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Comment Type **ER** *Comment Status* **D** *withdrawn*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This comment was WITHDRAWN by the commenter.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 **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 **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 **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* **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 **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* **162.3** *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* **162.9.3.4** *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:
0012322303231310010331213302202231320111030230213332303130303000
1003020031203332002123313231011003321022213103113222031333131300
0201311013311222101130233203202201221210013321323200113322333330
0110332203232300120233102211211010301312003221320210023220022223
0022122011202030031102321012312202130333101201321112010201010000
3010130102311113013221021203033011133122320310321223102110202000
1302033021032223303201211311312302232330021132121300321122111100
0331112311212000231210312332333031002023011232131330121230122222.

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** # 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** # 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* **162.9.4.1** *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* **162.9.4.3.4** *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* **162.11** *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 **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* **163.10.1** *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* **163.10.7** *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]