ck/public/21_05/zivny_3ck_01b_0521.pdf
After running straw poll #1, there were no objections to adopting the suggested remedy in comment #236 including li_3ck_01b_0521.
With editorial license implement the suggested remedy of comment #236 and presentation li_3ck_01b_0521.
Straw poll #1 (direction)
I support addressing comments #133 and #236 using:
A. The suggested remedy for comment #133 (Yasuo Hidaka).
B. The suggested remedy for comment #236 (Mike Li).
C. Need more information.
A: 9 B: 10 C: 9
Pick one.

Cl **162** *SC* **162.9.3.4** *P* **158** *L* **38** # 130

Ben Artsi, Liav — Marvell Technology

Comment Type **TR** *Comment Status* **R** *CRU description (bucket1)*

Defining a corner frequency for a clock recovery unit (CRU) can be ambiguous due to possible actual implementations of CRU implementations

SuggestedRemedy

Change the definition of a CRU unit with a definition of the effect expected from the CRU. The effect expected is a high frequency filter applied on the jitter of the measured signal. A reference for the wording can be found in 93.8 "The effect of a single-pole high-pass filter with a 3 dB frequency of XMHz is applied to the jitter"

Response *Response Status* **U**

REJECT.
The detailed description of the CRU is provided in 120D.3.1.8.2. This exception merely suggests changing the value of that corner frequency. So no further detailed description is required here.

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

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

The suggested remedy does not provide sufficient detail to implement.

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

Cl **162** *SC* **162.9.3.5** *P* **158** *L* **46** # 147

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **R** *(bucket1)*

Sentence is poor english

SuggestedRemedy

Change "Parameters that do not appear in Table 162-12 take values from Table 162-18."
to " Take parameter values that do not appear in Table 162-12 from Table 162-18."

Do the same for
162.9.4.5, pg 164, ln 40 and 162.11.3, pg 167, ln 26
163.9.2.1.2, 163.9.2.2, 163.9.3.2
163.10.3
120F.3.1.1, 120F.3.2.1, 120F.4.3
162B.1.3.2

Response *Response Status* **C**

REJECT.
The suggested remedy does not improve the quality of the draft.

Cl **162** *SC* **162.9.3.5** *P* **159** *L* **13** # 184

Dudek, Mike Marvell

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

Investigations of the effect of the Time-gated propagation delay on practical HCB's has shown that the input RF connector is affecting the ERL unless the 200 ps is increased to approx 300ps. 300ps is still adequately short to not affect the measurement of the device under test. i.e. The value used for Tfx does not sufficiently mitigate the effects of reflections from the test connector. See dudek_3ck_adhoc_01a_041421

SuggestedRemedy

Change the value from 0.2ns to 0.3ns. Also on page 167 line 44.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.3.6** *P* **159** *L* **18** # 169

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **A** *RLCC description*

1. This paragraph claims that the minimum common-mode to common-mode return loss is specified to reduce reflections of signals that were generated originally as differential and end up as differential. This is not the case: it is included to contain a gross build-up of CM voltage on the line caused by repeated reflections, that is otherwise unbounded.
If it had been intended to address mixed-mode issues it would be a tighter spec, but that's not viable for front-panel connectors. Other specs such as Rx Differential to common-mode return loss and Tx Common-mode to differential mode return loss (both 12 dB at Nyquist, total 24) and Differential to common-mode cable assembly conversion loss (10 dB each way) are there to address the mixed-mode issues, and this spec at only 2 dB won't make much difference to them.
2. This is a standard, not an attempt at a textbook. We don't give any justifications for most other specs; there is no reason that this one should be different.

SuggestedRemedy

Delete the paragraph

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment 148.
[Editor's note: Changed page/line from 157/30 to 159/18.]

Cl **162** *SC* **162.9.3.6** *P* **159** *L* **18** # 148

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **A** *RLCC description*

Description may or may not be helpful for those reading the standard. I do, however, note that previous clauses (examples are 92.10.6 and 110.10.6) do NOT describe why we limit CM return loss, but instead just define the limit. Perhaps this description of the re-reflections concept is helpful to readers, it was somewhat confusing until reading it multiple times.

SuggestedRemedy

Remove the first paragraph of this section. "Common-mode signals can be returned [. . .] To reduce this effect, a minimum common-mode to common-mode return loss is specified."

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.4.1** *P* **161** *L* **4** # 137

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **T** *Comment Status* **A** *RX signalling rate (CC)*

The signalling-rate tolerance of transmitter was changed from 100ppm to 50ppm according to comment #42 on D1.3. However, the signaling-rate tolerance of receiver remained 100ppm. It is not clear whether it was an overlooked error or it remained 100ppm on purpose for compatibility with prior implementations with up to +/- 100ppm.

SuggestedRemedy

Add the following statement:

Note that the tolerance of signaling rate of transmitter is +/- 50ppm. The tolerance of signaling rate of receiver is +/- 100ppm for compatibility with prior transmitter implementations with up to +/- 100ppm tolerance.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The signaling rate range for a transmitter is +/-50 ppm only for specific circumstances (e.g., the PMD transmitter is colocated with the PCS), otherwise it is 100 ppm. This allows for AUI transmitter specifications in the base standard and amendments (e.g., 100GAUI-4). However, an informative note may be helpful to the reader of this draft.
Add the following informative note:
"Note—Although the PMD transmitter is specified with a signaling rate range of +/-50 ppm when in the same package as the PCS sublayer, the signaling rate range may be +/- 100 ppm, when derived from an intermediate interface (e.g., 100GAUI-4)."
With editorial license, apply a similar note in Clause 163.
[Editor's note: CC: 162, 163.]

Cl **162** *SC* **162.9.4.1** *P* **161** *L* **4** # 8

Brown, Matt — Huawei

Comment Type **T** *Comment Status* **D** *nominal UI*

Specification of the nominal unit interval is unnecessary and redundant (since it can easily be derived from the nominal signaling rate). It is not specified for KR, C2C, or C2M. For consistency with sister Clauses/Annexes, this specification should be removed.

SuggestedRemedy

Delete the sentence "This translates to a nominal unit interval of 18.82353 ps."

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162** *SC* **162.9.4.3** *P* **161** *L* **36** # 33

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *RIT channel*

Table 162-14 references table 110-8 and figure 110-3b, but unlike CL 110 for the case of low loss channel Test 1 frequency dependent attenuator is zero because the loss of cable assembly=test chanel loss

SuggestedRemedy

If the low loss channel also include frequency dependent attenuator then please increase loss by 4.75 dB, if the intention was to not include frequncy dependent attenuator then a note would be helpful

Response *Response Status* **C**

REJECT.

The frequency-dependent attenuator is excluded from the test channel used for Test 1 in order to create the minimum loss channel with a compliant cable.

Cl **162** *SC* **162.9.4.3.3** *P* **162** *L* **26** # 139

Hidaka, Yasuo — Credo Semiconductor, Inc.

Comment Type **T** *Comment Status* **A** *RIT transition time*

In 120E.3.1.5, transition time is measured with 33GHz BT4 filter.

SuggestedRemedy

Change "T_r is measured using the method in 120E.3.1.5 with the transmit equalizer turned off
(i.e., coefficients set to the preset 1 values, see 162.9.3.1.3)."
to
"T_r is measured using the method in 120E.3.1.5 with the transmit equalizer turned off (i.e., coefficients set to the preset 1 values, see 162.9.3.1.3) with an exception that the waveform is observed through a fourth-order Bessel-Thomson low-pass response with a 3 dB bandwidth of 40 GHz.."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested response with editorial license.
[Editor's note: changed subclause from 162.9.4.3 to 162.9.4.3.3.]

Cl **162** *SC* **162.9.4.3.2** *P* **162** *L* **4** # 195

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *RIT channel*

An extra exception is needed for the test channel loss.

SuggestedRemedy

Change to "The test channel is the same as the one defined in 110.8.4.2.2, except that the cable assembly meets the requirements of 162.11, the test channel loss meets the requirements of table 162-14 and the cable assembly test fixture meets the requirements of 162B.1.2."

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.4.3.3** *P* **162** *L* **18** # 196

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *(bucket2)*

There are no mofications to COM paramters in Table 162-14.

SuggestedRemedy

Delete this bullet. (Note that if this is done then step f on page 162 line 20 will become step e).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: This response was updated on 2021/5/18.]

Delete item "b)" and renumber the list items appropriately.

Cl **162** *SC* **162.9.4.3.3** *P* **162** *L* **36** # 228

Wu, Mau-Lin — MediaTek Inc.

Comment Type **TR** *Comment Status* **A** *RIT SNDR*

For the calculation of SNDR measured at the Tx test reference, the linear fit in 120D.3.1.3 is performed with a pulse length (N_p) of 15 UI. The pulse length (N_p) shall be long enough to cover all 'linear response', such as reflection due to package length.In this case, the calculated SNDR includes nonlinearity only, instead of the far-away 'linear' reflection. The 15 UI spec here is the same as 50GBASE-CR, which is not reasonable for 100GBASE-CR1. We shall need a larger value of N_p here.
In 'li_3ck_01_1020', the authors proposed to consider TX + RX EQ capability to decide N_p value. In that contribution, N_p = 29 was proposed for Clause 163. I found no clues why we have different N_p value for Clause 162, since their TX + RX EQ capability are similar.

SuggestedRemedy

By considering the pulse length to at least cover reflection due to package trace length, whose maximum value is 31 mm. By considering the dielectrics constant, D_k, as in the range of 3.5 ~ 4.0, the location of reflection due to 31 mm trace length is around 22 ~ 24 taps after main cursor. Therefore, adopt N_p = 29 as Clause 163 seems reasonable. Proposed to N_p value from 15 to 29.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #197.

Cl **162** *SC* **162.9.4.3.3** *P* **162** *L* **36** # 197

Dudek, Mike — Marvell

Comment Type **TR** *Comment Status* **A** *RIT SNDR*

SNDR should be measured as appropriate for this clause not as for C2C at 25G.

SuggestedRemedy

Change "SNDR is measured at the Tx test reference using the procedure in 120D.3.1.6, with the exception that the linear fit in120D.3.1.3 is performed with a pulse length (Np) of 15 UI." to "SNDR is measured at the Tx test reference using the procedure in 162.9.3.3"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation, supporting comment #228, was reviewed by the task force: https://www.ieee802.org/3/ck/public/21_05/wu_3ck_01a_0521.pdf

The reference to 162.9.3.3 as proposed in the suggested remedy would effectively change the Np value to 200.

Comment #228 proposes that the Np value should be 29.

With editorial license, implement the suggested remedy and set the value of Np to 29.

Cl **162** *SC* **162.9.4.3.3** *P* **162** *L* **42** # 198

Dudek, Mike — Marvell

Comment Type **E** *Comment Status* **A** *(bucket1)*

93A.1.2.1 and 93A.1.2.4 have been brought into this amendment.

SuggestedRemedy

Make these references standard hot links.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.4.3.3** *P* **163** *L* **6** # 209

Healey, Adam — Broadcom Inc.

Comment Type **TR** *Comment Status* **A** *RIT jitter (CC)*

For values of J3u/Jrms where the condition stated in NOTE 1 is satisfied, The Q3 value should be derived from 10^(-3) and not 10^(-3)/2. The A_DD and sigma_RJ derived for the given value of Q3 will correspond to a dual-Dirac distribution with a smaller value of J3u than what is measured from the pattern generator. The calibrated interference amplitude (based on COM) will in turn be somewhat higher resulting in a level of overstress. This issue has been pointed out in <https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf>.

SuggestedRemedy

Change the value of Q3 to 3.0902. Change NOTE 1 to begin "Q3 is an approximated solution of Q(Q3) = 10^(-3), where…". Make a similar change to 163.9.3.4 (page 192, line 14). In 120F.3.2.3 (page 224, line 2), note that Q4 (an approximated solution of Q(Q4) = 10^(-4)) is 3.719 as an exception to the use of Equation (120D–10) and Equation (120D–11).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentations were reviewed by the task force:
https://www.ieee802.org/3/ck/public/adhoc/apr14_21/hidaka_3ck_adhoc_01_041421.pdf.
https://www.ieee802.org/3/ck/public/21_05/li_3ck_02c_0521.pdf

[Editor's note: CC: 162, 163, 120F]

Implement the suggested remedy with editorial license with the exception to change the variable names Q3 to Q3d and Q4 to Q4d.

It was noted that some explanation of this approach might be helpful. Further work is encouraged in this regard.

Straw Poll #4 (Chicago rules)
Straw Poll #5 (Pick one)
For calculation COM parameters A_DD and sigma_RJ I would support adopting the method as follows:
A: per suggested remedy in comment #209 (Adam Healey)
B: per suggested remedy in comments #134 and #135 and hidaka_3ck_adhoc_01_041421 (Yasuo Hidaka)
C: hybrid approach proposed in li_3ck_02c_0521 (Mike Li et al)
D: Need more information
E: No changes.
#4: A: 25 B: 19 C: 15 D: 11 E: 3
#5: A: 15 B: 12 C: 3 D: 7 E: 1

Cl **162** *SC* **162.9.4.3.4** *P* **163** *L* **23** # 207

Healey, Adam Broadcom Inc.

Comment Type **TR** *Comment Status* **A** *RIT noise*

The spectrum of the broadband noise that is added at the pattern generator output is undefined. Since noise injected at the pattern generator output is filtered by the channel, "broadband" noise will be low-pass filtered at the input to the receiver under test. This is a different stress from the "broadband" noise (with bounded spectral density) injected at the receiver for the Clause 163 interference tolernace test. It could also be argued that the low-pass filtered noise is less "realistic" and test results may not represent receiver peformance under normal operating conditions.

SuggestedRemedy

Bound the spectrum of the broadband noise in a manner similar to what is done in 93C.1. The spectrum should be bounded to be more high-pass in nature so that band-pass noise is presented to the receiver (similar to Clause 163 stress).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/healey_3ck_02a_0521.pdf

With editorial license, implement the changes proposed on slides 8 and 9 of the referenced presentation with the following corrections for slide 8:
f1 = 8 GHz, f2 = 5 GHz.

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

Ghiasi, Ali Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **U**

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

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

Cl **162** *SC* **162.9.4.6** *P* **164** *L* **46** # 168

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Most such RL equations are graphed out to help the user see what is meant.

SuggestedRemedy

Please illustrate this receiver differential to common-mode return loss too. This would be best done in in Figure 162-4, presently "Transmitter common mode to differential return loss" so that the reader can compare the two.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested response with editorial license.

Cl **162** *SC* **162.9.4.6** *P* **164** *L* **46** # 172

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **R** *return loss*

In C2M-like specs the Rx Differential to common-mode return loss and Tx Common-mode to differential mode return loss differ by 3 dB at low frequency, for a good reason, but in this clause they are the same. Also, the Differential to common-mode cable assembly conversion loss is more lenient than these specs.

SuggestedRemedy

Review the relation between these three limits and adjust if necessary.

Response *Response Status* **C**

REJECT.
The suggested remedy does not provide sufficient detail to implement.

Cl **162** *SC* **162.9.4.6** *P* **165** *L* **2** # 173

Dawe, Piers Nvidia

Comment Type **E** *Comment Status* **A** *(bucket1)*

Italic >=

SuggestedRemedy

Non-italic >= Also 162-10, 162-11, 162-11, possibly others.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.9.4.6** *P* **165** *L* **2** # 58

Brown, Matt Huawei

Comment Type **E** *Comment Status* **A** *(bucket1)*

For Equation (162-9) specifying a limit for receiver differential to common-mode return loss there is no graph illustrating the limit.

SuggestedRemedy

Add figure with graph for Equation (162-9).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment 168.

Cl **162** *SC* **162.9.4.6** *P* **165** *L* **9** # 199

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **A** *(bucket1)*

It would be helpful to have a graph showing this equation.

SuggestedRemedy

Either add a separate graph or reference figure 162-4 and change the figure title to Transmitter common mode to differential return loss and Receiver differential to common mode return loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #168.

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

Ghiasi, Ali Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **C**

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

Cl **162** *SC* **162.11.3** *P* **167** *L* **25** # 200

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **A** *(bucket1)*

93A.5 should be a hot link

SuggestedRemedy

fix it.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.3** *P* **167** *L* **49** # 149

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **A** *CA COM Tfx (bucket1)*

The location of the Tfx not is not consistant with other clauses (namely 162.9.4.5 & 162.9.3.5)

SuggestedRemedy

Move this note to line 28 (after the description of where to find the parameters)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Each of the referenced notes are intended to be an informative note against each table and thus should be placed immediately after each table. The note in 162.11.3 is in the intended location and is consistent with notes for Table 120G–2 and Table 120G–6. The note in 162.9.4.5 is in the wrong location.
Change the location of the note in 162.9.4.5 for to be after Table 162-12.

Cl **162** *SC* **162.11.4** *P* **168** *L* **31** # 59

Brown, Matt Huawei

Comment Type **E** *Comment Status* **A** *(bucket1)*

Change Figure title to be consistent with text.

SuggestedRemedy

Change title to "Cable assembly differential to common-mode return loss"

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.5** *P* **168** *L* **37** # 18

Brown, Matt — Huawei

Comment Type **E** *Comment Status* **A** *CL-IL difference (bucket1)*

In a previous draft, a new parameter was added to constrain the CR channel differential to common-mode conversion loss. The term used to identify this parameter is: "difference between the cable assembly differential to common-mode conversion loss and the cable assembly insertion loss". The purpose of this parameter might not be immediately clear to a new reader of this standard and would benefit from a brief explanation.

SuggestedRemedy

Add an explanation of the purpose of this parameter. Perhaps: "This parameter constrains the amount of common-mode noise present at the transmitter that is converted to differential noise at the receiver relative to the signal level at the receiver."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
At P168 L35 (at beginning of subclause), add sentence "The cable assembly differential to common-mode conversion loss is specified relative to the insertion loss."

[Editor's note: This comment response was updated 2021/5/17.]

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

Dudek, Mike — Marvell

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

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

SuggestedRemedy

Add 10dB to this equation

Response *Response Status* **U**

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

Cl **162** *SC* **162.11.5** *P* **169** *L* **20** # 67

Brown, Matt — Huawei

Comment Type **E** *Comment Status* **A** *(bucket1)*

Change Figure 162-7 title to be consistent with text.

SuggestedRemedy

Change title to "Cable assembly differential to common-mode conversion loss"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Editor's note: this comment was updated on 2021/5/18.]

The commenter intended to point to Figure 162-6 at page 168 line 31.

However, it is also noted that the title of Figure 162-7 is incorrect in two ways. First "cable assembly" should be move to the head of the figure title and the parameter name must be updated.

For figure 162-6, implement the suggested remedy.

For Figure 162-7, change the title to "Cable assembly differential to common-mode conversion loss to insertion loss difference"

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

Dawe, Piers — Nvidia

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

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

Cl **162** *SC* **162.11.7** *P* **169** *L* **39** # 202

Dudek, Mike — Marvell

Comment Type **E** *Comment Status* **A** *(bucket1)*

93A.1 is in this amendment. It should be a hot link

SuggestedRemedy

fix it.

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.11.7** *P* **169** *L* **44** # 150

Kochuparambil, Beth — Cisco

Comment Type **E** *Comment Status* **A** *CA COM tests (CC)*

We've lost a bit of the description of doing COM with 2 package test cases. Someone reading this section in isolation may be confused.

93.9.1 States "The Channel Operating Margin (COM) is computed using the procedure in 93A.1 with the Test 1 and Test 2 values in Table 93–8. Test 1 and Test 2 differ in the value of the device package model transmission line length zp.

SuggestedRemedy

Use editorial licence to modify paragraph to say something like,
"COM shall be computed twice, Test 1 and Test 2, which differ in the value of the device package model transmission line length zp."
Similarly, modify the COM table from "Rx Test 2" and "TX Test 2" to "Test 2, RX" and "Test 2, TX"

Replicate in COM description and tables for 163 & 120F

Response *Response Status* **C**

ACCEPT.
[Editor's note: CC: 120F, 162, 163]

Cl **162** *SC* **162.11.7** *P* **170** *L* **17** # 51

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *CA COM Tau (CC)*

Package delay Thao missing from table

SuggestedRemedy

Add package delay thao 5.79e-3 ns/mm

Response *Response Status* **C**

REJECT.
[Editor's note: Changed subclause from 162.11.7.1 to 162.11.7.]
Since no different value is specified for Tau, the value specified in Table 93A-3 (6.141E–3) is used. Note that comment #53 against D1.2 adopted changes from default values only for a1 and a2 parameters in Table 93A-3.
Resolve in conjunction with comment #52.
[Editor's note: CC: 120F, 120G, 162, 163]

Cl **162** *SC* **162.11.7** *P* **170** *L* **18** # 50

Ghiasi, Ali — Ghiasi Quantum/Inphi

Comment Type **ER** *Comment Status* **A** *(bucket1)*

Unit for Zc should be ohms not Farad

SuggestedRemedy

Change to ohms

Response *Response Status* **W**

ACCEPT.
[Editor's note: Changed subclause from 162.11.7.1 to 162.11.7.]

Cl **162** *SC* **162.11.7** *P* **170** *L* **41** # 57

Brown, Matt — Huawei

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

In Table 162-18 COM parameters for cable assembly, the step size for c(1) is 0.02 while in Table 163-10 (KR) and Table 120F-7 (C2C) the step size is 0.05. There is no reason for these values to be different.

SuggestedRemedy

Change the C(1) step size in Table 162-18 to 0.05 or alternately change C(1) step size in 163-10 and Table 120F-7 to 0.02.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Change the step size in Table 163-10 and Table 120F-7 to 0.02.
[Editor's note: Changed subclause from 162.11.7.1 to 162.11.7.]
[Editor's note: CC: 162, 163, 120F]

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

Dawe, Piers — Nvidia

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

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

SuggestedRemedy

Use another DFE root-sum-of-squares limit for positions 13-24. Similarly in 163, but as 163 specifies the complete channel while 162 uses clean synthetic host traces, the limit might differ.

Response *Response Status* **U**

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

Cl **162** *SC* **162.11.7.1** *P* **171** *L* **42** # 203

Dudek, Mike — Marvell

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

There is ambiuity as to whether the transmitter and receiver PCB signal paths include the capacitors or not. Here the description implies that they don't but on page 172 (e.g. equation 162-14) they do.

SuggestedRemedy

Change "The transmitter and receiver PCB signal paths are calculated using the method defined in 93A.1.2.3. The scattering parameters for a PCB transmission line are defined by Equation (93A–13), Equation (93A–14)and the parameter values given in Table 162–19."to " The scattering parameters for a PCB transmission line are calculated using the method defined in 93A.1.2.3 using Equation (93A–13), Equation (93A–14) and the parameter values given in Table 162–19."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.

Cl **162** *SC* **162.11.7.2** *P* **174** *L* **1** # 204

Dudek, Mike — Marvell

Comment Type **E** *Comment Status* **A** *CA COM XTALK (bucket3)*

It is confusing to state the aggressors are in column two through four because there are separate columns for next and fext.

SuggestedRemedy

Change to "the crosstalk paths are from the
aggressors listed horizontally to the victims listed vertically.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

With editorial license change text and Table 162-20 the form shown in the upper right portion of slide 5 in the following presentation:
https://www.ieee802.org/3/ck/public/21_05/diminico_3ck_04b_0521.pdf

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

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **W**

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

Cl **162** *SC* **162.14.3** *P* **176** *L* **31** # 86

Huber, Tom — Nokia

Comment Type **T** *Comment Status* **A** *(bucket1)*

Status for implementing the 100G FECs should be CR1 rather than CR2

SuggestedRemedy

Change CR2 to CR1

Response *Response Status* **C**

ACCEPT.

Cl **162** *SC* **162.14.4.3** *P* **178** *L* **43** # 219

Wu, Mau-Lin MediaTek Inc.

Comment Type **ER** *Comment Status* **A** *(bucket1)*

The 'Feature' of 'TC5' is not correct.

SuggestedRemedy

Change "Differential mode to common-mode output return loss" to "Common-mode to differential output return loss" for the 'Feature' of 'TC5'.

Response *Response Status* **W**

ACCEPT.

Cl **162A** *SC* **162A.4** *P* **260** *L* **40** # 182

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **R** *PCB IL*

This section, for CR, says "the recommended minimum insertion loss allocation for the transmitter or receiver differential controlled impedance PCBs is 2.3 dB at 26.56 GHz". This is the same as the 2.3 dB MCB PCB IL (but why?), and (ignoring connector via loss) 1/3 of the maximum host trace loss (6.875 dB). 92A.4 and 136A.4 use a ratio of 0.086/0.5 or 1/5.8 which allows more flexibility in host layout than 1/3 does. 120G has Host insertion loss up to 11.9 dB, and I didn't find a minimum host loss, although very low loss could be more of a concern in C2M than CR.

SuggestedRemedy

Reduce the recommended minimum insertion loss allocation for the CR transmitter or receiver differential controlled impedance PCBs to whatever is justified. If the reasonable limit is a strong function of host package reflection, state whether the recommendation is for a "nominal worst" package, or what. Add a recommended minimum insertion loss for C2M host traces as appropriate.

Response *Response Status* **C**

REJECT.

Slides 4 and 5 of the following presentation were reviewed by the task force:
https://www.ieee802.org/3/ck/public/adhoc/apr28_21/dawe_3ck_adhoc_01_042821.pdf

Slide 3 of the following presentation were reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/diminico_3ck_04b_0521.pdf

The IL pcb min and max are derived on the basis of PCB material IL and via IL . The PCB IL assumed is 1.24 dB/in and via of 0.68 dB @26.56 GHz. With consideration for maintaining reasonable minimum length while allowing loss between TX and connector.

Ilpcb(min)=(0.76 in*1.24 dB/in)+(2*0.68) dB = ~ 2.3 dB.

The MCB PCB IL is the same to emulate min host IL.

Cl **162A** *SC* **162A.5** *P* **263** *L* **28** # 25

Laubach, Mark IEEE Member / Self

Comment Type **E** *Comment Status* **A** *(bucket1)*

"usingEquation" needs a space

SuggestedRemedy

Change to "using Equation"

Response *Response Status* **C**

ACCEPT.

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

Tracy, Nathan TE Connectivity

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

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

SuggestedRemedy

change limit to 0.18dB

Response *Response Status* **U**

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

Cl **162B** *SC* **162B.1.3.1** *P* **269** *L* **1** # 217

Haser, Alex Molex

Comment Type **T** *Comment Status* **A** *(bucket1)*

IL_MTFref(26.56 GHz) does not match the 6.60 dB specified in 162B.1 (page 266 line 20).

SuggestedRemedy

Update Equation 162B-5; change coefficient out front from 0.9505 to 0.942 to get correct 6.60 dB value at 26.56 GHz

Response *Response Status* **C**

ACCEPT.

Cl **162B** *SC* **162B.1.3.1** *P* **269** *L* **36** # 218

Haser, Alex — Molex

Comment Type **T** *Comment Status* **A** *MTF FOMILD*

FOM_ILD limit is too strict for measured data

SuggestedRemedy

Relax FOM_ILD to 0.18 dB (see slide 11 of kocsis_3ck_adhoc_01_011321.pdf)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #142.

Cl **162B** *SC* **162B.1.3.1** *P* **269** *L* **36** # 48

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

FOMILD of 0.13 dB is horibale for an MTF and it is significnalty larger than Lim 2 inch channel with 5 dB

SuggestedRemedy

Reduce reduce ILD to 0.075, please ghiasi_3ck_01_0421

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #142.

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

Champion, Bruce — TE Connectivity

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

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

SuggestedRemedy

It is recommended to update this value to 0.18 dB

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

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

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

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

Change MTF FOMILD (max) to 0.15 dB.

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

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

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

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

Cl **162B** *SC* **162B.1.3.4** *P* **271** *L* **26** # 64

Brown, Matt Huawei

Comment Type **E** *Comment Status* **A** *(bucket1)*

Align terminology with other clauses.

SuggestedRemedy

Change "common-mode return loss" to "Common-mode to common-mode return loss" in four places and in PICS item TF5.

Response *Response Status* **C**

ACCEPT.

Cl **162B** *SC* **162B.1.3.4** *P* **271** *L* **30** # 65

Brown, Matt Huawei

Comment Type **E** *Comment Status* **A** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 162B-7 and in the variable list that follows, change variable name CMRL to Return_Loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #61.

Cl **162B** *SC* **162B.1.3.5** *P* **272** *L* **31** # 66

Brown, Matt Huawei

Comment Type **E** *Comment Status* **A** *RL terminology*

Align terminology with other clauses.

SuggestedRemedy

In Equation 162B-8 and in the variable list that follows, change variable name CMDRL to Return_Loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #61.

Cl **162B** *SC* **162B.1.3.6** *P* **273** *L* **30** # 210

Kocsis, Sam Amphenol

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

NEXT_loss(f) range specified is 50MHz-40.000MHz. I believe this is just a typo given the discussion on this topic. This could be deemed editorial, but there is tehcnical impact to the change.

SuggestedRemedy

Change be 40.000 GHz

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162B** *SC* **162B.1.3.6** *P* **273** *L* **42** # 211

Kocsis, Sam Amphenol

Comment Type **TR** *Comment Status* **A** *MTF XTALK*

Table 162B-2 rise and fall time specified as 7.5ps (1 instance. The group determined during D1p4 comment resolution that 8.5ps was a more practical value for the rise and fall time for FOM_ILD calculations. Its logical that the same rise time should be applied to ICN calculations.

SuggestedRemedy

Change to 8.5ps to match the FOM_ILD definitions in 162B.1.3.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Per strawpoll #11 there is consensus to make the proposed change.

Implement the suggested remedy.

Strawpoll #11 (decision):
I support changing transition time for SFP+ and multi-lane MTF crosstalk for ICN calculations from 7.5 ps to 8.5 ps:
Yes: 26
No: 8

Cl **162B** *SC* **162B.1.3.6** *P* **274** *L* **2** # 212

Kocsis, Sam — Amphenol

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

NEXT_loss(f) range specified is 50MHz-40.000MHz. I believe this is just a typo given the discussion on this topic. This could be deemed editorial, but there is tehcnical impact to the change.

SuggestedRemedy

Change to 40.000 GHz

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Cl **162B** *SC* **162B.1.3.6** *P* **274** *L* **18** # 213

Kocsis, Sam — Amphenol

Comment Type **TR** *Comment Status* **A** *MTF XTALK*

Table 162B-4 rise and fall time specified as 7.5ps (2 instances). The group determined during D1p4 comment resolution that 8.5ps was a more practical value for the rise and fall time for FOM_ILD calculations. Its logical that the same rise time should be applied to ICN calculations.

SuggestedRemedy

Change to 8.5ps to match the FOM_ILD definitions in 162B.1.3.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Per strawpoll #11 (see the response to comment #211) there is consensus to make the proposed change.

Implement the suggested remedy.

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

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **W**

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

Cl **162C** *SC* **162C.2.4** *P* **283** *L* **41** # 237

Zhang, Bo — Inphi

Comment Type **T** *Comment Status* **A** *MDI nomenclature (bucket1)*

QSFP+ is meant for 4x10G 40G pluggable connector transceivers. I believe this section is meant for QSFP families such as QSFP28, QSFP56, QSFP-DD etc.

SuggestedRemedy

Suggest replace QSFP+ with QSFP families. Also please provide similar references to the 'QSFP+' such as those in section 1.3 normative references footnotes.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
QSFP+ reference is already a normative reference in base standard subclause 1.3 as requested in the suggested remedy. However, the reference text should be updated to point to the relevant QSFP+ specification.
Change: "connectors meeting the requirements of (QSFP+)"
To: "connectors meeting the requirements of SFF-8665"
Also, for SFP+ on page 281, line 6…
Change: "meeting the requirements of (SFP+)"
To: "meeting the requirements of SFF-8432"
Resolve using the response to comment #45.

Cl **162C** *SC* **162C.1** *P* **277** *L* **54** # 190

Dudek, Mike — Marvell

Comment Type **T** *Comment Status* **A** *MDI interoperability (bucket3)*

For interoperability it would be good to specify which signals are assigned in a partially utilized connector.

SuggestedRemedy

Add a sentence. "When a connector is not fully utilized the lower PMD numbers should be used"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Add the following sentence:
"When an MDI connector is not fully utilized the lower PMD numbers (see Table 162C-2) should be used."
Also, in Table 162C-2 change "PMD #" to "PMD number".
Implement with editorial license.

Cl **162D** *SC* **162D.1** *P* **289** *L* **14** # 216

DiMinico, Christopher — MC Communications

Comment Type **ER** *Comment Status* **A** *(bucket1)*

There are six MDI connector "receptacles" destinguished uniquely by name, referring to them by "type" is unecessary.

SuggestedRemedy

P289; Line 14 delete "types of" in the sentence "There are six types of MDI connectors “receptacles” specified for hosts."
P289; Line 32 change sentence to "This enables multiple cable assembly types with different combinations of the plug connectors at each end."
P290; Line 4 in Table 162D–2 delete "type" two places "Receptacle/Plug type"
P290; Line 32 in Table 162D–3 delete "type" two places "Receptacle/Plug type"
P291; Line 20 in Table 162D–4 delete "type" two places "Receptacle/Plug type"

Response *Response Status* **W**

ACCEPT.

Cl **163** *SC* **163.1** *P* **181** *L* **9** # 220

Wu, Mau-Lin — MediaTek Inc.

Comment Type **E** *Comment Status* **A** *(bucket1)*

There are no descriptions for Annex 163B in the paragraph.

SuggestedRemedy

Add the following sentence at the end of the 1st paragraph of 163.1 Overview.
"Annex 163B provides informative information of an example test fixture meeting the requirements for TP0v"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
With editorial license implement the following.
Remove the last sentence of the first paragraph.
Insert a second paragraph as follows:
"There are two associated Annexes. Annex 163A provides measurement methods and test points for backplane and chip-to-chip interfaces. Annex 163B provides information on an example test fixture."
[Editor's note: CC: 163, 120F]

Cl **163** *SC* **163.1** *P* **181** *L* **24** # 100

Kabra, Lokesh — Synopsys Inc

Comment Type **E** *Comment Status* **A** *(bucket1)*

Typo-error for Clause number corresponding to RS/CGMII functions

SuggestedRemedy

Correct Clause number to "81" instead of "80" in row 1 and row 2 of Table 162-2

Response *Response Status* **C**

ACCEPT.

Cl **163** *SC* **163.9.2** *P* **187** *L* **40** # 110

Ran, Adee — Cisco

Comment Type **E** *Comment Status* **A** *(bucket1)*

Numerical values in standards are exact, so there should be no trailing zeros after the decimal point. This is the common practice in 802.3 (see https://www.ieee802.org/3/WG_tools/editorial/requirements/words.html#numbers).

SuggestedRemedy

Change "1.0" to "1".

Response *Response Status* **C**

ACCEPT.
[Editor's note: CC: 163, 162]

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

Dudek, Mike Marvell

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

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

SuggestedRemedy

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

Response *Response Status* **U**

REJECT.

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

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

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

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

Cl **163** *SC* **163.9.2.2** *P* **189** *L* **38** # 49

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *ERL example (bucket3)*

No reference to Annex 163B which provide referene ERL

SuggestedRemedy

Please provide reference to CL 163B

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #54.
[Editor's note: CC: 120F, 163]

Cl **163** *SC* **163.9.3** *P* **190** *L* **16** # 55

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *ERL example (bucket3)*

No reference to Annex 163B which provide referene ERL

SuggestedRemedy

Please provide reference to CL 163B

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #54.
[Editor's note: CC: 120F, 163]

Cl **163** *SC* **163.9.3** *P* **190** *L* **24** # 9

Brown, Matt Huawei

Comment Type **TR** *Comment Status* **A** *RX signalling rate (bucket3)*

For the KR receiver, there is no requirement specified to meet the specifications over the entire signaling rate range. See 162.9.4.1 for a relevant example.

SuggestedRemedy

Add a new sublcause before 163.9.3.1 with heading "Receiver signaling rate" and content as follows:
"A PHY shall comply with the receiver requirements of 163.9.3.4 and 163.9.3.5 for any signaling rate in the range 53.125 GBd ± 100 ppm."
Add a new row in Table 163-8 specifying the signaling rate range and reference the new subclause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Implement the suggested remedy with editorial license.
Comment #9, #10, #11, and #12 make similar proposals KR, CR, C2C, and C2M.
[Editor's note: CC: 120F, 120G, 163]

Cl **163** *SC* **163.9.3.4** *P* **191** *L* **48** # 151

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **R** *(bucket1)*

There are 2 different "Test 1 and Test 2" in the interferance tolerance test. In the interferance tolerance test description and in step h for COM.

SuggestedRemedy

Change the interferance tolerance test cases to "Setup 1" and "Setup 2" in both the proceedure and the table.

Do similar for 120F.

Response *Response Status* **C**

REJECT.
The wording is consistent with previous clauses. The difference in context is clear in the text by reference to the two different tables.
[Editor's node: CC: 163, 120F]

Cl **163** *SC* **163.9.3.4** *P* **192** *L* **9** # 138

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **A** *RIT COM*

The equation "T_r = 1.09 * T_rm - 4.32 ps" remains unchanged since it was adopted for clause 111 in IEEE P802.3by project to account for TP0 - TP0a effect. (See https://www.ieee802.org/3/by/public/Jan16/ran_3by_01b_0116.pdf, slide 13.)

Correction of transition time by this equation is not valid any more, because the symbol rate has been doubled and the test point has been changed from TP0a to TP0v.

We should calibrate T_r at the signal source so that the reference transition time at TP0v including the effect of the reference package model and the test fixture matches to the measured transition time at TP0v.

When a BERT is used as TX, it is not necessary to calibrate the transition time at the signal source to match the measured transition time at TP0v, because it is easy to measure the transition time at the signal source (i.e. the BERT output) directly without the test fixture. Using the measured transition time directly at BERT output without calibration is more accurate and error free in comparison to calibrating the transition time at the signal source to match the measured transition time after the test fixture at TP0v.

Note that in the former specs, the correction of transition time must be used even if a BERT is used as TX, because the transition time must be measured at TP0a after the test fixture, not directly at the BERT output.

Note that this equation is not used in CR spec, because the transition time of the BERT output is directly measured without test fixture. This equation is also not used in OIF CEI spec, because the test point is equivalent to TP0, not TP0a in OIF CEI spec.

There is the same issue in 120F.3.2.3 step d.

SuggestedRemedy

Change step e as follows:

In the calculation of COM, if the transmitter is a device with known S-parameters and transition time Tr, these parameters should be used instead of the transmitter package model in 93A.1.2. If the transmitter is a calibrated instrument-grade transmitter, the transmitter device package model S^(tp) is omitted from Equation (93A–3), TP0 to TP0a trace or replica trace in Figure 93C-2 through Figure 93C-4 is omitted, and Tr in Equation (93A-46) is same as the measured 20% to 80% transition time Trm of the signal source using the test setup in Figure 93C-3 without TP0 to TP0a trace. If the transmitter is not a device with known S-parameters and transition time nor a calibrated instrument-grade transmitter, Tr in Equation (93A-46) is calibrated so that the reference 20% to 80% transition time Tr^(ref) calculated according to 163A.3.1.X matches to the measured 20% to 80% transition time Trm of the signal at TP0v using the test setup in Figure 93C-3 including TP0 to TP0v trace. The measured 20% to 80% transition time Trm is measured with the transmitter equalizer turned off and using the method in 120E.3.1.5.

Apply the same change as above to 120F.3.2.3 step d.

Add a new sub clause in 163A.3.1.X to calculate the reference 20% to 80% transition time Tr^(ref) using the following equation:

Tr^(ref) = T_80 - T_20 (163A-X)
u(t) = integral of h(tau)/T_b from -inf to t (163A-Y)
T_80 is a solution of u(t) = 0.8 * vf^(ref) in terms of t.
T_20 is a solution of u(t) = 0.2 * vf^(ref) in terms of t.

where
Tr^(ref) is the reference 20% to 80% transition time.
u(t) is the output step response.
T_80 is the time to reach 80% of the reference steady-state voltage.
T_20 is the time to reach 20% of the reference steady-state voltage.
T_b is the unit interval in ps.
vf^(ref) is the reference steady-state voltage calculated by Equation (163A-3).

Obtain the output pulse response, h(t), using Equation (93A-23) and Equation (93A-24) with H^(0)(f) from Equation (163A-2), where A_t and T_b are specified by the clause that invokes this method.
Obtain the output step response, u(t), by integrating h(t)/T_b from minus infinite to t using Equation (163A-Y).
From the output step response, find the time to reach 20% and 80% of the reference steady-state voltage vf^(ref) as T_20 and T_80, respectively.
From T_20 and T_80, calculate the reference 20% to 80% transition time Tr^(ref) using Equation (163A-X).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
The following presentation was reviewed by the task force:
https://www.ieee802.org/3/ck/public/21_05/hidaka_3ck_01c_0521.pdf
Implement slides 7 to 10 in the referenced presentation with editorial license.
Include editor's note that the effect of an equivalent test filter may be required on the reference path (bottom of slide 9).

Cl **163** *SC* **163.9.3.4** *P* **192** *L* **34** # 134

Hidaka, Yasuo Credo Semiconductor, Inc.

Comment Type **TR** *Comment Status* **A** *RIT jitter (CC)*

Equation (163-2) and (163-3) are not accurate, because the dual-dirac jitter distribution estimated by these equations does not match well with the original distribution even if the original distribution is pure dual-dirac distribution as presented at ad hoc meeting (see hidaka_3ck_adhoc_01_041421). For instance, J3u of the estimated dual-dirac jitter distribution is always significantly smaller than the measured J3u. I propose to change these equations.

Since the proposed equations never break, we do not need Note 2.

I propose similar changes to clause 162.9.4.3.3.

SuggestedRemedy

Replace Equation (163-2) and (163-3) with the following set of equations:

D3d = (Q3d^2 + 1) * (J_RMS^2) - (J3u / 2)^2

If D3d >= 0,
  A_DD = (J3u / 2 + Q3d * sqrt(D3d)) / (Q3d^2 + 1)
  sigma_RJ = (J3u / 2 - A_DD) / Q3d

If D3d < 0,
  Qx = sqrt((J3u / 2 / J_RMS)^2 - 1)
  A_DD = (J3u / 2) / (Qx^2 + 1)
  sigma_RJ = sqrt((J_RMS^2) - (A_DD^2))

where
  Q3d = 3.0902

Change Note 1 as follows:

Note 1 -- Q3d is an approximated solution of Q(Q3d) = 1 x 10^(-3), where the Q function is defined in Equation (95-1).

Remove Note 2.

Apply the same changes to Equation (162-7), Equation (162-8), Note 1, and Note 2 in clause 162.9.4.3.3.

Change the references to Equation (162-7) and (162-8) in Note 2 of Table 162-15 in clause 162.9.4.4.2 with the updated equations.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolve using the response to comment #209.

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

Cl **163** *SC* **163.10** *P* **193** *L* **43** # 152

Kochuparambil, Beth Cisco

Comment Type **E** *Comment Status* **A** *channel summary (bucket3)*

Introduction to channel characteristics mention IL and ERL, but not COM.

SuggestedRemedy

Add "and COM 163.10.1" to the end of this paragraph.

Resulting sentence would read: "Channels shall meet the ERL requirements in 162.10.3 and COM requirements in 163.10.1."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #17.

Cl **163** *SC* **163.10** *P* **193** *L* **43** # 186

Dudek, Mike Marvell

Comment Type **E** *Comment Status* **A** *channel summary*

Why is the Channel ERL listed here with a duplicate "shall" to 163.10.3 but COM (or the other normative channel requirements aren't listed.

SuggestedRemedy

Either delete the two sentences here or change the second sentence to "Channels shall meet the requirements in 163.10.1 and 163.10.3 to 163.10.7."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Resolve using the response to comment #16 and #17.

Cl **163** *SC* **163.10** *P* **193** *L* **43** # 17

Brown, Matt Huawei

Comment Type **ER** *Comment Status* **A** *nnel summary (CC) (bucket3)*

It would be beneficial to include a specification summary table for the KR channel similar to the Tables for KR TX (Table 120F-5), KR RX (Table 163-8), and CR Channel (Table 162-16). The text in 163.10 is not complete and can be replaced with a summary table.

SuggestedRemedy

Delete the current text in 163.10.
Create a new table similar to Table 162-16 to summarize the KR channel characteristics including related introductory text.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #16 proposes similar changes in Annex 120F.
Implement the suggested remedy with editorial license based on slide 10 of the following presentation:
https://www.ieee802.org/3/ck/public/21_05/sun_3ck_01b_0521.pdf
Also, since the channel insertion loss is a recommendation, change the title of 163.10.2 to "Channel insertion loss (recommended)"
[Editor's note: CC: 120F, 163]

Cl **163** *SC* **163.10.1** *P* **194** *L* **13** # 52

Ghiasi, Ali Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **R** *COM Tau (CC)*

Package delay Thao missing from table

SuggestedRemedy

Add package delay thao 5.79e-3 ns/mm

Response *Response Status* **C**

REJECT.
[Editor's note: Changed page from 170 to 194.]
Since no different value is specified for Tau, the value specified in Table 93A-3 (6.141E–3) is used. Note that comment #53 against D1.2 adopted changes from default values only for a1 and a2 parameters in Table 93A-3.
Resolve in conjunction with comment #51.
[Editor's note: CC: 120F, 120G, 162, 163]

Cl **163** *SC* **163.10.1** *P* **195** *L* **21** # 205

Healey, Adam — Broadcom Inc.

Comment Type **TR** *Comment Status* **A** *COM bmax*

The bmax limit is very generous (0.2) for taps up to Nb. Channels considered by the Task Force do not justify such a high limit. The limit should be tightened to reduce the chance that unexpected channels will meet the minimum COM threshold but contain large reflections that are difficult to handle.

SuggestedRemedy

Change the bmax limit for n = 7 to Nb to be 0.1. Make a similar change to Table 162-16.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The task force reviewed the following related presentation:
https://www.ieee802.org/3/ck/public/21_05/healey_3ck_01_0521.pdf
In Table 163-10, change the bb_max limit for n = 7 to Nb to be 0.1.
Make a similar change to Table 162-18.
[Editor's note: CC: 162, 163]

Cl **163** *SC* **163.10.2** *P* **195** *L* **49** # 170

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **R** *channel IL (bucket3)*

51.8 dB at 40 GHz, at least 23.3 dB beyond the loss at Nyquist and further filtered by the transmitter and receiver, is unlikely to affect performance and may exclude some acceptable channels which are good to 30 GHz then less good at 40.

SuggestedRemedy

Replace the straight part of the limit with one that curves down (with an f^2 term), with a reduced fmax.

Response *Response Status* **C**

REJECT.
The suggest remedy does not provide sufficient detail to implement.

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

Ghiasi, Ali — Ghiasi Quantum/Inphi

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

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

SuggestedRemedy

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

Response *Response Status* **C**

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

Cl **163** *SC* **163.13.3** *P* **200** *L* **13** # 87

Huber, Tom — Nokia

Comment Type **T** *Comment Status* **A** *(bucket1)*

Status for implementing the clause 135 PMA should be KR1 rather than KR

SuggestedRemedy

Change KR to KR1

Response *Response Status* **C**

ACCEPT.

Cl **163B** *SC* **163B.1** *P* **297** *L* **12** # 22

Brown, Matt — Huawei

Comment Type **E** *Comment Status* **A** *TP0a (bucket3)*

The test point name TP0a is now obsolete. References to TP0a in Annex 163B are also references to TP0v, but for a specific example.

SuggestedRemedy

In 163B.1 delete the second sentence.
In the first paragraph in 163B.2 change TP0a to TP0v.
In the heading of Table 163B-1, change TP0a to TP0v.

Response *Response Status* **C**

ACCEPT.
[Editor's note: Changed line from 297 to 12.]

Cl **163B** *SC* **163B.2** *P* **297** *L* **22** # 53

Ghiasi, Ali
Ghiasi Quantum/Inphi

Comment Type **TR** *Comment Status* **A** *ERL package (bucket3)*

We have provided reference ERL for only 31 mm package

SuggestedRemedy

Please also provide ERL data for the 12 mm package as well

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
[Editor's note: Change clause/subclause to 163B/163B.2.]
The methodology in 163A.4.1.1 and parameters from 163/120F require ERL reference to be calculate at two package lengths, however only one package length is provided in this example.
Add a new paragraph after the first paragraph as follows:
"Although clauses using the TP0v methodology may require the ERL reference value to be calculate at more than one package length, only one is shown here."

Cl **163B** *SC* **163B.2** *P* **297** *L* **25** # 225

Wu, Mau-Lin
MediaTek Inc.

Comment Type **ER** *Comment Status* **A** *(bucket1)*

Equation (163-1) is the wrong reference. It shall be "Equation (163B-1)".

SuggestedRemedy

Change "Equation (163-1)" to "Equation (163B-1)" in the following sentence.
"The insertion loss of the example test fixture is approximated by Equation (163-1) which is illustrated in Figure 163B-1."

Response *Response Status* **W**

ACCEPT.

Cl **A** *SC* **A** *P* **205** *L* **8** # 4

Anslow, Pete
Independent

Comment Type **E** *Comment Status* **A** *OIF reference (bucket1)*

"OIF-CEI-05, …" should appear in the bibliography after "[B55] OIF-CEI-04.0, …"

SuggestedRemedy

Change the numbering from [B22a] to [B55a]

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Comment #221 proposes to remove the only reference to OIF-CEI-05.0. If that reference is removed then remove this bibliography entry. If the reference is not removed, then implement the suggested remedy.