Comment Resolution for Clause 162 Topics

Howard Heck, Intel
Chris Diminico, xxx

Training Comment #11

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

Lusted, Kent — Intel Corporation

Comment Type **T** *Comment Status* **D** *training*

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* **W**

PROPOSED ACCEPT IN PRINCIPLE.
This comment does not apply to the substantive changes between IEEE P802.3ck D3.0 and D3.1 or the unsatisfied negative comments from previous drafts. Hence it is not within the scope of the recirculation ballot.
However, the proposed change is an improvement to the draft.
* add in new table (after Table 162-9) that shows the revised status field structure. New Table 162-x "Status Field Structure" is 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-x"
* remove list item (e)
* move list item (b) to immediately precede the current list item (g)
* renumber the list.
Implement with editorial license

Bit(s)	Name	Description
15	Receiver ready	1 = Training is complete and the receiver is ready for data 0 = Request for training to continue
14:12	Reserved	Transmit as 0, ignore on receipt
11:10	Modulation and precoding status	11 10 1 1 = PAM4 with precoding 1 0 = PAM4 0 1 = Reserved 0 0 = PAM2
9	Receiver frame lock	1 = Frame boundaries identified 0 = Frame boundaries not identified
8	Initial condition status	1 = Updated 0 = Not updated
7	Parity	Even parity bit
6	Reserved	Transmit as 0, ignore on receipt
5:3	Coefficient select echo	5 4 3 1 1 0 = $c(-2)$ 1 1 1 = $c(-1)$ 0 0 0 = $c(0)$ 0 0 1 = $c(1)$
2:0	Coefficient status	2 1 0 1 1 1 = Reserved 1 1 0 = Coefficient at limit and equalization limit 1 0 1 = Reserved 1 0 0 = Equalization limit 0 1 1 = Coefficient not supported 0 1 0 = Coefficient at limit 0 0 1 = Updated 0 0 0 = Not updated

1 0 1 = c(-3)

Table 162-x (new table)

Training Comment #11

162.8.11 PMD control function

The PMD control function performs the PMD start-up protocol. This protocol facilitates timing recovery and equalization while providing a mechanism through which the receiver can configure the transmitter to optimize performance. The protocol supports these functions through the continuous exchange of fixed-length training frames.

The PMD shall implement one instance of the PMD control function described in 136.8.11 for each lane with the following exceptions:

a) The control field structure is specified in Table 162–9 and the status field structure is specified in Table 162-x.

b) The terminal count of max_wait_timer as specified in 136.8.11.7.3 is 12 s.

c) For k_list as specified in 136.8.11.4.4, the set of valid transmitter equalizer coefficient indices is {–3, –2, –1, 0, +1}.

d) For the initial condition request as described in 136.8.11.2.1 five predefined transmitter equalizer settings are specified in 162.9.4.1.3.

e) ~~The coefficient select bits in the control field (Table 136–9) and the coefficient select echo bits in the status field (Table 136–10) have an additional combination, 1 0 1, for selecting *c*(–3).~~

f) The "No equalization" value (see 136.8.11.2.4) of *c*(–3) is 0.

g) A receiver is expected to assert local_tf_lock within 275 ms from entry into the AN_GOOD_CHECK state in Figure 73–11 provided that there is a compliant signal containing valid training frames at the PMD input.

h) The of use_quiet_in_training (see 136.8.11.7.1) is TRUE.

The PMD control functions operate independently on each lane.

Signal paths
Comment #7, 36

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

Brown, Matthew — Huawei Technologies Canada

Comment Type **E** *Comment Status* **D** *signal paths*

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* **W**

PROPOSED ACCEPT.

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

Ran, Adee — Cisco Systems, Inc.

Comment Type **TR** *Comment Status* **D** *signal paths*

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* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Resolve using the response to comment #7.

TX Jitter Comments #12, 13

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

Lusted, Kent — Intel Corporation

Comment Type T *Comment Status* D *TX Jitter*

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* W

PROPOSED ACCEPT IN PRINCIPLE.
The extra parameter should be added to the first paragraph. However, J3u_03 is not defined in 120D.3.1.8.1, but is rather defined in the subsequent sentence.
Change the first sentence of the first paragraph to "Output jitter is characterized by four parameters: J3u, J3u_03, JRMS, and even-odd jitter."

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

Lusted, Kent — Intel Corporation

Comment Type T *Comment Status* D *TX Jitter*

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* W

PROPOSED ACCEPT IN PRINCIPLE.
Replace the first sentence with the following: "JRMS is calculated using the measurement method specified in 120D.3.1.8.1. J3u is calculated using the measurement method for 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)."
Implement with editorial license.

$J3u_{03}$

162.9.4.4 Output jitter

Output jitter is characterized by three parameters, J3u, J_{RMS}, and even-odd jitter. These parameters are 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 any or all of the jitter parameters.

J3u and J_{RMS} are calculated using the measurement method specified in 120D.3.1.8.1. $J3u_{03}$ is calculated the same way as J3u except that the jitter calculation uses only transitions R03 and F30 in Table 162–12.

Even-odd jitter is calculated using the measurement method specified in 120D.3.1.8.2. with the following exceptions:

a) The test pattern is either PRBS13Q or alternatively PRBS9Q. PRBS9Q is defined in 120.5.11.2.a. Meeting the even-odd jitter requirement with only one pattern is sufficient.

b) If the test pattern is PRBS13Q, the corner frequency of the clock recovery unit (CRU) is set to 4 MHz or to 1 MHz. Meeting the even-odd jitter requirement with only one CRU bandwidth is sufficient.

NOTE 1—If the measuring instrument is triggered by a clock based on the signaling rate divided by an even number, the even-odd jitter might not be correctly observed. As a result, the observation of J3u and J_{RMS} might also be affected.

NOTE 2—J3u is sensitive to measurement noise being converted to timing errors. Hence, accounting for measurement noise effects is recommended.

The pattern symbols and thresholds used to define each transition for PRBS13Q are defined in Table 120D–4. The pattern symbols and thresholds used to define each transition for PRBS9Q are defined in Table 162–12.

JRMS is calculated using the measurement method specified in 120D.3.1.8.1. J3u is calculated using the measurement method for 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).

TX RLcc Comment #48

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

Dawe, Piers J G — NVIDIA

Comment Type **TR** *Comment Status* **D** *TX RLcc*

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

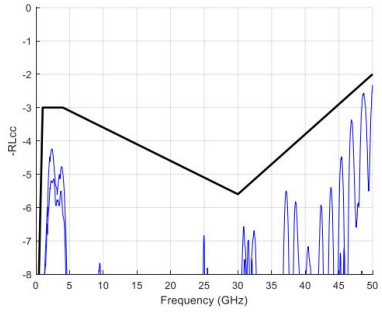
Use a frequency-dependent mask: 2 dB 0.2 <= f <= 4, 1.6+0.1*f dB 4 < f <= 30, 8.5-0.13f 30 < f <= 40. f is in GHz. See another comment for cable RLcc, 162.11.6.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The following related presentation was provided for review by the task force:
https://www.ieee802.org/3/ck/public/22_04/dawe_3ck_01_0422.pdf
The suggested remedy does not provide evidence to support the suggested remedy.

dawe_3ck_01_0422

Mated test fixture RLcc for reference



- Measured vs. spec

https://ieee802.org/3/ck/public/19_07/kocsis_3ck_01_0719.pdf

802.3ck Apr 2022 Common-mode return loss limits 3

Proposed improved host RLcc spec

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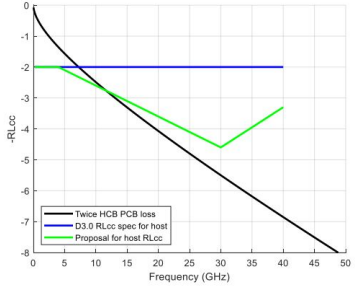

802.3ck Apr 2022 Common-mode return loss limits 6

CA RLcc
Comment #49

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

Dawe, Piers J G NVIDIA

Comment Type **TR** *Comment Status* **D** *CA RLcc*

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* **W**

PROPOSED REJECT.
This comment is a restatement of D3.0 comment i-181 recorded in the following comment report:
https://www.ieee802.org/3/ck/comments/draft3p0/8023ck_D3p0_final_closedcomments_sortedByNumber.pdf
Although a different remedy is provided, no further supporting evidence is given. Per straw poll #22 as recorded in the response to comment i-181, there is not consensus to make the proposed change. Straw poll #22 as recorded in Comment i-181 is reproduced here:
"Straw poll #22 (decision)
I support changing the CA RLcc as proposed in the suggested remedy in comment i-181.
Yes: 10
No: 10"
The following related presentation was provided for review by the task force:
https://www.ieee802.org/3/ck/public/22_04/dawe_3ck_01_0422.pdf

ERL reference Comment #26

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

Healey, Adam Broadcom Inc.

Comment Type E *Comment Status* D *ERL reference*

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* W

PROPOSED ACCEPT.

$s_{ij}^{(x)}$

$s_{ij}^{(y)}$

163A.3.1.2 ERL reference value

The reference reflection coefficient at TP0v is given by Equation (93A–7) where $s_{22}^{(x)}$ is Γ_1 as defined by Equation (93A–17) and $s_{ii}^{(y)}$ are the components of the scattering matrix of the reference channel $S^{(0)}$. In Equation (93A–17), the single-ended reference resistance, R_0, is set to 50 Ω and the single-ended termination resistance, R_d, specified by the clause that invokes this method. The reference pulse time-domain reflection (PTDR) response is computed from the reference reflection coefficient at TP0v using Equation (93A–58) and Equation (93A–59). The reference ERL value is determined from the reference PTDR response using the method in 93A.5 with parameters specified by the clause that invokes this method. If the invoking clause lists more than one set of reference package parameters, the ERL calculation is performed with each set, and the minimum value is used as the reference value.