Cl **46** *SC* **46.3.3.3** *P* **45** *L* **14** # r02-1

RAN, ADEE Intel Corporation

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

The text inserted here is about "a 2.5GBASE-X MAC/RS implementation". But a MAC/RS is generic, not specific to 2.5GBASE-X; as stated in 125.1.3, 2.5GBASE-X is "a family of Physical Layer implementations". and per 1.4.372 the PHY is between the MDI and the GMII. So, the term "2.5GBASE-X MAC/RS" should be corrected.

SuggestedRemedy

Change "a 2.5GBASE-X MAC/RS implementation " to "a 2.5 Gb/s MAC/RS implementation connected to a 2.5GBASE-X PHY".

Proposed Response *Response Status* **O**

Cl **46** *SC* **46.3.3.3** *P* **45** *L* **13** # r02-2

RAN, ADEE Intel Corporation

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

The original text in this subclause ends with:
A 10 Gb/s MAC/RS implementation is not required to process a packet that has an SFD in a position other than lane 3 of the column following the column containing the Start control character."

This text allows only a 10 Gb/s MAC/RS not to process an SFD in lane 2; a 2.5 Gb/s MAC/RS has no such option. Therefore the added text here does not make any new requirements, and is only informative.

SuggestedRemedy

Make the whole paragraph a NOTE.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.8** *P* **118** *L* **39** # r02-3

RAN, ADEE Intel Corporation

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

The test pattern specified here for DCD is defined in 48A.1

SuggestedRemedy

Change "shall consist of alternating ones and zeros (i.e., 10101010...)" to "shall be the high-frequency test pattern as defined in 48A.1"

Proposed Response *Response Status* **O**

Cl **130** *SC* **130.7.1.4** *P* **149** *L* **46** # r02-4

RAN, ADEE Intel Corporation

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

In all other PMD clauses, both the maximum and minimum voltages are tested under the same conditions, including with the same test pattern, since the test establishes the limits of the same parameter.

See for example 70.7.1.5, 71.7.1.4, 72.7.1.11, and 85.8.3.3.

I see no reason to deviate from precedence and use different patterns for minimum and maximum.

SuggestedRemedy

Change FROM "The maximum differential output voltage test pattern" TO "The differential output voltage test pattern".

Delete the next sentence about the minimum differential voltage test pattern.

Apply corresponding changes in PICS.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.4** *P* **115** *L* **50** # r02-5

RAN, ADEE Intel Corporation

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

"the square wave test pattern defined in 52.9.1.2, with a run of at least eight consecutive ones followed by an equal number of consecutive zeros"

This PMD is used with an 8B/10B PCS. This PCS can't generate pattern with a run longer than 5 bits. It should not be tested with a signal of eight or more bits, since it does not represent voltages expected in actual traffic. Also, there is no defined way to generate such a pattern.

The similar PMDs in clauses 70 and 71 use the test patterns in 36A.2 and 48A.2 respectively. These test patterns can be generated by the PCS and will create the voltages expected with actual traffic.

Also, in all other PMD clauses, both the maximum and minimum voltages are tested with the same test pattern, since the test establishes the limits of the same parameter. I see no reason to deviate from precedence and use different patterns for minimum and maximum.

48A.2 is suitable for 3.125 GBd as used in this clause.

SuggestedRemedy

Change FROM
"The maximum differential output voltage test pattern is the square wave test pattern defined in 52.9.1.2, with a run of at least eight consecutive ones followed by an equal number of consecutive zeros"
TO
"The differential output voltage test pattern is the test pattern specified in 48A.2".

Delete the next sentence about the minimum differential voltage test pattern.

Apply corresponding changes in PICS.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.2** *P* **115** *L* **31** # r02-6

RAN, ADEE Intel Corporation

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

"with f in MHz" is not required here; the quations already divide f by MHz and specify the range with units.

Also in 130.7.1.2, 130.7.1.5

SuggestedRemedy

Delete "with f in MHz" from the text, in all places.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.5** *P* **116** *L* **30** # r02-7

RAN, ADEE Intel Corporation

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

"with f in MHz" is misplaced. Table 128-4 does not use f.

Additionally, equations 128-3 and 128-4 use f as a frequency (so ignore the "f in MHz" definition)

Also in 128.7.2.5.

SuggestedRemedy

Delete "with f in MHz" from the text, here and in 128.7.2.5.

Either:
Change equation 128-4 to use "f/625 MHz" (similar to equation 128-2)
or
Change the text after 128-3 to "for 100 <= f < 625 with f in MHz"
Change the text after 128-4 to "for 615 <= f <= 2000 with f in MHz".

Consider merging the two equations; Equation 93-3 can be used as an example.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.6** *P* **117** *L* **36** # r02-8

RAN, ADEE Intel Corporation

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

f is not divided by MHz and units for the return loss are missing here.

SuggestedRemedy

Either:
Change equation 128-6 to use "f/625 MHz" (similar to equation 128-2)
or
Change the text after 128-6 to "for 615 <= f <= 2000 with f in MHz".

Add "dB" after both equations.

Consider merging the two equations; Equation 93-3 can be used as an example.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.5** *P* **117** *L* **3** # r02-9

RAN, ADEE Intel Corporation

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

Figure 128-4 shows a line but does not state which side of the line is OK. The fact that the y-axis is downwards makes this error-prone.

In similar figures there are indication of which side is good. See for example Figure 93-7.

Also applies to Figure 128-5.

SuggestedRemedy

Add "meets equation constraints" label at the appropriate place in both figures.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.2.1** *P* **119** *L* **26** # r02-10

RAN, ADEE Intel Corporation

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

The test pattern in 48A.4 (CRPAT) is defined there as "This pattern is not intended for jitter compliance testing". There is another test pattern which is intended for compliance testing, in 48A.5 (CJPAT).

The received interference tolerance test in the similar PMD in clause 71 is performed with CJPAT (see 71.7.2.1) and with the same method used here (Annex 69A). For consistency, this pattern should be used here too.

SuggestedRemedy

Change "48A.4" to "48A.5".

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.2.5** *P* **120** *L* **24** # r02-11

RAN, ADEE Intel Corporation

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

"This differential input return loss requirement applies to all valid input levels"

This sentence is a residue from the similar text in the transmitter, but it is meaningless for the receiver; The receiver does not generate an "input level" the way a transmitter generates an "output level".

This text does not appear in recent receiver specifications (from clause 93 and on). It should be removed here to reduce maintenance activity.

Also in 130.7.2.5.

SuggestedRemedy

Delete the quoted sentence from both places.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.4** *P* **110** *L* **22** # r02-12

RAN, ADEE Intel Corporation

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

A bit time in 2.5 Gb/s is 400 ps, so 40 bit times is 16 ns. In a PCB with Dk=4, n=0.5 and the delay is 6.7 ns per meter; this allows 2.4 meters for the round-trip path or 1.2 meters per direction. Is this considered sufficient? The project objectives don't state a length but an IL <= 11 dB at 1.5625 GHz and just "improved FR4" PCB can reach 1.3 m or more with this loss budget (see for example http://www.ieee802.org/3/bj/public/jan12/kochuparambil_01a_0112.pdf) So this assumption may not be safe.

Note also that the corresponding medium delay in clause 71 (similar PMD) is 160 bit times.

On the other hand, allowing 256-40 bit times for the PMD seems very lenient; a single-lane PMD should not create a delay larger than 10 ns. So taking another 40 bit times for the medium is probably safe.

SuggestedRemedy

Change "40 bit times" to "80 bit times".

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.8** *P* **118** *L* **36** # r02-13

RAN, ADEE Intel Corporation

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

*** Field CommentType updated on 12/15/2017 from T to TR ***
"The data pattern for jitter measurements shall be a low-frequency test pattern as defined in 48A.2"

This data pattern is a square wave, so the measurement will not include any data-dependent jitter (due to ISI or transmitter limited bandwidth).

This is fine if there are other specifications that limit the transmitter's ISI, but I don't see any such specifications in this clause.

Receiver tests are performed with a lossy channel but not with a lossy transmitter. This may lead to lack of interoperability.

To prevent a transmitter with high ISI/DDJ/loss, the transmit jitter should be measured with a frequency-rich signal such as CJPAT (48A.5). This is specified in the similar clause 71. The jitter specification limits should also be similar to those of clause 71.

SuggestedRemedy

Change "low-frequency test pattern as defined in 48A.2" to "jitter tolerance test pattern defined in Annex 48A.5".

Change the jitter maximum values in Table 128-4 to be equal to the ones in Table 71-4.

Apply corresponding changes in PICS.

Proposed Response *Response Status* **O**

Cl **130** *SC* **130.7.1.7** *P* **152** *L* **31** # r02-14

RAN, ADEE Intel Corporation

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

Small font size in "52.9.1.2" and later in 130.7.1.8 in "52.9.1.1"

SuggestedRemedy

fix it.

Proposed Response *Response Status* **O**

Cl **130** *SC* **130.10.4.2** *P* **158** *L* **50** # r02-15

RAN, ADEE — Intel Corporation

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

Mismatch between delay limits in PICS and in the referenced subclause

SuggestedRemedy

change 256 to 1024

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.6** *P* **33** *L* **39** # r02-16

Anslow, Peter — Ciena Corporation

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

Several Clause 45 tables are missing the footnote from the heading row, R/W entry

SuggestedRemedy

The R/W element in the heading of:
Table 45-7 should have a footnote "R/W = Read/Write, RO = Read only"
Table 45-17c should have a footnote "RO = Read only"
Table 45-60 should have a footnote "R/W = Read/Write, SC = Self-clearing, RO = Read only"

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.80** *P* **35** *L* **34** # r02-17

Anslow, Peter — Ciena Corporation

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

The row for bit 150.2 in Table 45-60 has "RW" but this should be "R/W"

SuggestedRemedy

Change "RW" to "R/W"

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.3.9a** *P* **39** *L* **40** # r02-18

Anslow, Peter — Ciena Corporation

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

Footnote a to Table 45-125a should be "RO = Read only"

SuggestedRemedy

Change the footnote to be "RO = Read only"

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.3.9a** *P* **39** *L* **19** # r02-19

Anslow, Peter — Ciena Corporation

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

The reserved row in Table 125a as modified by P802.3bs is for bits "3.21.15:6" but the "6" is not shown as being deleted.

SuggestedRemedy

Add a "6" in strikethrough font before the underlined "9" in what is currently "3.21.15:9"

Proposed Response *Response Status* **O**

Cl **127** *SC* **127.2.7.1.3** *P* **81** *L* **25** # r02-20

Anslow, Peter — Ciena Corporation

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

"in Tables 36-1a through 36-1e, or 36-2," is not correctly formatted to be replaced by cross-references when integrated into the 802.3 standard.

SuggestedRemedy

Change "in <g>Tables 36-1a through 36-1e</g>, or <g>36-2</g>," to "in <g>Table 36-1a</g> through <g>Table 36-1e</g>, or <g>Table 36-2</g>,"
where <g> and </g> are the start and end of green text (character tag External), respectively

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.3.2.1.2** *P* **31** *L* **18** # r02-21

Marris, Arthur — Cadence Design Syst

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

802.3cb will be a revision of IEEE Std 802.3-2017 which will incorporate IEEE Std 802.3bz-2016 so there is no need to include the text "(as inserted by IEEE Std 802.3bz-2016)" in the editing instruction

SuggestedRemedy

Delete the text:
"(as inserted by IEEE Std 802.3bz-2016)"

Scrub the entire document to update to make the editing instructions to refer to the new base standard.

Also delete the editor's note on line 3 pf page 31.

Also if 802.3cb is to be published after 802.3cd then the editing instructions need to take into account any changes introduced by 802.3cd. This is particularly relevant for the Clause 73 edits.

Proposed Response *Response Status* **O**

Cl **31B** *SC* **31B.4.3** *P* **164** *L* **7** # r02-22

RAN, ADEE — Intel Corporation

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

The editorial instructions refer to item labels that have been inserted by 802.3bz, but in the revision project these labels were modified.

Also applies to 31B.4.6.

SuggestedRemedy

In the editorial instruction, change "MIIca" to "MIId" and "MIIcb" to "MIIe".

Change item labels from "MIIcaa" to "MIId1" and "MIIca1" to "MIIe1" in the instruction and in the table.

Apply similar changes in 31B.4.6.

Proposed Response *Response Status* **O**

Cl **69B** *SC* **69B.4.2** *P* **171** *L* **28** # r02-23

RAN, ADEE — Intel Corporation

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

Figure 69B-2a includes a grid while the existing Figure 69B-2 doesn't.

The grid may be removed for visual clarity and consistence.

SuggestedRemedy

Consider removing the grid.

Proposed Response *Response Status* **O**

Cl **69B** *SC* **69B.4.3** *P* **173** *L* **3** # r02-24

RAN, ADEE — Intel Corporation

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

Figure 69B-5a and Figure 69B-5b don't include the "high confidence region" label (which appears in the similar existing figures).

SuggestedRemedy

Add "high confidence region" labels at the appropriate places.

Proposed Response *Response Status* **O**

Cl **69B** *SC* **69B.4.4** *P* **174** *L* **6** # r02-25

RAN, ADEE — Intel Corporation

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

"Equation (69B-10) and Equation (69B-11)." is new text, but it's not underlined.

SuggestedRemedy

Format with underline.

Proposed Response *Response Status* **O**

Cl **0** *SC* **0** *P* **175** *L* **3** # r02-26

RAN, ADEE Intel Corporation

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

Multiple new figures with function plots added by this project are bit-map graphics, unlike most other similar figures in the standard which are vector graphics.

This causes poor quality on a large display (and can be easily detected by zooming in on text or lines).

Applies to:
Figures 69B-2a, 69B-5a, 69B-5b, 69B-6a, 69B-7a and 69B-9;
Figures 128A-3, 128A-7;
Figures 128B-2, 128B-4, 128B-5;
Figure 130A-3, and Figure 130A-7.

Figures generated using Matlab are typically bit-mapped; Matlab does not support the SVG format internally, and third-party conversion tools create bit mapped SVG files. I don't know of a way to overcome this using Matlab.

Different tools, such as GNU Octave, inherently generate vector graphics SVG files with practically the same scripts. I have used Octave to generate these plots in other projects.

SuggestedRemedy

Change all new "function plot" figures listed above (and others if necessary) to pure vector graphics SVG files.

Proposed Response *Response Status* **O**

Cl **127A** *SC* **127A** *P* **179** *L* **10** # r02-27

RAN, ADEE Intel Corporation

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

"operating 2.5GBASE-X PCS/PMA to a 1000BASE-X PCS/PMA link partner"

Should be either "operating with" or "interfacing to".

SuggestedRemedy

Change "to" to "with".

Proposed Response *Response Status* **O**

Cl **127A** *SC* **127A** *P* **179** *L* **46** # r02-28

RAN, ADEE Intel Corporation

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

"The implication of this is the 2.5 Gb/s MAC has to be able to accept a seven byte preamble on the XGMII with the SFD positioned on lane 2."

Isn't that the RS that has to be able?

If so, a cross-reference to 46.3.3.3 would help. Otherwise, refer to wherever this is specified.

I think this also applies to the "MAC" occurrences in the next paragraph, but I'm not sure.

SuggestedRemedy

In line 46, change "MAC" to "RS (see 46.3.3.3)".

Consider changing "MAC" to "RS" twice in the next paragraph.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.1** *P* **181** *L* **15** # r02-29

RAN, ADEE Intel Corporation

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

There are multiple cross-references to Figure 128A-1 in lines 15-16, And then in line 16 there is a final sentence about what Figure 128A-1 is. Too many parentheses.

TP0D-H, TP0H-D, TP5D-H and TP5H_D are all shown in Figure 128A-1; one cross-reference is enough.

Compare with 130A.1 which is cleaner.

SuggestedRemedy

Remove all the parenthesized pointers to Figure 128A-1.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.1** *P* **181** *L* **2** # r02-30

RAN, ADEE Intel Corporation

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

"Figure 128A-2 (one direction shown) and Equation (128A-1) depict a typical 2.5GSEI application and summarize the informative differential insertion loss budget, which is shown in Figure 128A-3"

This is inaccurate.

Figure 128A-2 depicts the the informative differential insertion loss budget at a certain frequency (Nyquist frequency is 1.5625 GHz; this is mentioned in the figure title but not in the text).

Equation 128A-1 and Figure 128A-3 are not about a loss budget, they are the informative maximum insertion loss from TP0 to TP5 for frequencies from 0.05 to 2.34375 GHz.

Similar issue with similar text in 130A.1.

SuggestedRemedy

Change the quoted text to:

"Figure 128A-2 (one direction shown) depicts the informative differential insertion loss budget at 1.5625 GHz for a typical 2.5GSEI application.
The informative maximum differential insertion loss from TP0 to TP5 is given in Equation (128A-1) and depicted in Figure 128A-3."

In 130A.1, change
"(one direction shown) and Equation (130A-1) depict a typical 5GSEI application and summarize the informative differential insertion loss budget, which is shown in Figure 130A-2."

To
"Figure 130A-2 (one direction shown) depicts informative differential insertion loss budget at 2.578125 GHz for a typical 5GSEI application.
The informative maximum differential insertion loss from TP0 to TP5 is given in Equation (130A-1) and depicted in Figure 130A-2."

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.1** *P* **182** *L* **7** # r02-31

RAN, ADEE Intel Corporation

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

At the top part of figure 128A-2 the PMD transmit function is adjacent to TP01D-H, but at the middle part it is adjacent to TP0D-H.

The test points are aligned in the three parts of the figure, but the PMD transmit function is not. This is confusing.

SuggestedRemedy

In the top part, move the "PMD transmit function" block to the left so that it is aligned with the same block in the middle part, and extend the arrows from this block to the "connector" accordingly.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.1** *P* **183** *L* **2** # r02-32

RAN, ADEE Intel Corporation

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

Figure 128A-3 does not show which side of the line is good, and its title is vague.

SuggestedRemedy

Add a label "meets equation constraints" above the curve.

Change the title to "Informative maximum differential insertion loss from TP0 to TP5".

Proposed Response *Response Status* **O**

Cl **129** *SC* **129.1.2** *P* **129** *L* **21** # r02-33

RAN, ADEE Intel Corporation

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

The referenced subclause 49.2.13.3 is the "State diagrams" subclause, which does not define hi_ber at all. hi_ber is defined in 49.2.13.2.2, ber_cnt is defined in 49.2.13.2.4 and and 125us_timer is defined in 49.2.13.2.5.

Actually, the difference is in the behavior of the BER monitor process, whose stated diagram is mentioned in the referenced subclause.

Also, the units should be (greek mu)s rather than microsecond (as in 49.2.13.2.5).

Also, the text and paragraph formatting suggest a list of exceptions, but there is only one exception. It can be merged with the previous paragraph.

SuggestedRemedy

Change FROM

hi_ber is asserted if ber_cnt reaches 16 in a 250 microsecond period. This differs from the definition in 49.2.13.3 which defines hi_ber as occurring if ber_cnt reaches 16 in a 125 microsecond period.

TO

The BER Monitor process asserts hi_ber if ber_cnt reaches 16 in a 250 (greek mu)s period. This differs from the specification in 49.2.13.3, where it asserts hi_ber if ber_cnt reaches 16 in a 125 (greek mu)s period.

Also change "with the following exception:" to "with the exception that" and delete the paragraph break.

Proposed Response *Response Status* **O**

Cl **129** *SC* **129.1.3.2** *P* **131** *L* **3** # r02-34

RAN, ADEE Intel Corporation

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

Two lettered lists in the same subclause should not use the same letters.

See for example similar text in 51.1.2.

SuggestedRemedy

Change the list format here from a), b) etc. to a1), b1), etc.

Proposed Response *Response Status* **O**

Cl **129** *SC* **129.1.4** *P* **131** *L* **19** # r02-35

RAN, ADEE Intel Corporation

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

"The nominal rate of the PMA service interface is 322.27 Mtransfers/s"

This should be exactly 1/16 of the nominal rate of PMD service interface, which is stated in the next paragraph as 5.15625 Gb/s.

This yields exactly 322.265625 Mtransfers/s.

Numbers in the standard are exact; there is no reason for truncating digits.

SuggestedRemedy

Change "322.27" to "322.265625".

Proposed Response *Response Status* **O**

Cl **125** *SC* **125.3** *P* **64** *L* **34** # r02-36

RAN, ADEE Intel Corporation

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

The style manual (Presentation of data and table format, 13.3.2) says: "All numbers should be aligned at the decimal point."

This table does not follow the guideline, and with the separation to three-digit groups, the result is quite messy.

SuggestedRemedy

Format as required to follow the guideline.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1** *P* **186** *L* **5** # r02-37

RAN, ADEE Intel Corporation

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

Host output measurements should be performed with AC coupling to the test equipment, since the host transmitter is normally used with an AC-coupled receiver.

This is shown in the test setup diagrams (e.g. Figure 128B-1), but not mentioned here.

Also applies to drive output measurements, 128A.3.3.

SuggestedRemedy

In the paragraph starting at L39, change:

"A test system with a fourth-order Bessel-Thomson low-pass response with 8 GHz 3 dB bandwidth is to be used for all output signal measurements"

to
"A test system as depicted in Figure 128B-1, with a fourth-order Bessel-Thomson low-pass response with 8 GHz 3 dB bandwidth, is to be used for all output signal measurements"

Apply a similar change in 128A.3.3.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1.3** *P* **188** *L* **3** # r02-38

RAN, ADEE Intel Corporation

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

Figure 128A-7 does not show which side of the line is good.

SuggestedRemedy

Add a label "meets equation constraints" below the curve.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1.4.1** *P* **188** *L* **33** # r02-39

RAN, ADEE Intel Corporation

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

"rather than TP2 (see Figure 128A-4)"

TP2 does not appear in that figure. It appears in Figure 85-2, and I'm not sure it is important to point to that figure.

SuggestedRemedy

Change the reference to Figure 85-2, or delete "(see Figure 128A-4)"

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1.4.2** *P* **188** *L* **38** # r02-40

RAN, ADEE Intel Corporation

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

Parentheses should not be italicized. Also missing period after "128A.3.1.4.1".

SuggestedRemedy

fix per comment.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1.5** *P* **188** *L* **45** # r02-41

RAN, ADEE Intel Corporation

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

"The data pattern for jitter measurements shall be a square wave as defined in 52.9.1.2 with five consecutive 1's and 0's"

Clause 52 uses the 10GABSE-R PCS, different from this annex; The same test pattern for 2.5GBASE-X PHYs is defined in 48A.2, as mentioned in Clause 128.

Also, as noted in comment r02-46, the length of the measurement will be proportional to the length of the square wave (for the same number of edges), so a higher frequency pattern is preferable.

Consistency with Clause 128 and PCS is preferred.

SuggestedRemedy

Change "a square wave as defined in 52.9.1.2 with five consecutive 1's and 0's" to "the test pattern defined in Annex 48A.1".

If comment r02-46 is not accepted, change it to Annex 48A.2 instead.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1.7** *P* **189** *L* **10** # r02-42

RAN, ADEE Intel Corporation

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

PRBS9 is not a defined test pattern for a 2.5GBASE-X PHY. Neither the PMD nor the PCS have these test pattern even as optional capabilities.

In addition, the PCS never generates or expects a run of more than 5 bits, while this pattern has multiple runs up to 9 bits long. So even loopback may be impossible, since the receiver may not be able to receive PRBS9 correctly.

Since PRBS9 is used here only for the SNDR measurement (which uses the linear-fit procedure), we can remove it if the SNDR is defined in another way, such as with a square wave pattern.

SuggestedRemedy

Change the test definition in this clause as follows:

Use the test pattern defined in Annex 48A.5 (five 1's and five 0's); maintain the reference equalizer from 93A.1.4.3, with values from Table 128A-2.

Capture a large enough number of cycles of the test pattern to enable the desired measurement accuracy, sampling 10 samples per cycle such that the samples closest to the zero-crossings are approximately 0.5 UI away from the zero-crossing. The reference equalizer is applied in the measurement. Label the samples v_1 to v_N, where N is the ten times the number of cycles.

Define V_avg as the average of the samples.
Define A as the mean of the absolute difference between each sample and V_avg (A = Sigma[abs(V_i-V_avg)]/N, i=1 to N).
Define sigma_n+ as the RMS of the difference between each positive sample and A (sigma_n+ = Sqrt(Sigma[(V_i-A)^2]*2/N), for all i where V_i>0).
Define sigma_n- as the RMS of the difference between each negative sample and -A (sigma_n- = Sqrt(Sigma[(V_i+A)^2]*2/N), for all i where V_i<0).

Define SNDR as 10*log10(A^2/((sigma_n+)^2 + (sigma_n-)^2), with the reference equalizer setting that yields the highest value for that ratio.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.2.2** *P* **190** *L* **33** # r02-43

RAN, ADEE Intel Corporation

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

"The data pattern used for the receiver interference tolerance test shall be PRBS7"

PRBS7 is not a valid pattern for a 2.5GBASE-KX PHY, and there is no error counting capability defined for this pattern (it is actually not use by any clause in 802.3). Even if the test is performed with loopback, the receiver or its transmitter may be unable to handle this pattern correctly.

Receiver tolerance should be done with a test pattern representing real traffic; for example Clause 128 specifies using the test pattern defined in 48A.4 (proposed to be changed to 48A.5 in comment r02-10).

Also applies to the drive interference tolerance test in 128A.3.4.2 and to the host and drive jitter tolerance tests in 128A.3.2.3 and 128A.3.4.3.

SuggestedRemedy

Change "PRBS7" to "the test pattern defined in 48A.5", here and in 128A.3.2.3, 128A.3.4.2, and 128A.3.4.3.

Update the PICS accordingly.

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.2.2** *P* **190** *L* **28** # r02-44

RAN, ADEE Intel Corporation

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

"from f1 in Table 69B-2 to 0.5 times the signaling speed for the port type under test"

f1 has two values in that table; and this Annex is specific to 2.5GBASE-KX.

SuggestedRemedy

Change this sentence to "from 0.312 GHz to 1.5625 GHz".

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.1.4** *P* **188** *L* **28** # r02-45

RAN, ADEE Intel Corporation

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

The transmitter output waveform specification uses the procedure in 92.8.3.5.1. But that procedure uses a PRBS9 test pattern which is not a valid pattern for a 2.5GBASE-KX PHY.

This test may not be possible to conduct with some compliant transmitters. Also, since an 8B/10B transmitter does not generate all possible combinations of ISI cursors (for example, it can't generate long unbalanced sequences or long runs), this kind of analysis is not meaningful. Specifically the steady-state voltage from this analysis cannot appear with valid data (unlike in BASE-R PHYs).

Clause 128 has different measurement methods. They should be followed here, and extended if necessary. The limit values for these specifications may be different due to the measurement point.

The drive output characteristics in 128A.3.3.1 have the same issue.

These specifications are also referenced in the receiver interference tolerance tests and their associated tables, so those should be changed too.

SuggestedRemedy

For the host output:

Delete 128A.3.1.4 entirely. (possibly add instead specifications similar to those of 128.7.1.4 (Output amplitude) and 128.7.1.7 (Transition time), but these can be referenced directly).

In Table 128A-1:
- Delete the "Output waveform" row.

- Add a row for Peak-to-peak differential output voltage (min) with value 580 mV and (max) with value 1200 mV, measured per 128.7.1.4. (The min value accounts for the expected attenuation of a 10-UI-period square wave launched at 800 mV, with the maximum IL).

- Add a row for Maximum transition time (20%-80%) with value 460 ps, measured per 128.7.1.7. (The value matches the pulse-peak-to-steady-state ratio: 60%*UI/0.42).

Update and reorder 128A.3.4.2 (drive input receiver interference tolerance) so that in step c) the amplitude is adjusted to meet the PTP output voltage in Table 128A-8, and in step d) the ISI channel is adjusted to meet the transition time in Table 128A-8. Update table 128A-8 accordingly, replacing the first two rows with the min PtP output voltage and max transition time of the host.
Apply the same changes in 128A.3.4.3 (drive input receiver jitter tolerance) replacing Table 128A-8 with Table 128A-9.

For the drive output:

Delete 128A.3.3.1, 128A.3.3.2 and 128A.3.3.3.

In Table 128A-6:
- Delete the "Output waveform" row.
- Add a row for Peak-to-peak differential output voltage (min) with value 800 mV, and (max) with value 1200 mV, measured per 128.7.1.4. (The expected attenuation of a 10-UI-period square wave at the drive output is negligible).

- Add a row for Maximum transition time (20%-80%) with value 229 ps, measured per 128.7.1.7. (The value matches the pulse-peak-to-steady-state ratio: 60%*UI/0.84).

Update and reorder 128A.3.2.2 (host input receiver tolerance) so that in step c) the amplitude is adjusted to meet the PTP output voltage in Table 128A-3, and in step d) the ISI channel is adjusted to meet the transition time in Table 128A-3. Update table 128A-3 accordingly, replacing the first two rows with the min PtP output voltage and max transition time of the drive.
Apply the same changes in 128A.3.2.3 (host input receiver jitter tolerance) replacing Table 128A-3 with Table 128A-4.

Update the PICS accordingly.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.8** *P* **118** *L* **36** # r02-46

RAN, ADEE Intel Corporation

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

"The data pattern for jitter measurements shall be a low-frequency test pattern as defined in 48A.2"

I am fine with measuring jitter with a square wave, but this low frequency means that the edges are infrequent and therefore the measurement is 5 times longer than it would be with a high-frequency test pattern.

Since 128.7.1.9 says "Jitter specifications are specified for BER 10^-12", accurate measurements will take a very long time.

The test pattern in 48A.1 can be used for faster measurement of the same number of edges. It is also the pattern used for DCD measurement.

SuggestedRemedy

Change the quoted sentence to
"The data pattern for jitter measurements shall be a high-frequency test pattern as defined in 48A.1".

Delete the next paragraph (L39).

Proposed Response *Response Status* **O**

Cl **128A** *SC* **128A.3.2.2** *P* **190** *L* **45** # r02-47

RAN, ADEE Intel Corporation

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

"Adjust pattern generator random jitter to the required value"

This reads as if the value is directly programmed in the pattern generator control. Instead, the instrument should be adjusted to meet the maximum random jitter (as in previous items).

Also applies to 128A.3.2.3, 128A.3.4.2, and 128A.3.4.3.
Also applies to 130A.4.2, 130A.4.3, 130A.6.2, and 130A.6.3.

SuggestedRemedy

Change the quoted sentence to
"Adjust pattern generator random jitter to meet the random jitter (peak-to-peak)"

Apply similarly in 128A.3.2.3, 128A.3.4.2, 128A.3.4.3, 130A.4.2, 130A.4.3, 130A.6.2, and 130A.6.3.

Proposed Response *Response Status* **O**

Cl **128B** *SC* **128B.2** *P* **204** *L* **29** # r02-48
RAN, ADEE Intel Corporation

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

SFF-8482 is a specification, not a connector.

SuggestedRemedy

Insert "specified in" before "SFF-8482".

Proposed Response *Response Status* **O**

Cl **128B** *SC* **128B.1.2** *P* **203** *L* **48** # r02-49
RAN, ADEE Intel Corporation

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

Missing units (dB) in equation (128B-1). Also in (128B-2) and (128B-3).

In "for 0.05 <= f <=5.15625 GHz", the "GHz" is not required, since f is defined "in GHz".

SuggestedRemedy

Add (dB) in all equations.

Delete "GHz" from the frequency range.

Proposed Response *Response Status* **O**

Cl **128B** *SC* **128B.2.3.1** *P* **206** *L* **40** # r02-50
RAN, ADEE Intel Corporation

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

"from the FNEXT"

"FNEXT" is not defined in this draft, this should be "from the NEXT".

Also in L45, "The transmitter and receiver filter is defined in Equation (128B-5) as weighting functions" should be "The combined transmitter and receiver filters are defined by Equation (128B-5) as a weighting function".

SuggestedRemedy

Change per comment.

Proposed Response *Response Status* **O**

Cl **128B** *SC* **128B.2.3.1** *P* **206** *L* **54** # r02-51
RAN, ADEE Intel Corporation

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

Equation (128B-5) includes the term "f_ft" but it is not defined. The next paragraph defines f_nt, which makes sense since there is no FEXT in this case.

In the text paragraph, the sentence about f_nt is stated as plural but there is only one bandwidth.

SuggestedRemedy

Change f_ft to f_nt in the equation.

In the text, change "The 3 dB transmit filter bandwidths f_nt are inversely proportional" to "The 3 dB transmit filter bandwidth f_nt is inversely proportional".

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.1** *P* **212** *L* **2** # r02-52
RAN, ADEE Intel Corporation

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

something is missing in "(one direction shown)". (also subject of another comment)

SuggestedRemedy

Insert "Figure 130A-2".

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.3.1** *P* **216** *L* **5** # r02-53

RAN, ADEE Intel Corporation

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

Host output measurements should be performed with AC coupling to the test equipment, since the host transmitter is normally used with an AC-coupled receiver.

This is shown in the PMD test setup diagrams (e.g. Figure 128B-1), but not mentioned here.

Also applies to Drive output measurements, 130A.5.

SuggestedRemedy

In the paragraph starting at L40, change:

"A test system with a fourth-order Bessel-Thomson low-pass response with 8 GHz 3 dB bandwidth is to be used for all output signal measurements"

to
"A test system as depicted in Figure 128B-1, with a fourth-order Bessel-Thomson low-pass response with 8 GHz 3 dB bandwidth, is to be used for all output signal measurements".

Apply a similar change in 130A.5.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.3.1.2** *P* **217** *L* **13** # r02-54

RAN, ADEE Intel Corporation

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

"The peak-to-peak differential output voltage is shown in Table 130A-1, when the transmitter is enabled and disabled. The peak-to-peak differential output voltage is less than or equal to 35 mV when the transmitter is disabled."

These sentences don't make sense here. Voltages are not "shown" in a table; their limits are _specified_ in a table, but that has already been stated in 130A.3.1. The number 35 mV is the limit when disabled, but the limit when enabled is not listed.

Other clauses, and Annex 128A, don't have these sentences here.

Also, the whole paragraph is in smaller than usual font.

SuggestedRemedy

Delete the quoted sentence.

Format the rest of the paragraph with regular size font.

Proposed Response *Response Status* **O**

Cl **130** *SC* **130.7.1** *P* **148** *L* **31** # r02-55
RAN, ADEE Intel Corporation

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

The maximum jitter values in Table 130-4 are such that TJ=RJ+DJ; this is impossible, since jitter is a random process and the distribution peaks are not additive.

There is actually no need to define DJ separately, since the combination of RJ and TJ limits it.

I'm using clause 85 for an example of jitter specifications excluding DDJ (since the measurement in clause 130 uses a square wave pattern that creates no DDJ). In that clause, TJ=RJ+0.1 UI.

Also applies to Annex 130A output tests and interference tolerance stress.

SuggestedRemedy

Change the jitter maximum values in Table 130-4, Table 130A-1, Table 130A-4, Table 130A-7, and Table 130A-10 to be:

Random jitter: 0.15 UI
Total jitter: 0.25 UI

Apply corresponding changes in the PICS.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.3.6** *P* **219** *L* **31** # r02-56
RAN, ADEE Intel Corporation

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

What does "for the host only" mean here? it is a host output test.

SuggestedRemedy

delete the quoted words.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.4** *P* **220** *L* **26** # r02-57
RAN, ADEE Intel Corporation

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

"The test transmitter then transmits any valid PCS output (such as scrambled idle)."

This is not a test procedure subclause. The text does not make sense.

SuggestedRemedy

Delete the quoted sentence.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.4** *P* **220** *L* **23** # r02-58
RAN, ADEE Intel Corporation

Comment Type **G** *Comment Status* **X**

The hierarchical placement of 130A.4 is weird - it appears (both in the table of contents and in the PDF navigation pane) as a descendant of 130A.3, rather than a sibling subclause as I would expect.

Similarly for 130A.5 and 130A.6.

SuggestedRemedy

Format the headings as required to get the right hierarchy for 130A.4 through 130A.6 and their descendants.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.7** *P* **231** *L* **2** # r02-59
RAN, ADEE Intel Corporation

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

Missing "Annex 130A" after "for".

Also in the text of 130A.7.1 after "conform to".

Also in the "Identification of protocol standard" row in 130A.7.2.2, after "IEEE Std 802.3cb-20xx,".

Compare to other PICS subclauses.

SuggestedRemedy

Add the Annex number as cross-references in all three places.

Proposed Response *Response Status* **O**

Cl **128** *SC* **128.7.1.9** *P* **118** *L* **47** # r02-60

RAN, ADEE Intel Corporation

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

"Jitter specifications are specified for BER 10^-12"

This isn't good language.

Also in 130.7.1.9, 128A.3.1.6, and 130A.3.5

SuggestedRemedy

Change the quoted sentence, in all places, to

"Jitter values are specified for BER = 10^-12".

Proposed Response *Response Status* **O**

Cl **69A** *SC* **69A.2.1** *P* **166** *L* **6** # r02-61

Healey, Adam Broadcom Ltd.

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

The inserted paragraph is an almost complete duplication of the existing paragraph except that one is a requirement for 1000BASE-KX. 10GBASE-KX4, etc. while the other is for 2.5GBASE-KX and 5GBASE-KR. For the latter, it seems that the last sentence of the original paragraph has been omitted. Without this sentence, it is unclear how an "equivalent stress may be introduced in the test channel".

SuggestedRemedy

If the intended method is to define an adjustment to b3 as described by Equation (69A-1), then there is no need to change the paragraph starting at line 47 (p165) or insert the new paragraph starting at line 6 (p166). In this case, remove the change and insertion. If the method is intended to be different, it should be described.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.3.1** *P* **216** *L* **29** # r02-62

RAN, ADEE Intel Corporation

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

In Table 130A-1, Pre-cursor equalization ratio is specified as 0.65 +/- 0.65 which means 0 to 1.3. From the definition of Rpre in 130.7.1.10, this means that v2 (the voltage 1 UI before a transition) can be from 0 to 1.3 times higher than the steady-state voltage.

This wide range does not make sense; it is effectively saying "anything goes".

Note that At the PMD's transmitter, the pre-cursor ratio should be 1.2 to 1.3 (Table 130-4) due to pre-emphasis. But ISI created by the channel will reduce this ratio at TP4H-D. A value of 1 is ideal; any deviation from 1 is the ISI left to the receiver. Simple receivers will not be able to deal with a large precursor, so the precursor has to be controlled.

The pre-cursor ratio as defined in 130.7.1.10 is difficult to measure after the host channel, since the value v2 will not be on a "flat" voltage as in Figure 130-7.

Instead, the linear fit procedure specified in 130A.3.3.1 (defined in 92.8.3.5.1) can also be used to limit the pre-cursor ISI; this procedure yields c(-1) which is effectively the normalized precursor value - exactly what we want to control.

A recommended range for c(-1) is between -0.05 to +0.05. This corresponds to Rpre values from 1.11 to 0.9 respectively, which would leave precursor noise up to 10% of the main pulse (for receivers which do not handle precursor at all, this will create vertical eye closure of ~10%).

This may also apply to 130A.5 which measures the drive output; at that test point, the c(-1) should still be negative since it is in short distance from the PMD's transmitter, which is pre-emphasized (originally with Rpre=1.25, correponding to c(-1)=-0.125).

SuggestedRemedy

Create new subclause 130A.3.3.3 titled "Pre-cursor coefficient" with the text:

The Pre-cursor coefficient, c(-1), is determined according to 130A.3.3.1.

In Table 130A-1, replace "Pre-cursor equalization ratio" with "Pre-cursor coefficient", referenced to 130A.3.3.3, with value +/- 0.05.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.5.2** *P* **225** *L* **48** # r02-63

RAN, ADEE Intel Corporation

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

"The linear fit pulse, p(k), is determined according to 130A.3.3.1"

This should reference 130A.5.1 (the procedure is identical, but the test point is different).

SuggestedRemedy

change per comment.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.3.6** *P* **219** *L* **34** # r02-64

RAN, ADEE Intel Corporation

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

"Compute the linear fit pulse response p(k) and the linear fit error waveform e(k) from the resulting waveform per 85.8.3.3.5 using Np=8 and Dp = 1"

There is a procedure above, in 130A.3.3.1, which computes p(k) per 92.8.3.5.1, effectively with Dp=2. This is an improved procedure and a better value for Dp. There is no reason to use the old ones.

Note also that 85.8.3.3.5 should be in green (but I'm proposing to replace it).

Also applies to 130A.5.3 which should refer to 130A.5.1.

SuggestedRemedy

Change the quoted sentence to

"Compute the linear fit pulse response p(k) and the linear fit error waveform e(k) from the resulting waveform per 130A.3.3.1".

Apply similarly in 130A.5.3, referring to 130A.5.1.

Proposed Response *Response Status* **O**

Cl **130A** *SC* **130A.5** *P* **225** *L* **27** # r02-65

RAN, ADEE Intel Corporation

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

In another comment I suggest using c(-1) instead of pre-cursor equalization ratio for the host output.

This may also apply here, for the drive output; at TP2D-H, the c(-1) should still be negative since it is in short distance from the PMD's transmitter, which is pre-emphasized.

The nominal pre-emphasis creates Rpre=1.25 +/- 0.05, corresponding to c(-1) from -0.1 to -0.15. Reasonable limits at TP2D-H are -0.125 (min) and -0.075 (max).

Alternatively, pre-cursor equalization ratio can be maintained, but there should be a reference to its definition (130.7.1.10). Note that direct measurement of Rpre may prove difficult.

SuggestedRemedy

Create new subclause 130A.5.3 titled "Pre-cursor coefficient" with the text:

The Pre-cursor coefficient, c(-1), is determined according to 130A.5.1.

In Table 130A-7, replace "Pre-cursor equalization ratio" with "Pre-cursor coefficient", referenced to 130A.5.3, with limits -0.125 to -0.075.

Proposed Response *Response Status* **O**

Cl **127** *SC* **127.7.4.4** *P* **104** *L* **50** # r02-66

Mcclellan, Brett Marvell Semiconducto

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

fix typo "tenbit"

SuggestedRemedy

change "tenbit" to "ten bit"

Proposed Response *Response Status* **O**