Cl **FM** *SC* **FM** *P* **1** *L* **28** # R1-14

Grow, Robert RMG Consulting

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

This list is not correct. It also lists five previous amendments yet P802.3cx is identified as Amendment 5.

SuggestedRemedy

If new amendment numbers are assigned for the gaggle of amendments currently assumed to be hitting RevCom in September, obviously use that order. If amendment numbers remain unchanged from the last amendment number assignment, delete P802.3de from this list, and sort in amendment number order.

Proposed Response *Response Status* **O**

Cl **FM** *SC* **FM** *P* **11** *L* **17** # R1-15

Grow, Robert RMG Consulting

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

This paragraph is inconsistent with the current front matter as found in P802.3/D3.2.

SuggestedRemedy

Update for consistency with P802.3/D3.2.

Proposed Response *Response Status* **O**

Cl **FM** *SC* **FM** *P* **12** *L* **39** # R1-16

Grow, Robert RMG Consulting

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

The description of Section Nine has changed during balloting of P802.3.

SuggestedRemedy

Update to be consistent with P802.3/D3.2.

Proposed Response *Response Status* **O**

Cl **FM** *SC* **FM** *P* **24** *L* **44** # R1-27

Healey, Adam Broadcom Inc.

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

In the table of contents, annex headings break across multiple lines.

SuggestedRemedy

Modify the structure of annex headings per the most recent IEEE 802.3 FrameMaker draft template.

Proposed Response *Response Status* **O**

Cl **0** *SC* **0** *P* **0** *L* **0** # R1-5

Brown, Matthew Huawei Technologies Canada

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

Keep this draft in line with the new revision (802.3dc) and any amendments that precede 802.3ck.

SuggestedRemedy

Align the next draft with the latest versions of the new revision (802.3df) and any preceding amendments.

Proposed Response *Response Status* **O**

Cl **120** *SC* **120.5.11.2.a** *P* **110** *L* **30** # R1-37

Ran, Adee Cisco Systems, Inc.

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

Some separation between the text and the sequence would be nice.

SuggestedRemedy

Add an empty paragraph before the sequence.

Consider moving the sequence and the text referring to it after equation 120-1.

Proposed Response *Response Status* **O**

Cl **120F** *SC* **120F.3.1.2** *P* **241** *L* **4** # R1-59

Ran, Adee — Cisco Systems, Inc.

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

"with the exception the high-frequency peak-to-peak AC common-mode voltage is defined in 120F.3.1.1"

Missing "that".

SuggestedRemedy

Change to "with the exception that the high-frequency peak-to-peak AC common-mode voltage is defined in 120F.3.1.1".

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.1** *P* **256** *L* **12** # R1-6

Brown, Matthew — Huawei Technologies Canada

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

The implementation of Draft 3.0 comment i-92 resulted in the sentence being changed from: "The C2M interface comprises independent data paths in each direction."
to: "The C2M interface is composed of independent transmit and receive data paths."
The first part of the proposal was to replace the use of "comprises" with "is composed of" to be consistent throughout the standard. There is nothing wrong with this change.
The other part of the proposal was to change the text used to describe the data paths. Unfortunately, the new text uses terminology that is not consistent with the rest of the Annex. Specifically, there is no concept of a "transmit path" or "receive path". The original wording was chosen with this in mind.

SuggestedRemedy

Change: "The C2M interface is composed of independent transmit and receive data paths."
To: "The C2M interface is composed of independent data paths in each direction."

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.1** *P* **256** *L* **36** # R1-58

Ran, Adee — Cisco Systems, Inc.

Comment Type **GR** *Comment Status* **X**

The editor's note states that CEI-112G-VSR-PAM4 <...> is expected to be published as part of OIF-CEI-05.0. But the OIF-CEI-05.0 document has not been published yet. Unless it's published before 802.3ck, it would be inappropriate to have an unpublished document in the bibliography.

Since the technical work for Annex 120G has mainly done in 802.3ck before it was added to the OIF specification (unlike previous C2M specifications), the reference to OIF may be unnecessary, and it is proposed to delete it.

Alternatively, if a reference to OIF document is desired, it can be made to the CEI-112G-VSR-PAM4 document instead; rephrase the sentence accordingly and delete the editor's note. (The bibliography entry should change to "CEI-112G-VSR-PAM4 Very Short Reach Interface, Revision 20" which is current; we do not refer to it and there is no need to encompass future versions).

Alternatively, if it is anticipated that OIF-CEI-05.0 is published before July 2022, the editor's note should be made specific such that the reference is kept only if the document is published.

SuggestedRemedy

Delete the sentence "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]", the editor's note, and the bibliography entry in Annex A.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.1** *P* **258** *L* **41** # R1-50

Dawe, Piers J G — NVIDIA

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

Most product IL and RL specs (including ERL) start at 50 MHz, although test fixture specs start at 10 MHz and recommendations and reference equations are not bound by measurement practicalities. Including the RLdc limit in 162.9.4.7. I don't know why this product RLdc would be special.

SuggestedRemedy

Change 0.01 to 0.05. Also for Eq 120G-2 in 120G.3.3.3.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.1.1** *P* **258** *L* **42** # R1-51

Dawe, Piers J G NVIDIA

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

This RLdc spec goes to 50 GHz while the one in 162.9.4.7 goes to 40 GHz. I know the channel in C2M can be super-low-loss, but the modulation format and receiver filtering remove a lot of energy above 40 GHz. I did not notice any other *product* specs going to 50 GHz, but we should review them if they exist.

SuggestedRemedy

If appropriate, change 50 to 40, here and in Eq 120G-2.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.3.5.1** *P* **265** *L* **49** # R1-54

Dawe, Piers J G NVIDIA

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

For module output, the optimum setting for the second precursor is 0.02 to 0.04, so the optimum for any third precursor would be less than 1/2 a COM step of 0.02. We can simplify the tuning challenge for real modules and stressed signal generators by removing clutter. 120G has 4 dB more headline loss than 120F and a module doesn't have the very large package loss that 120F may have, so it may be reasonable that 120F has a small c(-3) term when C2M host stressed input doesn't need it.

SuggestedRemedy

Change "The pattern generator output equalization functional behavior is equivalent to the model shown in Table 120F-3. The tap coefficients are not specified" to "The pattern generator output equalization functional behavior is equivalent to the model shown in Table 120F-3, with c(-3) always zero. Other tap coefficients are not specified".

Unless the extra loss in the module stressed input signal tips makes this tap significant, this can apply to 120G.3.4.3.1 also.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.3.4.3.2** *P* **271** *L* **33** # R1-17

Calvin, John Keysight Technologies

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

Consistent with the groups consensus during polling at the 3/23/2022 Ad-Hoc Session and the presentation:
https://www.ieee802.org/3/ck/public/adhoc/mar23_22/calvin_3ck_adhoc_01_032322.pdf
Reducing the EH target by 20% from 10mV to 8mV in sponsor ballot with no supporting material was a mistake. There is an abundance of TP1A focused empirical data on record in the 802.3 project folders that underscores how little margin there was in achieving a valid VEC at 12-12.5dB evaluated at 10mV. There are multiple published existence proofs for a TP1A solution at 10mV/12dBVEC. There are no publicly published existence proofs that 8mV/12dB VEC is attainable.

SuggestedRemedy

Revert the Table "120G–10—Module stressed input parameters" EH value from the current value of 8mV to 10mV where it's been settled to date.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.4.1** *P* **273** *L* **18** # R1-38

Ran, Adee Cisco Systems, Inc.

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

120G.4 has only a single subclause 120G.4.1 and no other content. The extra hierarchy level is unnecessary.

SuggestedRemedy

Delete the 120G.4 paragraph and promote 120G.4.1 to second-level.

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.4.1** *P* **273** *L* **20** # R1-39

Ran, Adee Cisco Systems, Inc.

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

The word "channel" is overloaded in this annex. In this context, it refers to the path from the host component to the module component, excluding packages but including the connector and module PCB. It may not be obvious for the reader, and should be written explicitly.

Luckily we have a diagram that shows this exact path, and has the same ILL number; it would be helpful to have a cross-reference to that diagram.

SuggestedRemedy

Change "the channel insertion loss is recommended to meet" to
"the insertion loss of the channel between the host and module components (see Figure 120G–2) is recommended to meet"

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.1** *P* **274** *L* **12** # R1-60

Ran, Adee Cisco Systems, Inc.

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

..."is defined as the AC common-mode voltage range measured at TP0v that includes"...

TP0v is not defined for C2M; the output measurement points are TP1a and TP4.

SuggestedRemedy

Change to "is defined as the AC common-mode voltage range measured at TP1a or TP4 that includes"

Proposed Response *Response Status* **O**

Cl **120G** *SC* **120G.5.2** *P* **275** *L* **50** # R1-55

Dawe, Piers J G NVIDIA

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

As noted, this weighting function skews the spec to passing signals with relatively bad eye width, whether from jitter or other cause, which endanger the link BER, while failing signals with usable VEC and eye height and better eye width.

SuggestedRemedy

Pick one of the proposed solutions and fix the problem. Notice that the apparent VEC and EH numbers are likely to change in step.

Proposed Response *Response Status* **O**

Cl **161** *SC* **161.6.3** *P* **147** *L* **8** # R1-40

Dawe, Piers J G NVIDIA

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

RS-FEC-Int can't exist except as part of a RS-FEC/RS-FEC-Int pair, so it isn't a separate sublayer.

SuggestedRemedy

Move the clause to become Annex 91B.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.1** *P* **153** *L* **46** # R1-8

Brown, Matthew Huawei Technologies Canada

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

Footnote a in Table 162-1, Table 162-2, and Table 162-3 includes the word must, which is deprecated according the SA Standards Style Manual.

SuggestedRemedy

In Table 162-1, Table 162-2, and Table 162-3 ...
Change: "a conforming implementation must behave functionally"
To: "a conforming implementation behaves functionally"

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.8.11** *P* **164** *L* **21** # R1-11

Lusted, Kent — Intel Corporation

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

There is a contradiction in the specification as to which control field structure to use with the PMD control function. The first list item (a) in the exceptions list says that "The control field structure is specified in Table 162–9", while the item (e) states that the coefficient select bits in the control field are per Table 136-9 with an additional combination. Note that Table 162-9 includes the additional combination (cm3) in the coefficient select bits as well as other changes from Table 136-9.

Adding to the confusion is that this sub-clause only has the revised control field structure, not the revised status field structure.

SuggestedRemedy

Two solutions are proposed here for consideration by the comment resolution group:

Option A:
* remove list item (a) and renumber the list.
* remove Table 162-9

Option B:
* add in new Table 162-9a (after Table 162-9) that shows the revised status field structure. New Table 162-9a "Status Field Structure" would be based on Table 136-10 with the addition of entry "1 0 1 = c(-3)" in the coefficient select echo field
* change item (a) to "The control field structure is specified in Table 162–9 and the status field structure is specified in Table 162-9a"
* remove list item (e) and renumber the list.

Implement with editorial license

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.8.11** *P* **164** *L* **35** # R1-24

Lusted, Kent — Intel Corporation

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

Implementation issue associated with comment i-48 against D3.0 (see https://www.ieee802.org/3/ck/comments/draft3p0/8023ck_D3p0_final_closedcomments_sortedByNumber.pdf). The text as written for item h of 162.8.11 (page 164) is “The of use_quiet_in_training (see 136.8.11.7.1) is TRUE.”

SuggestedRemedy

Change to “The value of use_quiet_in_training (see 136.8.11.7.1) is TRUE." to align with the Accepted response to comment i-48 on Draft 3.0.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.8.11** *P* **164** *L* **35** # R1-2

Ran, Adee — Cisco Systems, Inc.

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

"The of use_quiet_in_training (see 136.8.11.7.1) is TRUE"

The word "value" is missing.

SuggestedRemedy

Change to "The value of use_quiet_in_training (see 136.8.11.7.1) is TRUE".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.8.11** *P* **165** *L* **24** # R1-10

Lusted, Kent — Intel Corporation

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

In Table 162-9, the coefficient select field has the entry values of "1 0 0= Reserved and "0 1 x = Reserved" underlined. The underlining is not necessary.

SuggestedRemedy

Remove the underlining for the entry values of "1 0 0" Reserved and "0 1 x = Reserved".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.2** *P* **165** *L* **44** # R1-7

Brown, Matthew — Huawei Technologies Canada

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

The implementation of Draft 3.0 comment i-89 resulted in the subclause being changed...
from:
"162.9.2 Signal paths
The MDI transmit and receive paths are point-to-point connections. Each path corresponds to one MDI lane and comprises two complementary signals, which form a balanced differential pair."
to:
"162.9.2 MDI connections
The MDI transmit and receive paths are point-to-point connections. Each MDI data path is composed of one or more MDI lanes. Each MDI lane is composed of two complementary signals, forming a balanced differential pair."
The first part of the proposal was to replace the use of "comprises" with "is composed of" to be consistent throughout the standard. There is nothing wrong with this change.
The other part of the proposal was to change the text used to describe the data paths. Unfortunately, the new text uses terminology that is not consistent with the rest of the Clause. Specifically, there is no concept of an "MDI path" "MDI transmit path", or "MDI receive path".

SuggestedRemedy

Change the subclause to:
"162.9.2 Signal paths
The MDI transmit and receive signal paths are point-to-point connections. Each signal path corresponds to one MDI lane and comprises two complementary signals, which form a balanced differential pair."

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.2** *P* **165** *L* **45** # R1-36

Ran, Adee — Cisco Systems, Inc.

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

Following the changes in thsi subclause, the sentence "The MDI transmit and receive paths are point-to-point connections" does not make sense, since the subcluase describes the content of the MDI ("paths" are no longer mentioned).

Alternatively, the content can be changed back to refer to paths.

SuggestedRemedy

Delete the quoted sentence.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.3** *P* **166** *L* **30** # R1-29

Ran, Adee — Cisco Systems, Inc.

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

(Cross-clause - 162, 163, 120F, 120G)

VCMPP-LF max value of 60 has no justification. In the presentations mellitz_3ck_01_0122 and mellitz_3ck_02_0122 the suggested limits were 30 mVpp and 40 mVpp for low frequency respectively. mellitz_3ck_adhoc_01_011222 slide 3 shows power supply noise distributions that are mostly below 40 mVpp and the best cases are about 25 mVpp. 60 mVpp was chosen as a result of a straw poll with no data or recorded reason.

We previously had a limit of 25 mV RMS without filtering (including the more significant high-frequency noise). Assuming HF and LF components are independent, the RMS should be the RSS of the RMSs of these components. Assuming uniform distribution of LF noise, 60 mVpp means 17 mV RMS for this component, leaving just 18 mV RMS for the HF component – and we struggled to increase the CM RMS to 25-30 mV mainly because of the HF component! The LF component was supposed to be much lower than that.

Assuming LF CM noise results from power supply noises (the only source that was discussed), a 60 mVpp for all but 1e-4 (which excludes rare events like powering other circuits on or off) would be a very sloppy design which would likely result in other impairments such as excessive jitter.

The LF CM component is not filtered out by the channel so we can expect the same levels at the receiver. The effect of LF CM noise on receivers depends on design, but in general, low-frequency effects may cause periods of higher-than-average BER and result in unexpected FEC failures which will be difficult to debug. We should avoid that by limiting the transmitter's CM noise (much easier to verify).

Same reasoning applies to 163.9.2, 120F.3.1, and 120G.3.1. For AUIs the VCMPP is defined at 1e-5 and the allowed range should be somewhat higher. Scaling by the Q value, the limit should be 13% higher, but I assume LF CM is closer to uniform than to Gaussian so the proposal for AUIs is just 7% higher.

SuggestedRemedy

In 162.9.3 and 163.9.2, change the VCMPP maximum from 60 mV to 30 mV.
In 120F.3.1 and 120G.3.1, change the VCMPP maximum from 60 mV to 32 mV.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **166** *L* **30** # R1-42

Dawe, Piers J G NVIDIA

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

Now the host has two opportunities to create AC CM and ifg it takes both, it can create much more than in the previous draft. This applies to C2M also.

SuggestedRemedy

Keep the new specs, but reinstate the all-frequencies RMS limit. Also in Table 120G-1.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **166** *L* **31** # R1-35

Ran, Adee Cisco Systems, Inc.

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

(cross-clause - 162 and 120G)
Clause 162 has a specification for V_CMPP-HF directly and not as a ratio of the pulse peak, while clause 163 and annex 120F have the SCMR specification instead.

Since the TP0-TP2 channel can attenuate the both high-frequency common mode noise and the differential signal, the reasoning for using a ratio here is as strong as it is in TP0v. It would be easier for readers to have consistent specification methods.

The SCMR limit for TP2 is suggested based on the limit in Table 163–5, with a relaxation of 1 dB due to possible mode conversion in the longer TP0-TP2 channel.

Applies similarly for clause 120G (at both TP1a and TP4).

SuggestedRemedy

In 162, replace the V_CMPP_HF (max) specification to SCMR (min), pointing to the definition in 163.9.2.8, with a value of 14 dB.

In 120G, apply a similar change, but use 120F.3.1.2 as a reference, and change the reference of VCMPP-LF to 120F.3.1.1 (which have the same 1e-5 probability).

Delete the new content about VCMPP in 120G.5.1.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **166** *L* **40** # R1-43

Dawe, Piers J G NVIDIA

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

The revision to the mated test fixtures' reference loss to be more like real measurements makes a small difference to the expected Rpeak.

SuggestedRemedy

Reduce Rpeak (min) by 1% from 0.397 to 0.393.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **167** *L* **16** # R1-18

Wu, Mau-Lin MediaTek Inc.

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

The ISI_RES spec of CR are quite different from that for KR. Based on that, the calculation method as well as the spec limit of ISI_RES of CR shall be modified. The detailed analysis had be covered in li_3ck_adhoc_01_030922 & wu_3ck_adhoc_033022.

SuggestedRemedy

Change "Residual intersymbol interference, ISI_RES (max)" from -30 dB to -29 dB in Table 162-10.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **167** *L* **16** # R1-20

Rysin, Alexander NVIDIA

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

Currently proposed ISI_RES limit is too tight – commercial test equipment with a recommended TP0-TP2 channel loss fail the specification. Using TX FIR to optimize ISI_RES does not help enough. Presentation is planned.

SuggestedRemedy

In table 162-10, change the minimum ISI_RES value to -27. Alternatively, revise the measurement methodology. See separate comments proposing different method.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **167** *L* **16** # R1-23

Rysin, Alexander NVIDIA

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

ISI_RES is affected by the pulse dispersion when measured at TP2. COM reference receiver uses CTLE to mitigate the effect. Measuring ISI effects with CTLE was adopted in 120D.3.1.7. Presentation is planned

SuggestedRemedy

Add a comment stating the following:

For the ISI_RES measurement the linear fit pulse response p(k) and error e(k) are determined using the linear fit procedure in 162.9.4.1.1, after these have been recalculated with the continuous time filter described in 93A.1.4.3 using the parameters in Table 163-11 applied and optimized for maximum ISI_RES, with the exception that Np=12+Dp+1".

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4** *P* **167** *L* **16** # R1-28

Healey, Adam Broadcom Inc.

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

ISI_RES includes the linear fit error computed as part of the SNDR metric and this linear fit error is primarily attributed to distortion. The simulations that served as the basis for the Clause 163 and Annex 120F ISI_RES limits (https://www.ieee802.org/3/ck/public/21_07/dudek_3ck_01_0721.pdf) used linear models with noise-dominated SNDR. Transmitters whose SNDR includes some linear fit error may have difficulty meeting the ISI_RES limit even with otherwise acceptable residual ISI. The limit for Clause 162 was set 1 dB higher but without demonstration that this is sufficient margin for the additional ISI introduced by a host channel. In addition, measurement of the transmitted waveform at the output of a dispersive channel will include an ISI "tail" that will be compensated by the reference receiver. Reflections are the primary focus of the ISI_RES specification and the inclusion of a reference equalizer to compensate the ISI tail would improve that focus. Finally, ISI_RES combines all errors independent of phase while ERL accounts for how the reflections align at the sampling phase. The performance penalty resulting from reflections could be more accurately predicted if such alignment was considered. These concerns can be addressed by the SNR_ISI metric defined in 120D.3.1.7.

SuggestedRemedy

Replace ISI_RES with SNR_ISI as defined in 120D.3.1.7 using the continuous time filter parameters in Table 163-11 and a time offset added to t_p whose value is swept from -0.5 UI to 0.5 UI when calculating ISI_cursors. Define SNR_ISI to be the minimum value found across the time offset sweep. For Clause 162, set N_b to 12 and SNR_ISI (min.) to 26 dB. For Clause 163 and Annex 120F, set N_b to 6 and SNR_ISI (min.) to 28 dB.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.1.1** *P* **167** *L* **6** # R1-30

Ran, Adee Cisco Systems, Inc.

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

(Cross-clause - 162, 163, 120F)

Following ad hoc presentation ran_3ck_01_032322, it is suggested to provide more specific definitions or guidance for Tx parameters that depend on equalization, to enable reasonable test times, both for design (simulations) and qualification (with instruments).

For RLM, the reference is 120D.3.1.2, which does not specify an equalization setting, although RLM can vary between equalization settings. We want high RLM at the setting that is actually used, but for test purposes, the 5 presets should provide sufficient coverage.

SuggestedRemedy

Add a subclause under 162.9.4 with heading "Transmitter linearity" and the following content:
"Transmitter linearity is defined using the method in 120D.3.1.2.
The transmitter linearity shall meet the requirement specified in Table 162–10 when the transmitter equalization is set to any of the initial conditions defined in Table 162-11."

Change the references of RLM in Table 163–5 and Table 120F–1 to point to the new subclause.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.1.2** *P* **169** *L* **37** # R1-3

Ran, Adee Cisco Systems, Inc.

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

"The linear fit pulse peak ratio Rpeak is defined as the ratio between the maximum value of p(k) and the steady-state voltage vf."

vf is defined in the previous paragraph as "measured with transmit equalizer set to preset 1 (no equalization)" but it may be interpreted as if this holds only for vf and not for p(k). Under this interpretation, Rpeak will be dependent on equalization setting (and will be degraded in other settings).

The intent is to follow the previously defined specifications such that R_peak uses the non-equalized signal (e.g. in 93.8.1.5.2, "The peak value of p(k) shall be greater than 0.71 × vf after the transmit equalizer coefficients have been set to the “preset” values").

Also, it would be useful to have an explicit definition of vpeak for other places that use it, such as the SCMR, RES_ISI, and possibly SNDR specifications. There are definitions in 163A.3.2.1 (reference and measured) but not here.

SuggestedRemedy

With editorial license:
Change the three paragraphs of 162.9.4.1.2 to the following:
"The linear fit pulse peak, v_peak, and steady-state voltage, v_f, are defined using the linear fit pulse response, p(1) through p(M×Nv), measured with transmit equalizer set to preset 1 (no equalization). Nv is set equal to 200. The linear fit procedure for obtaining p and the values of M and Np are defined in 162.9.4.1.1.

v_peak is defined as maximum value of p(k). v_f is defined as the sum of the linear fit pulse p(1) through p(M×Nv) divided by M.

The linear fit pulse peak ratio R_peak is defined as the ratio between v_peak and v_f.

The steady-state voltage and the linear fit pulse peak ratio shall meet the requirements specified in Table 162–10.
"

Apply the new team v_peak in other places that refer to the pulse peak (or will refer to it following resolution of other comments) such as 162.9.4.3, 163.9.2.8, and 163.9.2.6.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.1.2** *P* **169** *L* **37** # R1-44

Dawe, Piers J G NVIDIA

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

"ratio between" is ambiguous: the reader doesn't know which way round the fraction is calculated.

SuggestedRemedy

Change "the ratio between the maximum value of p(k) and the steady-state voltage vf" to "the maximum value of p(k) divided by the steady-state voltage vf"

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.3** *P* **171** *L* **8** # R1-31

Ran, Adee Cisco Systems, Inc.

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

(Cross-clause - 162, 163, 120F)

Following ad hoc presentation ran_3ck_01_032322, it is suggested to provide more specific definitions or guidance for Tx parameters that depend on equalization, to enable reasonable test times, both for design (simulations) and qualification (with instruments).

SNDR can depend on equalization setting, but the current definition (reference to 120D.3.1.6) and requirements are generic and can be applied to any equalization setting. We want high SNDR at the setting that is actually used, but for test purposes, the 5 presets should provide sufficient coverage. This would also eliminate unrealistic equalization settings in which the current requirement may be impossible to meet.

The proposed change is on 162.9.4.3, and since 163 and 120F refer back to this subclause it would apply there too.

SuggestedRemedy

Add the following paragraph at the end of 162.9.4.3.:

The transmitter SNDR shall meet the requirement specified in Table 162–10 when the transmitter equalization is set to any of the initial conditions defined in Table 162-11.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.4** *P* **171** *L* **12** # R1-12

Lusted, Kent — Intel Corporation

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

The first sentence of the first paragraph in the sub-clause states that output jitter is characterized by three parameters: J_rms, even-odd jitter, J3u. However, a total of four parameters are provided in the text and in Table 162-10: J_rms, even-odd jitter, J3u and J3u_03. The jitter parameter J3u_03 should be included in the first paragraph.

SuggestedRemedy

Change the first sentence of the first paragraph to "Output jitter is characterized by four parameters, J3u, J3u_03 JRMS, and even-odd jitter."

Similarly, consider adding J3u_03 to the first sentence of the second paragraph, too.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.4** *P* **171** *L* **17** # R1-13

Lusted, Kent — Intel Corporation

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

The first sentence of the second paragraph references J3u to the measurement method specified in 120D.3.1.8.1. However, 120D.3.1.8.1 is a method for J4u, not J3u, which may be confusing to the reader without providing additional context.

SuggestedRemedy

Add the following new sentence to the second paragraph, after the first sentence, "J3u is calculated the same way as J4u in 120D.3.1.8.1 except that J3u is defined as the time interval that includes all but 10–3 of f_j(t), from the 0.05th to the 99.95th percentile of f_j(t)."

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.5** *P* **172** *L* **25** # R1-46

Dawe, Piers J G — NVIDIA

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

This says "Parameters that do not appear in Table 162–13 take values from Table 162-19", contradicting the previous sentence. Anyway, as Tfx is an entry in Table 93A-4...

SuggestedRemedy

It would help the reader to find Tfx if it were in its expected place in the table. The "value" would point to the sentence "The value of Tfx is twice the delay between the test fixture test connector and the test fixture host-facing connection minus 0.2 ns", which could become a table footnote. Similarly for other ERL tables.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.5** *P* **172** *L* **28** # R1-45

Dawe, Piers J G — NVIDIA

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

This draft has 10 tables of ERL parameter values although only 3 for COM parameter values. Most of the entries are the same, so this is inefficient and makes it hard for the reader to see what is different.

SuggestedRemedy

Combine the tables to one per clause or annex. Use an extra column for the parameters that differ (e.g. in this clause, "Length of the reflection signal" needs two columns, for Transmitter and receiver, Cable assembly).

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.5** *P* **172** *L* **33** # R1-47

Dawe, Piers J G — NVIDIA

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

The order of parameters in ERL tables is not consistent across 802.3.

SuggestedRemedy

If these tables are not in the preferred order, re-order them.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.9.4.6** *P* **172** *L* **47** # R1-48

Dawe, Piers J G — NVIDIA

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

As already noted, this common mode return loss spec RLcc becomes useless at the frequency when the HCB loss is 2/2 dB, which is only 7.5 GHz. The spec should trend down somewhat slower than twice the MCB trace loss, at 0.1 dB/GHz.

SuggestedRemedy

Use a frequency-dependent mask: 2 dB 0.2 <= f <= 4, 1.6+0.1*f dB 4 < f <= 30, 8.5-0.13f 30 < f <= 40. f is in GHz. See another comment for cable RLcc, 162.11.6.

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.6** *P* **185** *L* **27** # R1-49

Dawe, Piers J G NVIDIA

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

As noted, we need a common mode return loss spec RLcc to stop large common-mode voltages building up through multiple low-loss reflections. As we know, this common mode return loss spec RLcc becomes useless at the frequency when the MCB loss is 1.8/2 dB, which is only 8.5 GHz. The impedance the cable presents is mostly related to the connector, (like the mated test fixtures' RLcc) plus the paddle card in the cable end, except at the very lowest frequencies where the cable loss is very small and both connectors can be seen by the measurement. This proposal allows for that.

SuggestedRemedy

Use a frequency-dependent mask: 1.4 dB 0.05 <= f <= 6, 0.68+0.12*f dB 6 < f <= 30, 10.28-0.2*f, 30 to 40. f is in GHz. See another comment for Tx (162.9.4.6 Table 162-10).

Proposed Response *Response Status* **O**

Cl **162** *SC* **162.11.7.1** *P* **186** *L* **7** # R1-52

Dawe, Piers J G NVIDIA

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

93A.1.1 says "It is recommended that the scattering parameters be measured with uniform frequency step no larger than Delta f from a start frequency no larger than fmin to a stop frequency of at least the signaling rate fb". But the test fixtures are defined to 50 GHz, and other specs such as RLdc are defined to 40 GHz.

SuggestedRemedy

Define the maximum frequency for COM and ERL, 40 or 50 GHz. Clauses 162, 163, 120F, 120G.

Proposed Response *Response Status* **O**

Cl **162A** *SC* **162A** *P* **284** *L* **15** # R1-56

Dawe, Piers J G NVIDIA

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

"TP0 and TP5 that might not be testable": see style guide and D3.0 comment 214 (accepted for here)

SuggestedRemedy

TP0 and TP5, which might not be testable. Also in 162.8.1

Proposed Response *Response Status* **O**

Cl **162A** *SC* **162A.4** *P* **285** *L* **1** # R1-41

Dawe, Piers J G NVIDIA

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

The equation for the channel from TP0 to TP2 or from TP3 to TP5 including the test fixture should be checked for consistency with the equations for the PCB, the mated test fixtures, and the cable test fixture traces, although there won't be a perfect match because of the allowances for ball grid array (BGA) footprint and host connector footprints, as well as the difference between product connector and test fixture connector.

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **162B** *SC* **162B.4.1** *P* **292** *L* **5** # R1-57

Dawe, Piers J G NVIDIA

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

Did Figure 162B-4, Mated test fixtures insertion loss, get updated with the revised Eq 162B-5?

SuggestedRemedy

If not (and if there is a visible difference on this scale), please do so.
Also, as the first dB are much more interesting than the last here, it would help the reader if the y axis were -20 to 0, even if that means that ILddMTFmax above 42 GHz is not illustrated.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.1** *P* **197** *L* **48** # R1-9

Brown, Matthew Huawei Technologies Canada

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

Footnote a in Table 163-1, Table 163-2, and Table 163-3 includes the word must, which is deprecated according the SA Standards Style Manual.

SuggestedRemedy

In Table 163-1, Table 163-2, and Table 163-3 ...
Change: "a conforming implementation must behave functionally"
To: "a conforming implementation behaves functionally"

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.6** *P* **206** *L* **20** # R1-33

Ran, Adee
Cisco Systems, Inc.

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

The residual intersymbol interference specification was initially added to clause 163 but subsequently used in 162 and 120F. Its placement in clause 163 is unusual, since most other definitions are placed in 162 and are referred to by the other clauses.

It would be more friendly for readers if all definitions were found in one clause.

SuggestedRemedy

Move subclause 163.9.2.6 to clause 162, and change the references in Table 162–10, Table 163–5, and Table 120F–1 to point to the new subclause.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.6** *P* **206** *L* **22** # R1-19

Wu, Mau-Lin
MediaTek Inc.

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

The ISI_RES spec of CR are quite different from that for KR. Based on that, the calculation method as well as the spec limit of ISI_RES of CR shall be modified. The detailed analysis had be covered in li_3ck_adhoc_01_030922 & wu_3ck_adhoc_033022.

SuggestedRemedy

Add the following paragraph after the 1st sentence of 163.9.2.6,
"ISI_RES is calculated from measurements with a single transmit equalizer setting to compensate for the loss of the transmitter package and host channel. The equalizer setting is chosen to minimize ISI_RES."

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.6** *P* **206** *L* **27** # R1-32

Ran, Adee
Cisco Systems, Inc.

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

*** Comment submitted with the file image.png attached ***

(Cross-clause - 162, 163, 120F)
(The attached file is a mistake, I can't remove it, should be ignored)

Following ad hoc presentation ran_3ck_01_032322, it is suggested to provide more specific definitions or guidance for Tx parameters that depend on equalization, to enable reasonable test times, both for design (simulations) and qualification (with instruments).

ISI_RES as currently defined is strongly dependent on equalization setting. Meeting the existing limit with equalization off may be impossible for CR devices due to ISI resulting from the dispersive loss between TP0 and TP2. Tx equalization can mitigate that, while emphasizing reflections in the path, which is the intent of this specification.

Excessive equalization will reduce the pulse peak and may degrade ISI_RES, so we should not specify it at any equalization setting, but rather allow equalization optimized to minimize ISI_RES.

SuggestedRemedy

Add the following paragraph after equation 163-1 and its variable list:

ISI_RES is calculated from measurements with a single transmit equalizer setting to compensate for the loss of the transmitter package and test fixture. The equalizer setting is chosen to minimize ISI_RES.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.6** *P* **206** *L* **27** # R1-22

Rysin, Alexander NVIDIA

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

ISI_RES is affected by the pulse dispersion when measured at TP2. COM reference receiver uses CTLE to mitigate the effect. Measuring ISI effects with CTLE was adopted in 120D.3.1.7. Presentation is planned.

SuggestedRemedy

In 163.9.2.6 change to: The linear fit pulse response p(k) and error e(k) are determined using the linear fit procedure in 162.9.4.1.1, after these have been recalculated with the continuous time filter described in 93A.1.4.3 using the parameters in Table 163-11 applied and optimized for maximum ISI_RES, with the exception that…".

Alternatively, add the exception only to CL162.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.6** *P* **206** *L* **27** # R1-21

Rysin, Alexander NVIDIA

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

ISI_RES is calculated with Np=11. COM reference receiver uses a 12-tap DFE, which corresponds to Np=17. Presentation is planned.

SuggestedRemedy

In 163.9.2.6 change "with the exception that Np = 11." to: "with the exception that Np=12+Dp+1". Same change in Clause 162.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.7** *P* **206** *L* **39** # R1-34

Ran, Adee Cisco Systems, Inc.

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

The placement of the Peak-to-peak AC common-mode voltage specification in clause 163 is unusual, since most of the definitions are placed in 162 and are referred to by the other clauses.

It would be more friendly for readers if all definitions were found in one clause.

Since 163.9.2.8 defines SCMR which is currently not used by clause 162, it should stay in clause 163. But if SCMR is used also in 162 (subject of another comment) then 163.9.2.8 should be moved too.

SuggestedRemedy

Move subclause 163.9.2.7 to clause 162, and change the references in Table 162–10, Table 163–5, and Table 120F–1 to point to the new subclause.

If SCMR is used in 162 (subject of another comment), also move 163.9.2.8 to clause 162.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.7** *P* **207** *L* **4** # R1-53

Dawe, Piers J G NVIDIA

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

The 4th order filter of 93A-20 would work, but it seems a bit fussy, and probably not what noise meters use.

SuggestedRemedy

Use a first order filter or whatever commercial test equipment uses.

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.8** *P* **207** *L* **15** # R1-4

Ran, Adee Cisco Systems, Inc.

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

The definition of SCMR uses p_max defined as the maximum of p(k), and the text says "The procedure in 162.9.4.1.1 is used to determine the differential-mode linear fit pulse response p(k)."

That procedure is applicable for any equalizer setting and will yield different p(k) vectors (it is actually used to characterize the equalization coefficients), so with this definition, SCMR depends on equalization setting. This is not helpful, and not practical to verify.

SCMR (and the limit applied to it) should be defined strictly with respect to the pulse peak in the "no equalization" setting.

Alternatively, we can get remove the SCMR specification and instead specify VCMPP-LF and VCMPP-HF, as on clause 162 and annex 120G. These are defined independently of equalization setting.

SuggestedRemedy

Change the equation to use v_peak instead of p_max, and refer to 162.9.4.1.2 for the definition of v_peak (subject of another comment).

Delete the sentence "The procedure in 162.9.4.1.1 is used to determine the differential-mode linear fit pulse response p(k)" (it will become redundant).

Proposed Response *Response Status* **O**

Cl **163** *SC* **163.9.2.8** *P* **207** *L* **18** # R1-1

Ran, Adee Cisco Systems, Inc.

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

Following ad hoc presentation ran_3ck_01_032322, it is suggested to provide more specific definitions or guidance for Tx parameters that depend on equalization, to enable reasonable test times, both for design (simulations) and qualification (with instruments).

SCMR is currently defined without reference to equalization setting. The numerator of the SCMR ratio is strongly dependent on equalization setting, while the denominator is mostly independent. So measurements with different equalization will yield different results.

The proposal is to define SCMR with respect to the unequalized pulse peak.

If we have a formal definition of v_peak in 162.9.4.1.2 (subject of another comment), SCMR can just refer to that subclause.

SuggestedRemedy

Delete the sentence "The procedure in 162.9.4.1.1 is used to determine the differential-mode linear fit pulse response p(k)." from the first paragraph.

Change the definition of SCMR to be
SCMR=20*log10(v_peak/V_{CMPP-HF})

In the "Where" list:
v_peak is the is the maximum value of the differential-mode linear fit pulse response p(k), determined using the procedure in 162.9.4.1.1 with equalization off.
- or -
v_peak is defined in 162.9.4.1.2.

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.1** *P* **319** *L* **11** # R1-25

Healey, Adam Broadcom Inc.

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

Equation (52-2) is an expression in terms of an intermediate variable y. Equation (52-3) is needed to map f_r to "y".

SuggestedRemedy

Change "Equation (52-2)" to "Equation (52-2) and Equation (52-3)".

Proposed Response *Response Status* **O**

Cl **163A** *SC* **163A.3.1.2** *P* **319** *L* **37** # R1-26

Healey, Adam
Broadcom Inc.

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

The subscript "ii" of s_{ii}^{(y)} would be better writen as "ij" since "ii" implies the suscripts are equal (e.g., s_{11}) where in the case they are sometimes not equal.

SuggestedRemedy

Change subscript from "ii" to "ij".

Proposed Response *Response Status* **O**