Cl **FM**　　　*SC* **FM**　　　　　*P* **1**　　　*L* **31**　　　# 30

Anslow, Pete　　　　　　　　　　Ciena

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

The Working Group Chair has now announced the assumed approval order for the next
three amendments as:
IEEE P802.3bs - Amendment 10
IEEE P802.3cc - Amendment 11
IEEE P802.3cb - Amendment 12

SuggestedRemedy

Change the end of the list of amendments on Page 1 line 31 from:
"… IEEE Std 802.3bu-2016, and IEEE Std 802.3bv-2017." to:
"…　IEEE Std 802.3bu-2016, IEEE Std 802.3bv-2017, IEEE Std 802.3-2015/Cor 1-2017,
IEEE Std 802.3bs-201x, IEEE Std 802.3cc-201x, and IEEE Std 802.3cb-201x."

On page 13:
Add the summary for Corrigendum 1 to be immediately after the summary for 802.3bv
In the summary for 802.3bs, add Amendment 10-
Add the summary for 802.3cc as Amendment 11 after 802.3bs
Add the summary for 802.3cb as Amendment 12 after 802.3cc

Proposed Response　　　　*Response Status*　**O**

Cl **000**　　　*SC* **0**　　　　　*P* **13**　　　*L* **19**　　　# 185

Slavick, Jeff　　　　　　　　　　Broadcom Limited

Comment Type　**E**　　　*Comment Status*　**D**　　　　　　　*<late>*

Shouldn't IEEE Std 802.3-2015/Cor1-2017 be listed in the introduction of what we're
amending?

SuggestedRemedy

Add IEEE Std 802.3-2015/Cor1-2017 to the list of ammendments preceding the cd
ammendment.

Proposed Response　　　　*Response Status*　**W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **030**　　　*SC* **30.5.1.1.2**　　　　*P* **41**　　　*L* **25**　　　# 49

Graber, Steffen　　　　　　　　　Pepperl+Fuchs

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

100GBASE-R on right side of table

SuggestedRemedy

Change 100GBASE-R to 200GBASE-R

Proposed Response　　　　*Response Status*　**O**

Cl **030**　　　*SC* **30.5.1.1.2**　　　　*P* **41**　　　*L* **25**　　　# 61

Cheng, Weiying　　　　　　　　　Coriant

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

Should it be 200GBASE-R? same comment for line 27, and 29.

SuggestedRemedy

Proposed Response　　　　*Response Status*　**O**

Cl **030**　　　*SC* **30.5.1.1.2**　　　　*P* **41**　　　*L* **27**　　　# 50

Graber, Steffen　　　　　　　　　Pepperl+Fuchs

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

100GBASE-R on right side of table

SuggestedRemedy

Change 100GBASE-R to 200GBASE-R

Proposed Response　　　　*Response Status*　**O**

Cl **030**　　　*SC* **30.5.1.1.2**　　　　*P* **41**　　　*L* **29**　　　# 51

Graber, Steffen　　　　　　　　　Pepperl+Fuchs

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

100GBASE-R on right side of table

SuggestedRemedy

Change 100GBASE-R to 200GBASE-R

Proposed Response　　　　*Response Status*　**O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected　　RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **030**
SC **30.5.1.1.2**

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2017-06-27 1:47:08 PM

Cl **030** *SC* **30.5.1.1.15** *P* **42** *L* **35** # 178

Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **D** *<late>*

Clause 119 has been added to the aFECAbility list of clauses

SuggestedRemedy

Bring in the changes made by 802.3bs, which are: Add "Clause 119," after Clause 108. Delete the words "a FEC sublayer for"

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **030** *SC* **30.5.1.1.29** *P* **43** *L* **0** # 175

Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **D** *<late>*

aRSFECIndicationAbility has a Clause 91 reference, need to add Clause 134 as well.

SuggestedRemedy

Delete the (see 91.5.3.3) from both 30.5.1.1.29 and 30.5.1.1.31

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **045** *SC* **45.2.1.116l** *P* **65** *L* **49** # 174

Slavick, Jeff Broadcom Limited

Comment Type **T** *Comment Status* **D** *<late>*

The bits in register 1.604 are for indicating a change in state is requested. In 135F.3.2.1 the text describing these bits using the term flag.   The bits of 1.605 and 1.606 are the requested status/setting.   Currently the Names for 1.604, 1.605, 1.606 only differ by the presence of "Lane X" for 1.605 and 1.606.   So I think some clarity could be made.

SuggestedRemedy

Change "request status" to "request flag" for all of 45.2.1.116l. Change the Description of the bits from "Tx/Rx input precoding requested" to "Tx/Rx input precoding change requested" and "Tx/Rx input precoding not requested" to "Tx/Rx input precoding no change requested"

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **045** *SC* **45.2.7** *P* **77** *L* **6** # 18

Hajduczenia, Marek Charter Communicatio

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

Bottom line in Table 45-200 should be thick all around

SuggestedRemedy

Fix the line thickness

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.5** *P* **78** *L* **1** # 19

Hajduczenia, Marek Charter Communicatio

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

Since there are no PICS to be added, why is it in here and empty?

SuggestedRemedy

Remove 45.5 is no PICs are intended to be added

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.5** *P* **78** *L* **1** # 31

Anslow, Pete Ciena

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

The Clause 45 PICS has no changes in it.

SuggestedRemedy

Either add some changes to the Clause 45 PICS or remove this section from the draft.

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.5.3.3** *P* **78** *L* **11** # 62

Cheng, Weiying Coriant

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

Is there any reason to have an empty table here? If there is no change, remove it. Otherwise, add changes for the PICS.

SuggestedRemedy

Proposed Response *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **045**
SC **45.5.3.3**

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Cl **069**   *SC* **69.1.2**   *P* **80**   *L* **47**   # 20
Hajduczenia, Marek   Charter Communicatio

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

"two-lane" or "2-lane" - it is not a big difference but the draft seems to use such terms inconsistently.

SuggestedRemedy

If you feel like doin a global find&replace, please at least align how you use these terms. I would opt for <number"-lane format, which is easier to read IMO

Proposed Response   *Response Status* **O**

Cl **069**   *SC* **69.1.2**   *P* **80**   *L* **53**   # 21
Hajduczenia, Marek   Charter Communicatio

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

Missing "," before "repectively"

SuggestedRemedy

Add missing comma

Proposed Response   *Response Status* **O**

Cl **069**   *SC* **69.2.3**   *P* **81**   *L* **36**   # 32
Anslow, Pete   Ciena

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

4-level should not split across two lines

SuggestedRemedy

change to a non-breaking hyphen (Esc - h)

Proposed Response   *Response Status* **O**

Cl **073**   *SC* **73.2**   *P* **84**   *L* **20**   # 22
Hajduczenia, Marek   Charter Communicatio

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

It would be really nice if at least initial version of the draft showed actual changes in figures when complete replacement is required. A red box around added / modified areas would really help readers asses what was modified.

SuggestedRemedy

Thank you

Proposed Response   *Response Status* **O**

Cl **073**   *SC* **73.6.4**   *P* **85**   *L* **17**   # 23
Hajduczenia, Marek   Charter Communicatio

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

Stray "."

SuggestedRemedy

Remove "."

Proposed Response   *Response Status* **O**

Cl **073**   *SC* **73.6.4**   *P* **85**   *L* **44**   # 24
Hajduczenia, Marek   Charter Communicatio

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

It does not matter what the purpose of reservation its is, it is just reserved, nothing more.

SuggestedRemedy

Change "Reserved for future technology" to "Reserved"

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **073**
SC **73.6.4**

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2017-06-27 1:47:08 PM

Cl **078**   *SC* **78.1**   *P* **91**   *L* **5**   # 180

Slavick, Jeff   Broadcom Limited

Comment Type   **T**   *Comment Status* **D**   *<late>*

In BS we decided to keep the AUIs in the introduction paragaph even when they don't support shutdown, (D3.0 comment i-13). This is done to make it clear if you want to use EEE and have a AUI in the system it's supported.

SuggestedRemedy

Bring in the 3rd paragph of 78.1 from 802.3bs and modify it to read "EEE supports operation over twisted-pair cabling systems, twinax cable, electrical backplanes, optical fiber, the XGXS for 10 Gb/s PHYs, the 25GAUI for 25 Gb/s PHYs, the XLAUI for 40 Gb/s PHYs, the LAUI-2 or 50GAUI-n for 50 Gb/s PHYs, the CAUI-10, CAUI-4 or 100GAUI-n for 100 Gb/s PHYs, the 200GAUI-n and 200GXS for 200 Gb/s PHYs, and the 400GAUI-n and 400GXS for 400 Gb/s PHYs. Table 78–1 lists the supported PHYs and interfaces and their associated clauses."

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **080**   *SC* **80.1.3**   *P* **93**   *L* **20**   # 54

Hanan, Leizerovich   MultiPhy

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

There is no 100GAUI-4 in Annex 83A, Annex83B, Annex83D, or Annex83E.

SuggestedRemedy

Change:
Annex 83A, Annex 83B, Annex 83D, or Annex 83E.

to:
Annex 83A, Annex 83B, Annex 83D, Annex 83E, Annex135D, or Annex 135E .

Proposed Response   *Response Status* **O**

Cl **080**   *SC* **80.1.3**   *P* **93**   *L* **44**   # 25

Hajduczenia, Marek   Charter Communicatio

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

"100GBASE-KP4 all use a 4 lane data path." - in this case, "4 lane" is an adjective and should be hyphenated

SuggestedRemedy

Change to "4-lane"; make changes also in other pieces of text already in the draft for consistency. See also comment on "four-lane" versus "4-lane"

Proposed Response   *Response Status* **O**

Cl **080**   *SC* **80.5**   *P* **101**   *L* **4**   # 181

Slavick, Jeff   Broadcom Limited

Comment Type   **T**   *Comment Status* **D**   *<late>*

Table 80-7 is missing columns for new baud rates we've added.

SuggestedRemedy

See presentation

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **080**   *SC* **80.7**   *P* **101**   *L* **0**   # 182

Slavick, Jeff   Broadcom Limited

Comment Type   **T**   *Comment Status* **D**   *<late>*

We added new 100G Clauses so list of related clauses needs to be updated.

SuggestedRemedy

Add "Clause 135-138, Clause 140" to the list of clauses that are 100G related to the first paragraph of 80.7

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **080**   Page 4 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **80.7**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **090**   *SC* **90.1**   *P* **104**   *L* **6**   # 33
Anslow, Pete   Ciena

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

The paragraph being changed is the second paragraph of 90.1 not the first.

SuggestedRemedy

Change "second" to "first".

Proposed Response   *Response Status* **O**

Cl **091**   *SC* **91**   *P* **105**   *L* **1**   # 77
Nicholl, Gary   Cisco Systems

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

In keeping with the response to comment #85 against D1.2 (made by Jeff Slavic) and subsequent ad-hoc discussions, it is proposed to add an optional FEC degrade monitor feature to the 100G RS-FEC. The proposed feature is identical to what was added for 200G/400G in 802.3bs, but without the end-to-end signalling. Please see nicholl_042617_3cd_adhoc for background.

SuggestedRemedy

nicholl_3cd_01_0717 defines the necessary changes to implement the proposed FEC degrade feature for 50G RS-FEC in Clause 134. Implement the same changes for the 100G RS-FEC in Clause 91, and add the appropriate MDIO registers/bits to Clause 45.

Proposed Response   *Response Status* **O**

Cl **091**   *SC* **91.3**   *P* **105**   *L* **0**   # 183
Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

Need to add 135 reference

SuggestedRemedy

Modify the 2nd sentence of the 1st paragraph of 91.3 to read "Therefore, the RS-FEC sublayer may be a client of the PMA sublayer defined in Clause 83 or Clause 135 when the PMA service interface width, p, is set to 4."

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **091**   *SC* **91.5.3.3**   *P* **107**   *L* **8**   # 184
Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

We aren't precluding the use of Bypass Correction for the CD PHYs, and we should do so.

SuggestedRemedy

Bring the last sentence of the 3rd paragraph of 91.5.3.3 into the draft and add 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2 and 100GBASE-DR to the list of PHYs that don't support bypass correction.
PICS RF6 also needs to be updated with the PHYs that don't support bypass correction

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **116**   *SC* **116.1.4**   *P* **112**   *L* **8**   # 34
Anslow, Pete   Ciena

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

Comment r01-56 against P802.3bs D3.1 has added a column for "Clause 118 200GMII Extender" in Table 116-3 as "O" for all PHY types.

SuggestedRemedy

Add a column for "Clause 118 200GMII Extender" in Table 116-2a as "O" for both PHY types.
Add a column for "Clause 118 200GMII Extender" in Table 116-3 as "O" for all PHY types.

Proposed Response   *Response Status* **O**

Cl **120**   *SC* **120.5.7.2**   *P* **115**   *L* **31**   # 179
Slavick, Jeff   Broadcom Limited

Comment Type **E**   *Comment Status* **D**   *<late>*

Editors note has served it's purpose

SuggestedRemedy

Delete editors note

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **120**   Page 5 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **120.5.7.2**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **120**   *SC* **120.5.7.2**   *P* **115**   *L* **31**   # 35

Anslow, Pete   Ciena

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

The editor's note says it will be deleted in the next draft.

SuggestedRemedy

Delete the note

Proposed Response   *Response Status* **O**

Cl **131**   *SC* **131.3.3**   *P* **123**   *L* **21**   # 86

Trowbridge, Steve   Nokia

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

The text "PMA:IS_SIGNAL.indication" has the line going through it in this one instance in Figure 131-2, where the similar text at all other inter-sublayer interfaces breaks the arrow above and below the text.

SuggestedRemedy

Break the arrow around the text as elsewhere in the same figure

Proposed Response   *Response Status* **O**

Cl **131**   *SC* **131.4**   *P* **256**   *L* **9**   # 85

Stover, David   Analog Devices

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

Gap between digits in many locations throughout document. Looks like a thousands-place separator was replaced with a space. For example, Table 131–4 column "Maximum (bit time)" includes entries such as "2 048", "16 384", etc.

SuggestedRemedy

Search and repair all instances where thousands-place separator was replaced with a space; delete the space.

Proposed Response   *Response Status* **O**

Cl **131**   *SC* **131.5**   *P* **125**   *L* **24**   # 87

Trowbridge, Steve   Nokia

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

In the right hand stack, the top of the box for the 50GAUI-n (labeled wth SP1 and SP6 on the side) doesn't line up with the PMA(2:n) box above

SuggestedRemedy

Tidy up the figure

Proposed Response   *Response Status* **O**

Cl **131**   *SC* **131.5**   *P* **126**   *L* **22**   # 186

Slavick, Jeff   Broadcom Limited

Comment Type **E**   *Comment Status* **D**   *<late>*

Tables 131-5 and 131-6 use - for not applicable, while both Clause 80 and 116 have used N/A.

SuggestedRemedy

Change the -'s to N/A in Tables 131-5 and 131-6

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **132**   *SC* **132.1**   *P* **129**   *L* **23**   # 1

Hajduczenia, Marek   Charter Communicatio

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

"64-bit wide" or "64-bit-wide"? Given that these three words form a new adjective, the latter should be used

SuggestedRemedy

Per comment

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **132**   Page 6 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **132.1**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **132**   *SC* **132.1.7**   *P* **131**   *L* **32**   # 88
Trowbridge, Steve   Nokia

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

Given that 81.3 defines CGMII and XLGMII (which are identical), given that the sublayers below (e.g., PCS) resemble 40GBASE-R more than 100GBASE-R, better to refer to XLGMII from this clause than CGMII

SuggestedRemedy

Change CGMII to XLGMII, lines 32, 37, 41 and onward through the rest of clause 132

Proposed Response   *Response Status* **O**

Cl **133**   *SC* **133.2.1**   *P* **137**   *L* **2**   # 2
Hajduczenia, Marek   Charter Communicatio

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

"20 479 66-bit blocks on each PCS lane, rather than after every 16 383 66-bit blocks" - in text, it would be much clearer for a reader to have "," as thousand separator rather than " "

SuggestedRemedy

Consider changing to "20,479 66-bit blocks on each PCS lane, rather than after every 16,383 66-bit blocks" or alternatively, use no separator at all - it is still simple to read without any specific separation
Consider scrubbing the rest of the draft.

Proposed Response   *Response Status* **O**

Cl **133**   *SC* **133.2.2**   *P* **137**   *L* **26**   # 3
Hajduczenia, Marek   Charter Communicatio

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

In figure 133-3, individual 66b blocks are not properly left-aligned, as would be expected. Since the accompanying text does not speak of any misalignment, I assume block should be left aligned.

SuggestedRemedy

Make sure all 66b blocks and markers are left aligned across lanes - they are NOT right now

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134**   *P* **144**   *L* **1**   # 78
Nicholl, Gary   Cisco Systems

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

In keeping with the response to comment #85 against D1.2 (made by Jeff Slavic) and subsequent ad-hoc discussions, it is proposed to add an optional FEC degrade monitor feature to the 50G RS-FEC. The proposed feature is identical to what was added for 200G/400G in 802.3bs, but without the end-to-end signalling. Please see nicholl_042617_3cd_adhoc for background.

SuggestedRemedy

Implement the changes shown in nicholl_3cd_01_0717, and add the approprite MDIO registers/bits to Clause 45.

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.1.1**   *P* **144**   *L* **28**   # 5
Hajduczenia, Marek   Charter Communicatio

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

The scope states clearly that: "The optional FEC bypass correction feature is not supported" but then age 151, line 36 speaks of "bypass correction indication" that may be enabled - are these the same featurer os not?

SuggestedRemedy

if they are not the same, please consider adding reference to where an example of "bypass correction feature" is defined, for a reader to know what NOT to expect
If they are the same, then text on page 151 should be removed, since the feature is supposed to NOT be supported

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.4**   *P* **146**   *L* **4**   # 4
Hajduczenia, Marek   Charter Communicatio

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

"bit times" or "BT" - 134.4 uses "bit times" while 133.3 uses "BT" to imply the same meaning, I assume

SuggestedRemedy

Pick one and use consistently Given that the acronym is not used in clauses exctensively, I'd suggest using "bit times"

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **134**
SC **134.4**

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2017-06-27 1:47:08 PM

Cl **134**　　　*SC* **134.5.3.2**　　　　*P* **151**　　　*L* **12**　　　# 89

Trowbridge, Steve　　　　　　　　Nokia

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

"all FEC lanes" is appropriate when the number of FEC lanes could be in the range 4-16 as for other interfaces, but reads funny when the number of lanes is exactly two

SuggestedRemedy

Change "After all FEC lanes are aligned …" to "After both FEC lanes are aligned …"

Proposed Response　　　*Response Status* **O**

Cl **134**　　　*SC* **134.5.3.3**　　　　*P* **151**　　　*L* **49**　　　# 120

Ran, Adee　　　　　　　　Intel

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

As shown in a contribution to 802.3bs (see http://www.ieee802.org/3/bs/public/16_09/ran_3bs_01a_0916.pdf), predicting the link performance by the binary event of the average symbol error ratio exceeding some threshold is error prone and would result in problems setting the threshold correctly.

In mass deployment of 802.3cd links, as expected in future data centers, this may result in multiple false alerts or perceived degradations in links that have ample margin for practically error-free operation. The only way to avoid these false alarms is to have a very high margin in all links, but that would increase the cost.

An alternative solution, outlined in http://www.ieee802.org/3/bs/public/16_09/ran_3bs_02a_0916.pdf, is to count codewords with a specific number of symbol errors in separate counters. This information is available from the RS-FEC decoder and would be much more useful for predicting uncorrectable errors and identifying links that have insufficient margin (and the desired margin can be defined after the data is collected).

The proposal above was not accepted, mainly claiming that it is tightly coupled with the PCS FEC which might only be used in an XS while the actual PMD-PMD link would use another FEC. But in 802.3cd there are no XS's and no other FEC is expected, so this method is perfectly adequate.

If information on degradation or prediction of uncorrectable errors is desirable, it should use the relevant information. At the minimum, that information should be available through standard registers. These registers may be queried by management and reported to the partner through higher layer protocols, outside of the scope of 802.3 (or we can add LLDP message in clause 79 later).

SuggestedRemedy

Based on slide 17 of http://www.ieee802.org/3/bs/public/16_09/ran_3bs_02a_0916.pdf:

Define a variable array (16 integers, 12 bits each) for counting received codewords with 1 to 15 symbol errors and uncorrectable codewords. Map these variables to MDIO registers, non-rollover, clear on read.

Add similar variables mapped to the same registers also in clause 91 for the 100G RS-FEC and in clause 119 for the 200G PCS FEC. These should be optional.

Proposed Response　　　*Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected　　RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **134**
SC **134.5.3.3**

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Cl **134**   *SC* **134.5.3.7**   *P* **152**   *L*   # 90

Trowbridge, Steve   Nokia

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

Missing ">"

SuggestedRemedy

Change "amp_rx_3<63:58> = am_rxpayloads<1, 125:120" to "amp_rx_3<63:58> = am_rxpayloads<1, 125:120>"

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.5.3.7**   *P* **152**   *L* **16**   # 7

Hajduczenia, Marek   Charter Communicatio

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

Different styles of marking up variables - in some locations, variables are surrounded with "", in others, they are not

SuggestedRemedy

Consider adding "" around names of variables - this adds to readability of the text, especially when names of variables can be easily confused with the rest of the sentence. Alternatively, putting names of variables in italics might help as well. There are multiple examples (see page 151 lin 24 for example of inconsistencies)

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.5.3.7**   *P* **152**   *L* **18**   # 6

Hajduczenia, Marek   Charter Communicatio

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

missing space in "(see134.5.3.4)"

SuggestedRemedy

Per comment

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.6**   *P* **156**   *L* **48**   # 80

Nicholl, Gary   Cisco Systems

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

Need to insert a definiton for the fec_optional_states variable.

SuggestedRemedy

Insert a new variable definition before amps_Lock<x> as follows:

134.6.4 fec_optional_states

This variable is always set to true to indicate that the optional states in the FEC synchronization state diagram in Figure 91–8 are implemented. This variable is mapped to the bit defined in 45.2.1.102 (1.201.7).

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.6.2**   *P* **156**   *L* **1**   # 79

Nicholl, Gary   Cisco Systems

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

fec_optional_states variable is missing in Table 134-2.

SuggestedRemedy

Insert new row in Table 91–3 after "RS-FEC high SER" row to define the mapping for the fec_optional_states status variable.

Proposed Response   *Response Status* **O**

Cl **134**   *SC* **134.6.2**   *P* **156**   *L* **20**   # 91

Trowbridge, Steve   Nokia

Comment Type **TR**   *Comment Status* **D**

Since there are only two FEC lanes, presumably only registers 1.210 and 1.211 are used

SuggestedRemedy

Change "1.210 to 1.213" to "1.210, 1.211"

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **134**
SC **134.6.2**

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Cl **134** 　 *SC* **134.6.7** 　 *P* **157** 　 *L* **15** 　 # 81
Nicholl, Gary 　 Cisco Systems

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

The first sentence is not strictly correct as there is no optional "fec bypass correction" feature defined in Clause 134.

SuggestedRemedy

Change
 "An uncorrected FEC codeword is a codeword that contains errors (when the bypass correction feature is supported and enabled) or contains errors that were not corrected (when the bypass correction feature is not supported or not enabled)."
to
"An uncorrected FEC codeword is a codeword that contains errors that were not corrected."

Proposed Response 　 *Response Status* **O**

Cl **134** 　 *SC* **134.7.4.1** 　 *P* **160** 　 *L* **40** 　 # 171
Wertheim, Oded 　 Mellanox Technologie

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

The Alignment marker insertion feature indicates: First 256 message bits to be transmitted from every 1024th codeword.
The AM length is 257 bits.

SuggestedRemedy

Replace 256 with 257.

Proposed Response 　 *Response Status* **O**

Cl **135** 　 *SC* **135.1.4** 　 *P* **165** 　 *L* **53** 　 # 8
Hajduczenia, Marek 　 Charter Communicatio

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

More instanced of adjective forming inconsistencies: "2 lane" - other locations "2-lane" and "two-lane"

SuggestedRemedy

Align to "<digit/number>-lane" format in the whole draft

Proposed Response 　 *Response Status* **O**

Cl **135** 　 *SC* **135.3** 　 *P* **167** 　 *L* **52** 　 # 92
Trowbridge, Steve 　 Nokia

Comment Type **TR** 　 *Comment Status* **D**

The description of 50G lanes is broken in several ways: the PCSL and FECL rates are different, and only FECLs can be carried over a single-lane 50G interface

SuggestedRemedy

Change "If a PMA client is another PMA, a 50GBASE-R PMA with p=2 physical input lanes receives NRZ symbols on each of its input lanes at 2 times the PCSL/FECL rate." to "If a PMA client is another PMA, a 50GBASE-R PMA with p=2 physical input lanes receives NRZ symbols on each of its input lanes at the FECL rate or at 2 times the PCSL rate."
Change "A 50GBASE-R PMA with p=1 physical input lane receives PAM4 symbols on each of its input lanes at 2 times the PCSL/FECL rate, with each symbol formed from two bits." to "A 50GBASE-R PMA with p=1 physical input lane receives PAM4 symbols on that input lane at the FECL rate, with each symbol formed from two bits."
Delete the final sentence of the paragraph "The bit stream represented by the input symbols carries z/p bit-multiplexed PCSLs/FECLs on each physical input lane, where z=2 (below the FEC) or z=4 (above the FEC) for 50GBASE-R." since it is impossible to have a single-lane 50G AUI above the FEC

Proposed Response 　 *Response Status* **O**

Cl **135** 　 *SC* **135.3** 　 *P* **168** 　 *L* **7** 　 # 93
Trowbridge, Steve 　 Nokia

Comment Type **TR** 　 *Comment Status* **D**

PAM4 symbols carry two bits, so while a 100G PMA with p=1 or p=2 input lanes receives BITS on each of its input lanes at 4 or 2 times the FECL rate, the input lanes receive PAM4 symbols at 2 or 1 times the FECL rate

SuggestedRemedy

Change "4 or 2 times" to "2 or 1 times"

Proposed Response 　 *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **135**
SC **135.3**

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Cl **135**   *SC* **135.5.7**   *P* **175**   *L* **2**   # 187

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *\<late\>*

In the PCS Clauses we have a flow of data, as we go from sub-clause to sub-clase, we use variables of inputs -> ouputs, where the output of the previous sub-clause is the input to the next. We don't have this in the PAM4 encoding section (Precode section uses G(j) and P(j) but the Gray encode section does not). In Clause 94, Figure 94-2 and 94-3 defines the order of gray and precoding for that PMA in each direction.

SuggestedRemedy

Add the following text to 135.5.7: For lanes encoded as PAM4 additional encoding of the data stream is done. In the transmit direction pairs of bits are first Gray encoded, and then Precoded when precoding is enabled. In the receive direction the received symbol is precoded, when precoding is enabled, and then Gray mapped into pairs of bits.

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **135**   *SC* **135.5.7.1**   *P* **175**   *L* **6**   # 191

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *\<late\>*

There's only a transmit path Gray mapping, no receive path.   And the pairs of bits -> gray symbol is only done for output lanes, not input lanes.

SuggestedRemedy

Add the following to 135.5.7.1 "For input lanes encoded as PAM4, the PMA receive process shall map Gray-coded symbols to pairs of bits as specified in 120.5.7"

Change the current text "For lanes encoded as PAM4" to be "For output lanes encoded as PAM4"

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **135**   *SC* **135.5.7.2**   *P* **175**   *L* **10**   # 173

Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

This says
For lanes encoded as PAM4, the PMA shall provide 1/(1+D) mod 4 precoding capability on each transmit lane and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane.
and later,
In a PMA that is adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2... In a PMA that is adjacent to any other PMD, precoder_tx_out_enable_i and precoder_rx_in_enable_i are always set to 0.

while 120.5.7.2 says
A PMA adjacent to a 200GBASE-CR4 or 200GBASE-KR4 PMD, shall provide 1/(1+D) mod 4 precoding capability on all transmit lanes and may optionally provide 1/(1+D) mod 4 decoding capability on all receive lanes on the PMD service interface. Precoding is implemented as specified in 135.5.7.2.
...
The variables precoder_tx_out_enable_i and precoder_rx_in_enable_i are always set to 0 in a PMA that is not adjacent to a 200GBASE-CR4 or 200GBASE-KR4 PMD.

It should be made clear that precoding is not used on optics or C2M, so there is no need to provide the functionality and then disable it.

SuggestedRemedy

Change the first paragraph of 135.5.7.2 to
For lanes encoded as PAM4, a PMA adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2 PMD or a PMA that is used for 50GAUI-1 C2C or 100GAUI-2 C2C shall provide the 1/(1+D) mod 4 precoding capability on each transmit lane, and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane. A PMA that is used for 50GAUI-1 C2M or 100GAUI-2 C2M or adjacent to an optical PMD does not use precoding across the C2M interface, or towards or from the optical PMD.

Add a Tx output precoder ability MDIO bit.

Change the first paragraph of 120.5.7.2 to:
A PMA adjacent to a 200GBASE-CR4 or 200GBASE-KR4 PMD shall provide 1/(1+D) mod 4 precoding capability on all transmit lanes, and may optionally provide 1/(1+D) mod 4 decoding capability on all receive lanes on the PMD service interface. Precoding is implemented as specified in 135.5.7.2. A PMA that is used for 200GAUI-4 C2C or 400GAUI-8 C2C, 200GAUI-4 C2M or 400GAUI-8 C2M, or adjacent to an optical PMD, does not use precoding across the C2C or C2M interface, or towards or from the optical PMD.

Add a Tx output precoder ability MDIO bit (I don't know if it would be the same bit as for 135).

Consistency: "each lane" or "all lanes"

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **135**   Page 11 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **135.5.7.2**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Proposed Response   *Response Status* **O**

Cl **135**   *SC* **135.5.7.2**   *P* **175**   *L* **10**   # 172

Wertheim, Oded   Mellanox Technologie

Comment Type **TR**   *Comment Status* **D**

The PAM4 encoding clause states that for lanes encoded as PAM4, the PMA shall provide 1/(1+D) mod 4 precoding capability. While this is true for PMAs used for C2C interfaces or for PMA adjacent to KR or CR PMDs, it's not the case for C2M.
The requirement implies that an optical transceiver has to add the cost for a precoder even when it's not in use in the C2M interfaces

SuggestedRemedy

For lanes encoded as PAM4, a PMA adjacent to a 50GBASE-CR, 50GBASE-KR, 100GBASE-CR2, or 100GBASE-KR2 PMD or a PMA that is used for 50GAUI-1 C2C or 100GAUI-2 C2C shall provide 1/(1+D) mod 4 precoding capability on each transmit lane and may optionally provide 1/(1+D) mod 4 decoding capability on each receive lane. A PMA that is used for 50GAUI-1 C2M or 100GAUI-2 C2M or adjacent to an optical PMD does not use precoding towards or from the optical PMD.

Add a Tx output precoder capability MDIO bit either to PMA precoder control Tx output register or to a new register.

Proposed Response   *Response Status* **O**

Cl **135**   *SC* **135.7.2.1**   *P* **181**   *L* **21**   # 36

Anslow, Pete   Ciena

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

Comment i-52 against P802.3bx D3.0 changed all instances of "enquiries" to "inquiries" in IEEE Std 802.3-2015.

SuggestedRemedy

Change "enquiries" to "inquiries" on Page 181, line 21 and Page 364, line 25

Proposed Response   *Response Status* **O**

Cl **135B**   *SC* **135B.1**   *P* **330**   *L* **50**   # 116

Ran, Adee   Intel

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

The third paragraph of this annex contains too much information. It talks about definition of link, loss budget, NRZ modulation, AC coupling, recommendation about -3 dB point, seems to have no logical order and is dificult to follow.

The rest of the annex is short and concise paragraphs.

Signalling rate is missing from this paragraph but appears in the next paragraph, unconnected to its remainder, which discusses equalization.

Breaking this paragraph into shorter paragraphs would benefit the reader.

Also, signaling rate and modulation should be described together and separately from the other information. The best place seems to be the previous, one-line paragraph, which describes the service interface being instantiated.

Similarly applies to all C2C annexes.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **135B**
SC **135B.1**

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Cl **135C**   *SC* **135C.1**   *P* **336**   *L* **50**   # 121
Ran, Adee   Intel

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

The third and fourth paragraphs of this annex contain too much information. They talk about definition of link, loss budget, NRZ modulation, AC coupling, recommendation about -3 dB point, seem to have no logical order and are dificult to follow.

The rest of the annex is short and concise paragraphs.

Signalling rate is missing from this text but appears in the next paragraph, unconnected to its remainder, which discusses relation to OIF documents.

Breaking these paragraphs into shorter paragraphs would benefit the reader.

Also, signaling rate and modulation should be described together and separately from the other information. The best place seems to be the previous, one-line paragraph, which describes the service interface being instantiated.

Similarly applies to all C2M annexes.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response   *Response Status* **O**

Cl **135D**   *SC* **135D.1**   *P* **343**   *L* **1**   # 117
Ran, Adee   Intel

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

The paragraphs about 50G (L1) and 100G (L26) are separate and mostly repeat the same information. They should be merged and reordered to address both cases, and state the differences.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response   *Response Status* **O**

Cl **135E**   *SC* **135E.5.3**   *P* **352**   *L* **1**   # 82
Maki, Jeffery   Juniper Networks

Comment Type **TR**   *Comment Status* **D**

Figure 135E-1 shows that 50GAUI-2 C2M and 100GAUI-4 C2M require FEC. No where in 135E.5.3 Major capabilities/options is it listed that FEC is mandatory. Furtermore, what FEC code is mandatory is not listed.

SuggestedRemedy

List the mandatory FEC code to make a compliant chip-to-module interface.

Item: FEC50; Feature: 50GBASE-R RS-FEC; Subclause: 134; Value/Comment: Device implements Clause 134 RS-FEC for 50GBASE-R; Status: M; Support: Yes [ ]

Item: FEC100; Feature: 100GBASE-R RS-FEC; Subclause: 91; Value/Comment: Device implements Clause 91 RS-FEC with RS(544,514) for 100GBASE-P; Status: M; Support: Yes [ ]

Proposed Response   *Response Status* **O**

Cl **135F**   *SC* **135F.1**   *P* **357**   *L* **7**   # 146
Dawe, Piers   Mellanox

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

There is nothing called 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) in 120D.4, and the normative requirement for this annex is in 135F.4.

SuggestedRemedy

Change The normative channel compliance is through 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) as described in 120D.4" to "The normative channel compliance is determined by the 50GAUI-1 C2C or 100GAUI-2 C2C channel operating margin (COM) specified in 135F.4".
Similarly in 135B.1, 135D.1.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **135F**
SC **135F.1**

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Cl **135F**   *SC* **135F.1**   *P* **357**   *L* **8**   # 145

Dawe, Piers   Mellanox

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

Make consistent with 120D.1, except for the "Note that" which should not be used - it means nothing and can be confused with a NOTE.

SuggestedRemedy

Add another sentence: For this equation the channel loss at the Nyquist frequency is lower than or equal to 20.457 dB.

Proposed Response   *Response Status* **O**

Cl **135F**   *SC* **135F.3.2**   *P* **357**   *L* **25**   # 65

Hidaka, Yasuo   Fujitsu Lab. of Americ

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

120D.3.3 does not exist.

SuggestedRemedy

Change 120D.3.3 to 120D.3.2.

Proposed Response   *Response Status* **O**

Cl **135F**   *SC* **135F.3.2.1**   *P* **357**   *L* **28**   # 176

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

For the precoding request function, the PMA needs to know when the update is complete. To best accomplish this task, the configuration of the Precoder state should be managed entirely by management processes (which is how TxEq is done). MDIO registers 1.600-1.603 provide the precoder control over each end of the link. When the request flag in 1.604 is asserted, 1.605 and 1.606 are used indicate the desired setting, but changing that setting in 1.600-1.603 should be done via management. Once the requested status and configurations align, the request flag is lowered. Clarification is needed to specify that this is how the operation should be done.

SuggestedRemedy

Change 135F.3.2.1 to be:

135F.3.2.1 Precoder request (optional)

The precoder request is an optional capability for a 50GAUI-1 C2C or 100GAUI-2 C2C receiver. If implemented, it shall operate as described in this subclause.

The precoder request is generated for each input (Tx and Rx) on each lane (0 and 1). The variables that control the precoding request are specific for each input and lane.

A 50GAUI-1 C2C or 100GAUI-2 C2C input may generate a request to change the precoder state on a given interface and lane by setting the variables request_precoder_tx_in_i or request_precoder_rx_in_i (where i is 0 to 1) to indicate the desired precoder setting per lane and interface. A precoder request from a 50GAUI-1 C2C or 100GAUI-2 C2C receiver is generated in an implementation specific manner. A 50GAUI-1 C2C or 100GAUI-2 C2C receiver that does not implement precoder request always sets request_precoder_tx_in_i, request_precoder_rx_in_i, request_precoder_tx_in_flag, and request_precoder_rx_in_flag to 0.

When a 50GAUI-1 C2C or 100GAUI-2 C2C supports precoder request and a request_precoder_tx_in_i differs from it's precoder_tx_in_en_i the request_precoder_tx_in_flag is set to 1. When a 50GAUI-1 C2C or 100GAUI-2 C2C supports precoder request and a request_precoder_rx_in_i differs from it's precoder_rx_in_en_i the request_precoder_rx_in_flag is set to 1. When request_precoder_tx_in_flag is 1, the request is fulfilled by setting the precoder_rx_out_en_i of the remote transmitter and the precoder_tx_in_en_i of the local receiver to the state of the request_precoder_tx_in_i. When request_precoder_rx_in_flag is 1, the request is fulfilled by setting the precoder_tx_out_en_i of the remote transmitter and the precoder_rx_in_en_i of the local receiver to the state of the request_precoder_rx_in_i.

If a Clause 45 MDIO is implemented, the variables request_precoder_rx_in_flag and request_precoder_tx_in_flag are accessible through register 1.604 (see 45.2.1.116l), variables request_precoder_rx_in_i are accessible through register 1.605 (see 45.2.1.116m), variables request_precoder_tx_in_i are accessible through register 1.606

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **135F**   Page 14 of 41
SC **135F.3.2.1**   2017-06-27 1:47:08 PM

(see 45.2.1.116n), variables precoder_tx_in_en_i are accessible through registers 1.603
(see 45.2.1.116k), variables precoder_rx_in_en_i are accessible through registers 1.601
(see 45.2.1.116i), variables precoder_tx_out_en_i are accessible through registers 1.600
(see 45.2.1.116h), and variables precoder_rx_out_en_i are accessible through registers
1.602 (see 45.2.1.116j).

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **135G**   *SC* **135G.5.3**   *P* **365**   *L* **1**   # 83

Maki, Jeffery   Juniper Networks

Comment Type **TR**   *Comment Status* **D**

Figure 135G-1 shows that 50GAUI-1 C2M and 100GAUI-2 C2M require FEC. No where in
135G.5.3 Major capabilities/options is it listed that FEC is mandatory. Furtermore, what
FEC code is mandatory is not listed.

SuggestedRemedy

List the mandatory FEC code to make a compliant chip-to-module interface.

Item: FEC50; Feature: 50GBASE-R RS-FEC; Subclause: 134; Value/Comment: Device
implements Clause 134 RS-FEC for 50GBASE-R; Status: M; Support: Yes [ ]

Item: FEC100; Feature: 100GBASE-R RS-FEC; Subclause: 91; Value/Comment: Device
implements Clause 91 RS-FEC with RS(544,514) for 100GBASE-P; Status: M; Support:
Yes [ ]

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.1**   *P* **118**   *L* **33**   # 38

Anslow, Pete   Ciena

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

Comment r01-56 against P802.3bs D3.1 has added rows for the Clause 118 200GMII
Extender to Tables 121-1 and 122-1.
Assuming that the related comment to add a column fir Clause 118 to Tables 116-2a and
116-3 is accepted, corresponding rows should be added co Tables 136-3, 137-3, and 138-
3.

SuggestedRemedy

In Table 136-3, add a row for 118-200GMII Extender, Optional
In Table 137-3, add a row for 118-200GMII Extender, Optional
In Table 138-3, add a row for 118-200GMII Extender, Optional

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.7**   *P* **194**   *L* **19**   # 27

Anslow, Pete   Ciena

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

The editor's note says it will be removed after D1.3

SuggestedRemedy

Delete the note

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.7**   *P* **194**   *L* **19**   # 76

Healey, Adam   Broadcom Ltd.

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

The editor's note states that it was supposed to self destruct after Draft 1.3.

SuggestedRemedy

The information in the note appears to be stale. Remove it.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.7**   *P* **194**   *L* **19**   # 192

Slavick, Jeff   Broadcom Limited

Comment Type **E**   *Comment Status* **D**   *<late>*

Editors note has served it's purpose

SuggestedRemedy

Delete editors note

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 15 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.7**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**   *SC* **136.7**   *P* **194**   *L* **41**   # 199

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

In Table 136-6 the PMD status variable should not have _# since each lane has it's own instance of the logic running. The exception is for the signal_detect_#.

SuggestedRemedy

In Table 136-6 remove the _# from rx_trained, local_frame_lock, training, training_failure from the PMD status variable column.

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.7**   *P* **194**   *L* **41**   # 200

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

In Table 136-6 there is no PMD status variable rx_trained.   The equivalent variable is local_trained

SuggestedRemedy

Change rx_trained_# to local_trained in Table 136-6

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.7**   *P* **194**   *L* **42**   # 198

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

In Table 136-6 the PMD status variable for Frame lock # is listed as local_frame_lock. No variable by that name exists, it should be local_tf_lock

SuggestedRemedy

Change local_frame_lock_# to local_tf_lock in Table 136-6

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.1.3**   *P* **202**   *L* **39**   # 193

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

P(j=0) is first precoded bit if you start at index 0, but would be the previous bit if you start at index 1.   The text is stating that for the first symbol of the training pattern that this precoded, P(j-1)=0 in Equation 135-1.

SuggestedRemedy

Change "so that P(j=0) in Equation (135-1) is set to 0." to "so that P(j-1)=0 in Equation (135-1) for the first PAM4 symbol of the training pattern."

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.2.1**   *P* **203**   *L* **38**   # 94

Dudek, Mike   Cavium

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

Wrong Reference.

SuggestedRemedy

Change 136.8.11.3.4 to 136.9.3.1.3

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.8.11.3.3**   *P* **205**   *L* **13**   # 194

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

The Receiver Frame Lock bit is forced to 0, only during a training startup condition. It should also be forced low when in the TIMEOUT and TRAINING_FAILED states. local_tf_lock is forced low, but that does not force an ENCODE_STS to occur (the function that currently encodes transmitted status bit for receiver frame lock based on local_tf_lock)

SuggestedRemedy

Change the 2nd paragraph of 136.8.11.3.3 to be "Receiver frame lock shall be set to 0 when the variable training is false and it shall not be set to 1 until training and local_tf_lock are both true."
Remove "local_tf_lock is mapped to the receiver frame lock bit," from the definition of ENCODE_STS

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **136**
SC **136.8.11.3.3**

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2017-06-27 1:47:08 PM

Cl **136**   *SC* **136.8.11.3.5**   *P* **205**   *L* **24**   # 99
Dudek, Mike   Cavium

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

The control field and status fields are differential Manchester Coded and therefore inherently DC balanced.   The Parity bit is not required for DC balance.   In any case adding a parity bit to a binary sequence won't make it balanced anyway.

SuggestedRemedy

Delete the sentence "Even parity ensures that the transmitted control and status fields (see 136.8.11.1.2) are DC balanced.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.8.11.5**   *P* **206**   *L* **7**   # 115
Ran, Adee   Intel

Comment Type **TR**   *Comment Status* **D**

This subclause defines the behavior of the receiving side of a coefficient update request. However, there is no description of the behavior of a requestor.

There are underlying assumptions for this handshake protocol: a request should be maintained until the status acknowledges it was received and handled. Then it should be replaced with a "hold" request and acknowledged with "no change" before a new request can be initiated.

These assumptions or expected behavior are not stated, and should be.

SuggestedRemedy

Candidate text will be supplied.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.8.11.5**   *P* **206**   *L* **9**   # 201
Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

Update to the coefficients is only done upon a change in request bits, not a change in select.

SuggestedRemedy

Remove "coefficient select or" from the first sentence of 136.8.11.5

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.5**   *P* **206**   *L* **9**   # 202
Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

The algorithm in this section does not set coef_sts = not_upd, that is done in Figure 136-9. But when you change the coef_req from INC/DEC/NOEQ to HOLD that is a change in the coefficient request bits. So now you have the FSM (Figure 136-9) and this algorithm fighting each other. This algorithm would set coef_sts = UPDATED for HOLD (but not change the setting) while the FSM sets the response properly to NOT_UPDATED

SuggestedRemedy

Change "When a change to the coefficient select or coefficient request bits is detected" to "When a request to update a coefficient setting is detected in the coefficient request bits" to limit the scope of this code to execute only when you go from HOLD -> INC/DEC/NOEQ

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.5**   *P* **206**   *L* **9**   # 170
Zvi, Rechtman   Mellanox

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

The Coefficient update state machine in figure 136-9 defines the transmitter behavior upon peer receiver requests. While the requestor flow is not explicitly defined in the clause. Resubmission of comment #36 against D1.3

SuggestedRemedy

Need to add a definition of the requestor behaviour.
Presentation will be sent.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.8.11.7.1**   *P* **208**   *L* **20**   # 203
Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

coef_sts has more enumerations then are listed.

SuggestedRemedy

Add "equalization limit, coefficient at limit and equalization limit" to the list of valid values for this variable.

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 17 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.8.11.7.1**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**   *SC* **136.8.11.7.1**   *P* **208**   *L* **40**   # 190

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *\<late\>*

local_tf_lock should be soley based on the state of Figure 136-8. Another comment is changing the definition of the transmitted Receiver Frame Lock status bit to handle the case when training fails. So we no longer need to force this local status bit low in training failure. While in training failure it's a useful debug status bit to know if you do have training frame lock or not.

SuggestedRemedy

Change the definition of local_tf_lock to be: "Boolean variable that is true when the training frame marker positions have been identified and is false otherwise."

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.7.1**   *P* **209**   *L* **38**   # 118

Ran, Adee   Intel

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

The variable tp_mode is defined as the status of the partner. There is also a local status which is sent to the partner, but does not have a variable associated with it. This may be confusing and actually this variable is incorrectly used in 136.8.11.7.2. Other similar settings have local and remote variables.

SuggestedRemedy

Rename tp_mode to remote_tp_mode, and add a local_tp_mode variable.

Add a subclause after 136.8.11.4 similar to it, to describe the behavior when a change in the "Modulation and precoding request" including setting local_tp_mode.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.8.11.7.2**   *P* **209**   *L* **54**   # 195

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *\<late\>*

ENCODE_STS maps local_rx_ready into the transmitted status frame. But it's only called when the remote partner modifies his transmitted frame. So when the local side transitions to TRAIN_REMOTE state, until the partner sends a change in his Control Frame they won't see that you're done. The local side should push it's local_rx_ready status to the partner based on it's state.

SuggestedRemedy

Remove ", local_rx_ready is mapped to the receiver ready bit" from the definition of ENCODE_STS
To help clarify which variable is mapped into the transmitted status bit add "(local_rx_ready = true)" to the end of 2nd sentence of 136.8.11.3.1, and add "(local_rx_ready = false)" to the end of the 3rd sentence.

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.7.2**   *P* **210**   *L* **1**   # 196

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *\<late\>*

tp_mode is based on received frames. ENCODE_STS updates the status field of the transmitted frames, which should not be based on tp_mode, but based on our local logic acting upon the received tp_mode_req from the far end.

SuggestedRemedy

Remove ", and tp_mode is mapped to modulation and precoding bits (see 136.8.11.3.2)" from the definition of ENCODE_STS
The current definition in 136.8.11.3.2 sufficiently defines how the local status bits are set.

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.8.11.7.2**   *P* **210**   *L* **1**   # 119

Ran, Adee   Intel

Comment Type **TR**   *Comment Status* **D**

tp_mode is defined as the remote status. The local status should be encoded.

SuggestedRemedy

Change to use local_tp_mode (to be added per another comment).

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 18 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.8.11.7.2**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**   *SC* **136.8.11.7.5**   *P* **212**   *L* **18**   # **84**

Stover, David   Analog Devices

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

Timer execution keyword "start" is upper case in some states (TRAIN_LOCAL, LINK_READY), lower case in others (TIMEOUT); should be consistent.

SuggestedRemedy

Change "Start" to "start" in states TRAIN_LOCAL, LINK_READY.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.8.11.7.5**   *P* **213**   *L* **4**   # **197**

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

The training FSM maybe run through a reset sequence without the PMD being reset. When that happens, the Frame_lock and Coeff_Update FSM blocks should also be placed into their Reset states.

SuggestedRemedy

Add "+ mr_restart_training" to the entry condition of OUT_OF_FRAME in Figure 136-8 and to the entry condition of "OUT_OF_SYNC" in Figure 136-9

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.9.3**   *P* **216**   *L* **10**   # **73**

Hidaka, Yasuo   Fujitsu Lab. of Americ

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

Some references to 120D are wrong. In 120D, the name of variable J4 was also changed to J4u.

SuggestedRemedy

In Table 136-11, change the reference of 120D.3.1.1 for the output jitter to 120D.3.1.8.
In Table 136-11, change the reference of 120D.3.1.2 for the Signal-to-noise-and-distortion ratio to 120D.3.1.6.
In PICS in 136.14.4.3, change the subclause of TC10 from 120D.3.1.2 to 120D.3.1.6.
In PICS in 136.14.4.3, change the subclause of TC12 from 120D.3.1.1 to 120D.3.1.8.
In Table 136-11, change "J4" to "J4u".
In 136.9.4.2.3, item e) on P221, change "J4" to "J4u" at 3 locations (on L1, L3, and L5).
Change "J4" to "J4u" in Equation (136-6) at 2 locations.
Change "J4" to "J4u" in Equation (136-7).

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.9.3**   *P* **216**   *L* **11**   # **143**

Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

J4, now called J4u (all but 1e-4 of the edges, or 1e-4*0.75 of the number of UI, divided between early and late, so 3.75e-5 per UI or 1.875e-5 per bit) is overkill for the spec BER of 2.4e-4, and J3u (1.875e-4 per bit) is a good match to the spec BER - just as J4u is a good match to the BER of 1e-5 for 120D. Also, not all edges cause errors. We can make the spec better (more accurate, less performance left on the table) and reduce test time. Futher, the jitter at TP2 won't be the same as at TP0a in 137.9.2 (expected to be more).

SuggestedRemedy

Change J4 to J3u. Choose the limit at TP2 considering jitter limit at TP0a and the mated compliance board crosstalk specs, among other factors.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.9.3**   *P* **216**   *L* **22**   # **122**

Ran, Adee   Intel

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

The editor's note should be removed at some point if there is no discussion of suggested changes in SNDR, SNR_ISI, and SNR_TX.

SuggestedRemedy

Unless other comments prevent this, remove this note.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 19 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.9.3**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**   *SC* **136.9.3.1.3**   *P* **218**   *L* **27**   # 163

Hegde, Raj   Broadcom Ltd.

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

The current draft lists 3 options for the initial transmit equalizer coefficient values based on the variable ic_req in Table 136-12.
The values 'preset1', 'preset2', and 'preset3' for ic_req correspond to no equalization, 6dB of pre-cursor only equalization, and 6dB of post-cursor only equalization, respectively. Though 6dB of tx-equalization may be needed to meet the BER target on channels close to the spec limit, such high level of tx-equalization, particularly in the post cursor, is not necessary to obtain initial frame-lock on these long channels. Hence the coefficient configuration corresponding to the 'preset 3' setting seems unnecessary.
 Moreover, 6dB of post-cursor equalization is definitely excessive for short and medium length channels and could lead to dead-zones and prevent the CDRs from achieving initial frame lock.
 It could also be noted that the reference receivers in Clauses 136 and 137 do not need 6dB of post-cursor equalization even on spec-limit channels to achieve the target BER.

SuggestedRemedy

Replace the post-cursor equalization only option with a configuration that provides a combination of both pre and post cursor equalization.
In addition to addressing the concerns raised above, this may also on average reduce the number of coefficient updates needed to meet the BER target over the range of channel losses supported by the spec.
Replace the coefficient settings corresponding to preset 3 with the following:
 c(-2): 0+/-0.05   c(-1): -0.15+/-0.05   c(0): 0.75+/-0.05   c(1): -0.1+/-0.05

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.9.3.1.3**   *P* **218**   *L* **28**   # 188

Slavick, Jeff   Broadcom Limited

Comment Type **T**   *Comment Status* **D**   *<late>*

136.9.3.1.3 states that when Figure 136-9 enters the OUT_OF_SYNC state the TxEq should be set according to Table 136-12 (Preset1 = NoEq). However, in Figure 136-9 there is no "load" of that Equalization value.

SuggestedRemedy

Add a call to "UPDATE_IC" into the OUT_OF_SYNC state before the ENCODE_STS call.

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **136**   *SC* **136.9.4.2**   *P* **220**   *L* **12**   # 124

Palkert, Thomas   Molex

Comment Type **TR**   *Comment Status* **D**

COM limits and cable attenuation limits do not reflect current cable characteristics

SuggestedRemedy

Cable test data shows that COM should be changed to 3.5 and attenuation changed to 18dB

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.9.4.2.2**   *P* **220**   *L* **28**   # 72

Hidaka, Yasuo   Fujitsu Lab. of Americ

Comment Type **TR**   *Comment Status* **D**

Test channel of receiver interference tolerance test is specified as the cable assembly meets the requirements of 136.11 and the cable assembly test fixture meets the requirements of Annex 136B. However, as explained in hidaka_3cd_01a_0517.pdf and hidaka_060717_3cd_adhoc-v2.pdf, the cable assembly just meeting the requirements of 136.11 allows use of a cable assembly with the worst return loss, which will cause interoperability problems between compliant channel and compliant Rx. As explained in hidaka_3cd_02_adhoc-v2.pdf, the return of of the test channel for Rx ITT is important to improve margin for interoperability. We should specify the Rx-side return loss of the test channel tighter than the return loss of the compliant channel so that a good test channel is always used for Rx ITT.

SuggestedRemedy

Change the sentence of 136.9.4.2.2
"The test channel is the same as the one defined in 110.8.4.2.2, except that the cable assembly meets the requirements of 136.11 and the cable assembly test fixture meets the requirements of Annex 136B."

to

"The test channel is the same as the one defined in 110.8.4.2.2, except that the cable assembly meets the requirements of 136.11, the cable assembly test fixture meets the requirements of Annex 136B, and the differential return loss of the test channel measured at Rx test reference including the cable assembly meets Equation (92-38)."

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 20 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.9.4.2.2**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**   *SC* **136.9.4.3.2**   *P* **222**   *L* **33**   # 112
Dudek, Mike   Cavium

Comment Type **TR**   *Comment Status* **D**

It is possible that with the added jitter the COM could be below the 3dB even with no noise added.   This would over-stress the receiver.

SuggestedRemedy

Add an extra sentence to the first paragraph.   With the applied jitter of Case E in table 120D-7 the COM as calculated by the method in 136.9.4.2 is equal or greater than the value given in table 136-13 for all lanes.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11**   *P* **223**   *L* **42**   # 113
Dudek, Mike   Cavium

Comment Type **TR**   *Comment Status* **D**

Equation 92-27 for the differential return loss gives 5.3dB return loss at 13.28GHz. This is not the 6dB listed and is a relatively poor value and could lead to significant differences between system performance with a real host and the COM calculated with the single 110 Ohm host board trace equivalent. Work on backplanes and C2C (e.g. Hidaka_3cd_01a_0317, Dudek_3bs_02_0517) has shown that this affect is significant and it would be better to test COM with nominal impedances and have a guard band between the channel COM and the Interference tolerance COM.

SuggestedRemedy

Change 6 to 5.3 Change the COM value to 3.5dB. In table 136-15 change the value of Rd to 50 Ohm, the value of Zc to 95 Ohm, On page 224 line 40 change the value of COM to 3.5dB. Change the impedance of the test trace from TP0 to TP1 and TP4 to TP5 to 100 Ohm by changing on page 226 line 41 from "using zp = 151 mm in length, representing an insertion loss of 6.42 dB at 13.28 GHz on each PCB." to "using Zc = 100 Ohm and zp = 151 mm in length, representing an insertion loss of 6.42 dB at 13.28 GHz on each PCB." Also change to 3.5dB in PICS CA8.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11**   *P* **224**   *L* **13**   # 100
Dudek, Mike   Cavium

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

The value of Tr used in Clause 137 is 12ps (120D (56G per lane C2C) is 13ps.   It was 8ps for the 25G NRZ clause 110). As it is expected that the same ASICs are likely to be used for the backplane and copper cable specifications this risetime should be aligned with that in Clasue 137.

SuggestedRemedy

Change 8ps to 12ps.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.2**   *P* **197**   *L* **12**   # 98
Dudek, Mike   Cavium

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

The reference in 92.8.3.6 provides the loss at 12.8906GHz (the Nyquist frequency for that clause) .   As the Nyquist frequency is different in this clause it would be helpful to provide the loss at that frequency here. However equation 92-8 gives an attenuation 10.11 dB at 13.28 GHz which conflicts with th 10.07dB shown in Figure 136A-1.

SuggestedRemedy

Either
Add the following sentence between "92.8.3.6" and "Annex 136A".

Either
Note that the recommended maximum insertion loss from TP0 to TP2 or from TP3 to TP5 is 10.11 dB at 13.28GHz GHz

Change Figure 136A-1 and table 136A-1 to show 10.11 dB for the losses between TP0 and TP2 and between TP3 and TP5 and in the equation. Increase the 28.9dB total budget to 28.98dB and change the NOTE to say the host connector is allocated 0.66dB of additional Margin, and on page 368 line 39 change the connector loss to 1.73dB and on line 41 change the value to 10.11dB
Or (preferred as I don't think we want to increase the budget and I think we may want to further amend this curve to allow fly over cable results.)
Don't refer to 92.8.3.6.   Create a local section with the same content except that the equation becomes.   0.08 + 0.57sqrt(f) + 0.596f and -19.109 + 2.119f and the note says 10.07dB at 13.28GHz.   Refer to this section in Table 136-7 instead. Also refer to this equation on page 369 lines 12 and 40 and page 368 line 40.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **136**
SC **136.11.2**

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Cl **136**   *SC* **136.11.7**   *P* **224**   *L* **31**   # 9

Hajduczenia, Marek   Charter Communicatio

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

"Channel Operating Margin" acronym is defined here for the first time, but used extensively before

SuggestedRemedy

Move the definition of acronym to its first use

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.7**   *P* **225**   *L* **6**   # 164

Li, Peng   Intel

Comment Type **TR**   *Comment Status* **D**

Cd =1.8e-4 nF. On the other hand, the CEI-56G-LR-PAM4 Rev06 (the latest version) has Cd=1.6e-4 nF which is better and enables larger solution space for channels, and that is what application is asking for. In practice, most of the SERDES vendors play in both markers with the same SERDES. So it is logical to make them aligned to the better one.

SuggestedRemedy

Change Cd to 1.6e-4 nF.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.7**   *P* **225**   *L* **8**   # 101

Dudek, Mike   Cavium

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

Formatting of the table has gone wrong.

SuggestedRemedy

It should be 30mm for the test 2 Zp, and 1.1e-4 for Cp

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.7**   *P* **225**   *L* **8**   # 69

Hidaka, Yasuo   Fujitsu Lab. of Americ

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

New lines between the values for z_p = 30mm, C_p = 1.1 x 10^-4 nF, Z_c = 90 ohm in Table 136-15 are lost.

SuggestedRemedy

Insert new lines to separate values.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.7**   *P* **225**   *L* **8**   # 74

Healey, Adam   Broadcom Ltd.

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

In "Value" column in the first row, missing line break between "30" and "1.1 x 10^(-4)".

SuggestedRemedy

Insert line break. There is a similar problem in Table 137-5 (page 243, line 22). There is also some inconsistent justification of value fields (some left, some center). Re-format to be consistent.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 22 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.11.7**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**   *SC* **136.11.7**   *P* **225**   *L* **9**   # 71

Hidaka, Yasuo   Fujitsu Lab. of Americ

Comment Type **TR**   *Comment Status* **D**

As explained in hidaka_061417_3cd_01_adhoc.pdf, the limit of variation of compliant channels will grow, if we use a single reference value for the COM impedance parameters, and the single reference value is different from the nominal value. In order to minimize the variation of compliant channels, we should use the nominal value as the single reference value, or we should use multiple reference values. Reduction of variation helps to improve margin for interoperability, which is not guaranteed in the current specification. When we change the COM impedance parameters, we should also consistently change A_v, A_{fe}, A_{ne} to get the same signal amplitude at TP0a from reference Tx in COM, and we should also change the COM value to avoid changing the pass / fail status of existing channels. The consistent changes required to A_v, A_{fe}, and A_{ne} were reported in hidaka_060717_3cd_adhoc-v2.pdf slide 12. The consistent change required to COM value was reported in hidaka_061417_3cd_01_adhoc.pdf slide 14-18.

SuggestedRemedy

Change the following COM parameter values in Table 136-15:

Package Z_c from 90 ohm to 95 ohm
R_d from 55 ohm to 50 ohm
A_v from 0.44 V to 0.415 V
A_{fe} from 0.44 V to 0.415 V
A_{ne} from 0.63 V to 0.604 V

In the second paragraph of 136.11.7.1, P226, L31, change
"the parameter values given in Table 92-12"
to
"the parameter values given in Table 92-12 excepting that Z_c is 100.0 ohm".

For clarification of the intention of the value, in the parameter column of Table 136-15, change
"Package transmission line characteristic impedance"
to
"Package transmission line nominal characteristic impedance".

In Table 136-14, change the value of Minimum COM from 3 dB to 3.3 dB.

In the third paragraph of 136.11.7, P224, L40, change
"shall be greater than or equal to 3 dB"
to
"shall be greater than or equal to 3.3 dB".

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.7**   *P* **226**   *L* **19**   # 114

Ran, Adee   Intel

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

The editor's note should be removed at some point if there is no discussion of suggested changes in Z_c.

SuggestedRemedy

Unless other comments prevent this, remove this note.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.11.7.1.2**   *P* **227**   *L* **10**   # 135

Dawe, Piers   Mellanox

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

For 200GBASE-CR4, the aggressor zp could be shorter than the victim zp, because of different routes out of a big IC package and routing on the PCB, but 151-72 = 79 mm = 3.1" difference is not credible, considering that a long path in the package can go with a shorter path on the PCB.

SuggestedRemedy

Maybe zp = 110 mm for 200GBASE-CR4 and 100GBASE-CR2 aggressor.

Proposed Response   *Response Status* **O**

Cl **136**   *SC* **136.14.3**   *P* **231**   *L* **10**   # 102

Dudek, Mike   Cavium

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

The PICS only cover the SFP to QSFP options.

SuggestedRemedy

Either add PICS for all the other options (and combinations) or delete these existing PICS.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136**   Page 23 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136.14.3**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136**　　*SC* **136.14.4.4**　　　　*P* **233**　　*L* **26**　　　# 103
Dudek, Mike　　　　　　　　　　　Cavium

Comment Type **T**　　*Comment Status* **D**
　The Requirement in 136.9.4.1 is for a FEC symbol error rate not BER.

SuggestedRemedy
　Change "PMD BER better than 10–4" to "Meets FEC symbol error rate requirement"

Proposed Response　　　*Response Status* **O**

Cl **136**　　*SC* **136.14.4.6**　　　　*P* **234**　　*L* **27**　　　# 104
Dudek, Mike　　　　　　　　　　　Cavium

Comment Type **T**　　*Comment Status* **D**
　Need to add the other MDI options.

SuggestedRemedy
　Add them.

Proposed Response　　　*Response Status* **O**

Cl **136A**　　*SC* **1**　　　　　　*P*　　　　*L*　　　　# 95
Dudek, Mike　　　　　　　　　　　Cavium

Comment Type **E**　　*Comment Status* **D**
　It is better to make a direct reference rather than refering to 92A which then refers to the
　equation in 92.10.3.

SuggestedRemedy
　Change the reference to equation 92-27.

Proposed Response　　　*Response Status* **O**

Cl **136A**　　*SC* **136A.7**　　　　*P* **371**　　*L* **11**　　　# 105
Dudek, Mike　　　　　　　　　　　Cavium

Comment Type **T**　　*Comment Status* **D**
　The tables don't have different specifications for different cable types.

SuggestedRemedy
　Delete "for the cable type being used"

Proposed Response　　　*Response Status* **O**

Cl **136B**　　*SC* **136.2.3**　　　　*P* **376**　　*L* **14**　　　# 107
Dudek, Mike　　　　　　　　　　　Cavium

Comment Type **T**　　*Comment Status* **D**
　The PICS for the test fixture for QSFP needs to refer to the more stringent XTALK spec.

SuggestedRemedy
　Change the HTF2 and CATF2 references from 92.11.1 to 136B.1.1

Proposed Response　　　*Response Status* **O**

Cl **136B**　　*SC* **136B.1.1.6**　　　*P* **373**　　*L* **14**　　　# 142
Dawe, Piers　　　　　　　　　　　Mellanox

Comment Type **TR**　　*Comment Status* **D**
　Just as for the QSFP connector, we will need better crosstalk to support PAM4 with the
　SFP connector.

SuggestedRemedy
　When we have information about recent test fixtures' performance, tighten max. NEXT
　from 1.8 mV rms towards 1.5 as feasible, by changing "shall meet the specification in
　Table 110B-1." to e.g. "shall be less than 1.6 mV." TR because it may take a while to get
　the information.

Proposed Response　　　*Response Status* **O**

Cl **136B**　　*SC* **136B.1.1.6**　　　*P* **373**　　*L* **30**　　　# 106
Dudek, Mike　　　　　　　　　　　Cavium

Comment Type **T**　　*Comment Status* **D**
　The specification for the multi-lane mated test fixture needs to include more than QSFP.

SuggestedRemedy
　Change "The QSFP28" to "The multi-lane".   Change the title of table 136-2 replacing
　QSFP28 with "multi-lane.   The PICS also need to be amended to include the additional
　test fixtures.

Proposed Response　　　*Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected　　RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **136C**   *SC* **136C.1**   *P* **377**   *L* **22**   # 96

Dudek, Mike   Cavium

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

It would read better if the "enabling a 3m length" were not split by the parenthsis (2 places).

SuggestedRemedy

Change "The 50GBASE-CR is a single-lane cable assembly (and can also be implemented as a multiple version using a four-lane or eight-lane plug for high density applications), enabling a 3 m length" to
"The 50GBASE-CR is a single-lane cable assembly enabling a 3 m length(and can also be implemented as a multiple version using a four-lane or eight-lane plug for high density applications). "

Make the similar change in the next sentence.

Proposed Response   *Response Status* **O**

Cl **136C**   *SC* **136C.1**   *P* **377**   *L* **38**   # 108

Dudek, Mike   Cavium

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

It would be good to be explicit that there are no restrictions on the combinations of connectors and numbers of lanes.

SuggestedRemedy

In Section 136C.3.1 state as the last sentence. "Cables using any combination of MDI's and number of lanes are acceptable form factors."

Proposed Response   *Response Status* **O**

Cl **136C**   *SC* **136C.3.1**   *P* **378**   *L* **36**   # 109

Dudek, Mike   Cavium

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

It would be good to add the cross cables to this section.

SuggestedRemedy

After "on both ends". Insert "One plug to one plug cables can also have different cable plugs on each end for example QSFP28 on one end and uQSFP on the other end.

Proposed Response   *Response Status* **O**

Cl **136C**   *SC* **136C.3.2**   *P* **379**   *L* **27**   # 111

Dudek, Mike   Cavium

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

"two 50Gb/s links" isn't very explicit and it would be good to be more precise and describe the 100G scenario as well.

SuggestedRemedy

Replace "two 50Gb/s links" with "two 50GBASE-CR links or one 100GBASE-CR2 link"

Proposed Response   *Response Status* **O**

Cl **136C**   *SC* **136C.3.3**   *P* **380**   *L* **9**   # 189

Slavick, Jeff   Broadcom Limited

Comment Type   **T**   *Comment Status* **D**   *<late>*

Figure 136C-3 is a example of a 1 to 4 plug

SuggestedRemedy

Change "two-plug" to "four-plug"

Proposed Response   *Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136C**   Page 25 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136C.3.3**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136D**   *SC* **2.3**   *P* **386**   *L* **11**   # 166
Kolesar, Paul   CommScope

Comment Type **T**   *Comment Status* **D**
   Reference is made to the microQSFP MSA using footnote 22. The refrence is to an MSA website that may not be permanent.

SuggestedRemedy
   Refer to a permenent reference or consider deletion of the reference.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **2.4**   *P* **387**   *L* **4**   # 167
Kolesar, Paul   CommScope

Comment Type **T**   *Comment Status* **D**
   Reference is made to the QSFP-DD MSA using footnote 23. The refrence is to an MSA website that may not be permanent.

SuggestedRemedy
   Refer to a permenent reference or consider deletion of the reference.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **2.5**   *P* **388**   *L* **4**   # 168
Kolesar, Paul   CommScope

Comment Type **T**   *Comment Status* **D**
   Reference is made to the OSFP MSA using footnote 24. The refrence is to an MSA website that may not be permanent.

SuggestedRemedy
   Refer to a permenent reference or consider deletion of the reference.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **3.3**   *P* **390**   *L* **6**   # 169
Kolesar, Paul   CommScope

Comment Type **T**   *Comment Status* **D**
   There are no PICS stated, yet there are "shall" statements in the clause at page 382 lines 42, 43, 47; page 384 line 1;

SuggestedRemedy
   Create PICS for each shall statement.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **136D**   *P* **382**   *L* **1**   # 97
Dudek, Mike   Cavium

Comment Type **ER**   *Comment Status* **D**
   It would be better to introduce the normative MDI section ahead of the application information.

SuggestedRemedy
   Move 136D to be 136C.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **136D.**   *P* **382**   *L* **50**   # 110
Dudek, Mike   Cavium

Comment Type **T**   *Comment Status* **D**
   The MDI needs to be consistent with the cable specs as well.

SuggestedRemedy
   Add 136.11

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **136D**   Page 26 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **136D.**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **136D**   *SC* **136D.3**   *P* **389**   *L* **1**   # 29
Anslow, Pete   Ciena

Comment Type   **T**   *Comment Status* **D**
    Annex 136D PICS is blank

SuggestedRemedy
    Fill out the PICS proforma.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **136D.3.3**   *P* **390**   *L* **4**   # 63
Cheng, Weiying   Coriant

Comment Type   **E**   *Comment Status* **D**
    Is there any reason to have an empty table here? If there is no change, remove it.
    Otherwise, add changes for the PICS.

SuggestedRemedy

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **136D.3.3**   *P* **390**   *L* **6**   # 75
Healey, Adam   Broadcom Ltd.

Comment Type   **T**   *Comment Status* **D**
    The major capabilities/options and PICS proforma tables are blank.

SuggestedRemedy
    Complete the tables.

Proposed Response   *Response Status* **O**

Cl **136D**   *SC* **136D.3.4**   *P* **390**   *L* **18**   # 64
Cheng, Weiying   Coriant

Comment Type   **E**   *Comment Status* **D**
    Is there any reason to have an empty table here? If there is no change, remove it.
    Otherwise, add changes for the PICS.

SuggestedRemedy

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9**   *P* **241**   *L* **1**   # 136
Dawe, Piers   Mellanox

Comment Type   **TR**   *Comment Status* **D**
    We don't yet know how to write a spec for 30 dB channels that isn't bleeding edge for ICs
    and/or channels. This isn't Ethernet "broad market" today, it's a specialist niche.

SuggestedRemedy
    Keep working on it in Working Group ballot and if things don't improve, reduce the 30 dB
    objective and reduce the high loss RITT loss. It might be OK to leave the channel
    recommended insertion loss limit if the COM spec protects the Tx and Rx.

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9.1**   *P* **241**   *L* **11**   # 138
Dawe, Piers   Mellanox

Comment Type   **T**   *Comment Status* **D**
    Consistency - 120D.2 has an exception for the upper frequency for the test fixture.

SuggestedRemedy
    Do the same here.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **137**
SC **137.9.1**

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2017-06-27 1:47:08 PM

Cl **137**   *SC* **137.9.1**   *P* **241**   *L* **11**   # 137
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

Now that the return loss spec has been tightened (Eq 137-1), the allowed return loss of the test fixture (in 93.8.1.1) is too close to the limit and ruins the measurement. There is a similar problem in 120D.
Per 93.8.1.1, "The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements"

SuggestedRemedy

Tell the user to de-embed the test fixture return loss, or tighten the TF RL spec? Making the IC implementer responsible for the test fixture seems appropriate, as the test fixture is custom designed for that IC and the IC is soldered onto it.

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9.2**   *P* **241**   *L* **21**   # 140
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

Output residual ISI SNR_ISI (min) 43 dB is way too high - probably can't measure the IC through the test fixture and cables, even test equipment fails this limit. The warning NOTE in 120D.3.1.7 notes the issue (for 34.8 dB), but doesn't solve it.

SuggestedRemedy

It may be necessary to move away from the SNR_ISI method.

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9.2**   *P* **241**   *L* **22**   # 139
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

Signal-to-noise-and-distortion ratio (min) 32.5 dB is too high (even worse than 120D) - probably can't measure the IC through the test fixture and cables. I suspect there is double counting of jitter in SNDR and as jitter, in COM.

SuggestedRemedy

Remove the double counting. Reduce the SNDR limit to something that can reasonably be measured, or change the measurement method.

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9.2**   *P* **241**   *L* **24**   # 144
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

J4u in 120D (all but 1e-4 of the edges, or 1e-4*0.75 of the number of UI, divided between early and late, so 3.75e-5 per UI or 1.875e-5 per bit) is overkill for the spec BER of 2.4e-4, and J3u (1.875e-4 per bit) is a good match to the spec BER - just as J4u is a good match to the BER of 1e-5 for 120D. Also, not all edges cause errors. We can make the spec better (more accurate, less performance left on the table) and reduce test time.

SuggestedRemedy

Change J4 to J3u, max 0.106 UI (from eq 136-6 and 7). In Eq 136-6 and 136-7 and the NOTE, change Q4=3.8906 to Q3=3.2905, Q(Q3) = 5 x10^-4.

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9.3**   *P* **241**   *L* **32**   # 66
Hidaka, Yasuo   Fujitsu Lab. of Americ

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

Table 120D-6 specifies insertion loss at 13.2813 GHz, not 13.28 GHz.

SuggestedRemedy

Change 13.28 GHz to 13.2813 GHz in item 2 and item 3.

Proposed Response   *Response Status* **O**

Cl **137**   *SC* **137.9.3**   *P* **241**   *L* **36**   # 67
Hidaka, Yasuo   Fujitsu Lab. of Americ

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

It is written as "Receiver jitter tolerance (see 120D.3.2.2) is tested using the test channel in item 3)." but which "item 3)" is not clear.

SuggestedRemedy

Change "the test channel in item 3)" to "the test channel of receiver interference tolerance for Test 2 (high loss)".

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **137**
SC **137.9.3**

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2017-06-27 1:47:08 PM

Cl **137**   *SC* **137.9.3.1**   *P* **241**   *L* **46**   # 141

Dawe, Piers   Mellanox

Comment Type   **TR**   *Comment Status*   **D**

The low frequency RL at 14.25 dB is insignificant for signal integrity compared with the 8.7 dB at 6 GHz. This RL is much tighter than CEI-56G-LR at low (and high) frequency (although apparently looser between 4 and 9 GHz).

SuggestedRemedy

Change 14.25 - f to 12 -0.625f

Proposed Response   *Response Status*   **O**

Cl **137**   *SC* **137.10**   *P* **243**   *L* **20**   # 165

Li, Peng   Intel

Comment Type   **TR**   *Comment Status*   **D**

Cd =1.8e-4 nF. On the other hand, the CEI-56G-LR-PAM4 Rev06 (the latest version) has Cd=1.6e-4 nF which is better and enables larger solution space for channels, and that is what application is asking for. In practice, most of the SERDES vendors play in both markers with the same SERDES. So it is logical to make them aligned to the better one.

SuggestedRemedy

Change Cd to 1.6e-4 nF.

Proposed Response   *Response Status*   **O**

Cl **137**   *SC* **137.10**   *P* **244**   *L* **31**   # 123

Ran, Adee   Intel

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

The editor's note should be removed at some point if there is no discussion of suggested changes in Z_c.

SuggestedRemedy

Unless other comments prevent this, remove this note.

Proposed Response   *Response Status*   **O**

Cl **137**   *SC* **137.10.**   *P* **243**   *L* **21**   # 68

Hidaka, Yasuo   Fujitsu Lab. of Americ

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

New lines between the values for z_p = 30mm, C_p = 1.1 x 10^-4 nF, Z_c = 90 ohm in Table 137-5 are lost.

SuggestedRemedy

Insert new lines to separate values.

Proposed Response   *Response Status*   **O**

Cl **137**   *SC* **137.10.**   *P* **243**   *L* **23**   # 70

Hidaka, Yasuo   Fujitsu Lab. of Americ

Comment Type   **TR**   *Comment Status*   **D**

As explained in hidaka_061417_3cd_01_adhoc.pdf, the limit of variation of compliant channels will grow, if we use a single reference value for the COM impedance parameters, and the single reference value is different from the nominal value. In order to minimize the variation of compliant channels, we should use the nominal value as the single reference value, or we should use multiple reference values. Reduction of variation helps to improve margin for interoperability, which is not guaranteed in the current specification. When we change the COM impedance parameters, we should also consistently change A_v, A_fe, A_ne to get the same signal amplitude at TP0a from reference Tx in COM, and we should also change the COM value to avoid changing the pass / fail status of existing channels. The consistent changes required to A_v, A_fe, and A_ne were reported in hidaka_060717_3cd_adhoc-v2.pdf slide 10. The consistent change required to COM value was reported in hidaka_061417_3cd_01_adhoc.pdf slide 9-13.

SuggestedRemedy

Change the following COM parameter values in Table 137-5:

Z_c from 90 ohm to 95 ohm
R_d from 55 ohm to 50 ohm
A_v from 0.44 V to 0.415 V
A_fe from 0.44 V to 0.415 V
A_ne from 0.63 V to 0.604 V

For clarification of the intention of the value, in the parameter column of Table 137-5, change
"Package transmission line characteristic impedance"
to
"Package transmission line nominal characteristic impedance".

Proposed Response   *Response Status*   **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **137**   Page 29 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **137.10.**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **138**   *SC* **138.1**   *P*   *L*   # 26

Alan Flatman   LAN Technologies

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

   PMD types do not mention reach, hence inconsistent.

SuggestedRemedy

   Delete reach statement from clause 138.1 to remove error and make consistent with other
   PMD overviews

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.5.7**   *P* **260**   *L* **20**   # 156

Dawe, Piers   Mellanox

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

   PMD_global_transmit_disable function

SuggestedRemedy

   PMD global transmit disable function (although PMD transmit disable function would be
   better). Similarly in 139.5.6 and 140.5.6.

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.7**   *P*   *L*   # 47

King, Jonathan   Finisar

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

   Consequent to the changes to TDECQ to use a T spaced reference equalizer and the
   approx half symbol rate bandwdth reference receiver, TDECQ measurements will increase
   by about 0.9 dB.
   In order not to fail transmitters that would pass the D2.0 definiton of TDECQ, the TDECQ
   value should increase by 0.9dB. Other specs are also affected

SuggestedRemedy

   Subject to task force review, implement the proposd changes for clause 138 in
   king_3cd_03_0617 with editorial license .

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.7**   *P*   *L*   # 44

King, Jonathan   Finisar

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

   In Comment #47 to D1.3 (with associated presentation
   http://www.ieee802.org/3/cd/public/May17/dawe_3cd_01_0517.pdf) a case was made that
   lowering the extinction ratio from 5 to 3.5 dB for 100GBASE-DR would enable lower cost
   transmitters.
   In several presentations (http://www.ieee802.org/3/cd/public/May17/king_3cd_01_0517.pdf
   and http://www.ieee802.org/3/cd/public/May17/anslow_3cd_01_0517.pdf) it was
   demonstrated that for an ER of 3.5 dB the increase in MPI penalty could be limited to 0.3
   dB while not creating an unstable performance conditions where the link would be close to
   collapsing.
   Since P802.3bs adopted an ER of 3.5 dB for 400GBASE-DR4 in D3.2 it would be
   extremely desirable to also specify a minimum ER or 3.5 dB also for 100GBASE-DR to
   achieve the highest level of consistency between both specifications and implementations.

   In

SuggestedRemedy

   In Table 140-6 change the minimum extinction ratio from 5 to 3.5 dB.
   In the row for Outer Optical Modulation Amplitude (OMAouter) (min) add "for extinction
   ratio >= 5 dB" to the existing power level and add another "line" starting with "for extinction
   ratio <5 dB" with value 0 dBm.
   In the row for Launch power in OMAouter minus TDECQ (min) add "for extinction ratio >= 5
   dB" to the existing power level and add another "line" starting with "for extinction ratio <5
   dB" with value -1 dBm.

   In Table 140-8:
   In the row for Power budget (for max TDECQ) add "for extinction ratio >= 5 dB" to the
   existing level and add another "line" starting with "for extinction ratio <5 dB" with value 5.9
   dB.
   In the row for Allocation for penalties (for max TDECQ) add "for extinction ratio >= 5 dB" to
   the existing level and add another "line" starting with "for extinction ratio <5 dB" with value
   5.9 dB minus max channel insertion loss per Table 140-12.

   In Table 140-12:
   Change the maximum channel insertion loss for 6 x -35 dB reflectances from 2.7 to 2.6 dB.

   All with editorial license.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **138**   Page 30 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **138.7**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **138**   *SC* **138.7.1**   *P* **262**   *L* **17**   # 147
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

This PMD needs more study, and knowing what TDECQ is feasible is probably the key.

SuggestedRemedy

While in WG ballot, show evidence of technical feasibility for the numbers in the spec: eyes, receiver waterfall plots, TDECQ measurements and so on.   Adjust the draft as appropriate. TR because this could take a few meeting cycles.

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.7.1**   *P* **262**   *L* **18**   # 127
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

It seems that it is possible to make a bad transmitter (e.g. with a noisy or distorted signal), use emphasis to get it to pass the TDECQ test, yet leave a realistic, compliant receiver with an unreasonable challenge (up to 4/2 dB worse than the SRS test?) With some of the changed low-bandwidth TDECQ being used to equalize the reference receiver's own bandwidth, this issue becomes more apparent.
This is an issue for all the PAM4 optical PMDs, although it may be worse for MMF because of the high TDECQ limit.

SuggestedRemedy

Define TDECQrms = $10*\log10(A\_RMS/(s*3*Qt*R))$ where A_RMS is the standard deviation of the measured signal after the 13.28125 GHz filter response. s is the standard deviation of a fast clean signal with OMA=2 and without emphasis, observed through the 13.28125 GHz filter response (around 0.7 - can be calculated when the filter bandwidth is stable).
Set limit for TDECQrms according to what level of dirty-but-emphasised signal we decide is acceptable, add max TDECQrms row to the table. Alternatively, if the same relative limit is acceptable for all PAM4 optical PMDs, the limit could be in the TDECQ procedure 121.8.5.3 as proposed in P802.3bs D3.2 comment r02-35.
Similarly in clauses 139, 140.

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.7.1**   *P* **262**   *L* **19**   # 155
Dawe, Piers   Mellanox

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

Table 121-6 and 124-6 say Extinction ratio, each lane (min), while tables 122-9, 122-10, 138-8, 139-6 and 140-6 say Extinction ratio (min).

SuggestedRemedy

Consistency would be good. As adding the extinction ratios of the lanes together makes no sense, it seems that extinction ratio could go without "each lane", like modulation format, SMSR, spectral width, and some others. If so, nothing to do in P802.3cd.

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.7.1**   *P* **262**   *L* **26**   # 10
Hajduczenia, Marek   Charter Communicatio

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

Footnote c is separated visually from a) and b) for some reason

SuggestedRemedy

Please apply proper format so that a), b), and c) have the same line spacing

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.7.5**   *P*   *L*   # 45
King, Jonathan   Finisar

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

Comment r01-21 against P802.3bs D3.1 has changed the TDECQ reference measurement bandwidth to approximately half the symbol rate in GHz, consistent with a reference equalizer which is a 5 tap T spaced equalizer.
Keep the TDECQ definition for 50GBASE-SR, 100GBASE-SR2 and 200GBSE-SR4 consistent with this change, by changing the TDECQ measurement bandwidth to 11.2 GHz, consistent with a reference equalizer of half the symbol rate convolved with the effective filtering function of the worst case link.

SuggestedRemedy

Change:
"The combination of the O/E and the oscilloscope used to measure the optical waveform has a fourth-order Bessel-Thomson filter response with a bandwidth of 12.6 GHz" to:
"The combination of the O/E and the oscilloscope used to measure the optical waveform has a fourth-order Bessel-Thomson filter response with a bandwidth of 11.2 GHz."

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **138**   Page 31 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **138.7.5**   2017-06-27 1:47:08 PM
SORT ORDER: Clause, Subclause, page, line

Cl **138**   *SC* **138.8.2**   *P* **265**   *L* **18**   # 148
Dawe, Piers   Mellanox

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

We included TIA/EIA-455-127-A in e.g. 802.3ba because IEC 61280-1-3:1998 lacked
some features of the newer TIA spec. But now 1.3 refers to IEC 61280-1-3:2010, which I
believe is suitable for measuring center wavelength and RMS spectral width - although it
would be good if someone else could confirm this. Clause 115 refers to IEC 61280 and not
TIA/EIA-455-127-A, which should be TIA-455-127-A anyway.

SuggestedRemedy

Delete "TIA/EIA-455-127-A or", revise PICS OM2 in 138.11.4.4.

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.8.5**   *P* **265**   *L* **44**   # 159
Ghiasi, Ali   Ghiasi Quantum and

Comment Type **TR**   *Comment Status* **D**

Based on 802.3bs contributions an oscilloscope BW of 12.6 GHz will results in exccess
TDECQ penalty or transmitter will require pre-emphasis which will impact peak to average
ratio
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest to increase the BW to at 16 GHz

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.8.5**   *P* **265**   *L* **44**   # 150
Dawe, Piers   Mellanox

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

If the SMF TDECQ bandwidth stays low and MMF follows, the special TDECQ bandwidth
for MMF will need changing.

SuggestedRemedy

Revise the 12.6 GHz.

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.8.5.1**   *P* **265**   *L* **5**   # 160
Ghiasi, Ali   Ghiasi Quantum and

Comment Type **TR**   *Comment Status* **D**

Based on 802.3bs contributions 5 T/2 equalizer will be to short to equalize the link and will
result in excessive yield loss
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest replacing 5 T/2 equalizer with 5 T spaced equalizer

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.8.5.1**   *P* **265**   *L* **50**   # 11
Hajduczenia, Marek   Charter Communicatio

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

"5 tap" is a compound adjective

SuggestedRemedy

Change to "5-tap"
Same with "T/2 spaced" to "T/2-spaced"

Proposed Response   *Response Status* **O**

Cl **138**   *SC* **138.8.5.1**   *P* **265**   *L* **50**   # 42
King, Jonathan   Finisar

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

Comment r01-21 against P802.3bs D3.1 has changed the reference equalizer for
200GBASE-FR4, 200GBASE-LR4, 400GBASE-FR8, and 400GBASE-LR8 to a 5 tap, T
spaced equalizer.
Keep the TDECQ definition for 50GBASE-SR 100GBASE-SR2 and 200GBASE-SR4
consistent with this.

SuggestedRemedy

In 138.8.5.1 change "5 tap, T/2 spaced" to "5 tap, T spaced"

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **138**
SC **138.8.5.1**

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2017-06-27 1:47:09 PM

Cl **138**　　*SC* **138.8.5.1**　　　　*P* **265**　　*L* **51**　　　# 39
Anslow, Pete　　　　　　　　　　　Ciena

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

Comment r01-3 against P802.3bs D3.1 has added "The sum of the equalizer tap coefficients is equal to 1." at the end of the first paragraph of 121.8.5.4 and 122.8.5.4.

SuggestedRemedy

Keep the two drafts in sync by adding "The sum of the equalizer tap coefficients is equal to 1." at the end of the first paragraph of 138.8.5.1 and 139.7.5.4

Proposed Response　　*Response Status* **O**

Cl **138**　　*SC* **138.8.8**　　　　*P* **266**　　*L* **27**　　　# 151
Dawe, Piers　　　　　　　　　　　Mellanox

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

The MMF SECQ bandwidth (presently 19.34 GHz) should align with the MMF TDECQ bandwidth (presently 13.28125 GHz).

SuggestedRemedy

Make them the same. Make other updates to track changes in P802.3bs, if appropriate, e.g. 140.7.5 38.68 GHz.

Proposed Response　　*Response Status* **O**

Cl **138**　　*SC* **138.8.8.1**　　　*P* **266**　　*L* **41**　　　# 12
Hajduczenia, Marek　　　　　　　　Charter Communicatio

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

Table 138-13 contains frequency bands with clear statement on what happens below 40 kHz. What happens above 10 LB? Is it specified or not?

SuggestedRemedy

Consider adding entry for f>10LB with value of Not specified, for clarity. Othersise, remove first row and add a statement that area <40kHz and above 10LB is not specifieid

Proposed Response　　*Response Status* **O**

Cl **138**　　*SC* **138.8.11.7.1**　　*P* **209**　　*L* **37**　　　# 177
Slavick, Jeff　　　　　　　　　　Broadcom Limited

Comment Type **T**　　*Comment Status* **D**　　　　　　　　*<late>*

tp_mode is based on the received frames. To help clarify that, it would be useful to change it's name to remote_tp_mode

SuggestedRemedy

Change tp_mode to remote_tp_mode throughout Clause 136. (Table 136-6, Figure 136-7, 136.8.11.7.1)

Proposed Response　　*Response Status* **W**

[Editor's note: This comment was received after the Working Group ballot closed.]

Cl **138**　　*SC* **138.9.2**　　　　*P* **267**　　*L* **10**　　　# 13
Hajduczenia, Marek　　　　　　　　Charter Communicatio

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

missing space in "Hazard Level1M"

SuggestedRemedy

Change to "Hazard Level 1M"

Proposed Response　　*Response Status* **O**

Cl **138**　　*SC* **138.9.2**　　　　*P* **267**　　*L* **10**　　　# 52
Graber, Steffen　　　　　　　　　Pepperl+Fuchs

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

Hazard Level1M

SuggestedRemedy

Change to: Hazard Level 1M (add space)

Proposed Response　　*Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general　　　　*Cl* **138**　　Page 33 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected　　RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn　　*SC* **138.9.2**　　2017-06-27 1:47:09 PM
SORT ORDER: Clause, Subclause, page, line

Cl **138**　　*SC* **138.10.1**　　　*P* **268**　　*L* **41**　　# 14

Hajduczenia, Marek　　　　　Charter Communicatio

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

Different ways to define a term inline: in some locations, it is italicized, in some sorrounded with "", in others - no special markup exists

SuggestedRemedy

Please consider using consistent approach, at least within this draft. Suggested ""

Proposed Response　　*Response Status* **O**

Cl **138**　　*SC* **138.11.4.4**　　*P* **275**　　*L* **12**　　# 55

Shariff, Masood　　　　　CommScope

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

The terms OM3, OM4, and OM5 are used in several place in the standard to designated Optical Multimode cables as defined by ISO/IEC/JTC 1/SC 25/WG 3. It is confusing to use the same designations for other purposes in this document.

SuggestedRemedy

Change the designations of the Optical Masurement Method to OMM instead of OM

Proposed Response　　*Response Status* **O**

Cl **138**　　*SC* **138.11.4.5**　　*P* **298**　　*L* **14**　　# 56

Shariff, Masood　　　　　CommScope

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

The terms OM3, OM4, and OM5 are used in several place in the standard to designated Optical Multimode cables as defined by ISO/IEC/JTC 1/SC 25/WG 3. It is confusing to use the same designations for other purposes in this document.

SuggestedRemedy

hange the designations of the Optical Masurement Method to OMM instead of OM

Proposed Response　　*Response Status* **O**

Cl **139**　　*SC* **139.5.1**　　　*P* **281**　　*L* **1**　　# 15

Hajduczenia, Marek　　　　　Charter Communicatio

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

Different ways to designate Test Points - in Figure 139-2, these are deisgnators in large circles, in other locations, there are just labels, or slanted trapezoids.

SuggestedRemedy

Please use consistent symbols for test points, at least within this draft - not asking for any global alignment …

Proposed Response　　*Response Status* **O**

Cl **139**　　*SC* **139.6**　　　*P*　　*L*　　# 48

King, Jonathan　　　　　Finisar

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

Consequent to the changes to TDECQ to use a T spaced reference equalizer and the approx half symbol rate bandwdth reference receiver, TDECQ measurements will increase by about 0.9 dB.

In order not to fail transmitters that would pass the draft 2.0 definiton of TDECQ, the TDECQ value should increase by 0.9dB. Other specs are also affected

SuggestedRemedy

Subject to task force review, implement the changes proposed for clause 139 in king_3cd_03_0617, with editorial license .

Proposed Response　　*Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected　　RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **139**
SC **139.6**

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Cl **139**   *SC* **139.6.1**   *P*   *L*   # 37

Stassar, Peter   Huawei

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

Following up to comment #44 to D1.3 and to remain consistent with agreed modifications to 200/400GBASE FRx/LRx in Clause 122 of draft D3.2 of 802.3bs, the minimum extinction ratio in Table 139-6 should be reduced from 4.5 to 3.5 dB for both 50GBASE-FR and 50GBASE-LR.
While initially it was proposed in comment #44 to put the burden of 0.1 dB completely on the trasnmitter, in http://www.ieee802.org/3/cd/public/adhoc/archive/stassar_061417_3cd_adhoc-v2.pdf, presented during the CD Ad Hoc call on 14 June 2017 with presentation, it was proposed to put the burden of 0.1 dB completely on the receiver. An updated presentation will be submitted to the Berlin meeting in July 2017.

SuggestedRemedy

Make the following modifications to Clause 139:
Table 139-6
Change Extinction ratio (min) from 4.5 dB to 3.5 dB

Table 139-7
Change Receiver sensitivity (OMAouter) (max):
From -7.3 dBm to -7.4 dBm for 50GBASE-FR
From -8.8 dBm to -8.9 dBm for 50GBASE-LR.
Change Stressed receiver sensitivity (OMAouter) (max):
From -5 dBm to -5.1 dBm for 50GBASE-FR
From -6.3 dBm to -6.4 dBm for 50GBASE-LR.

Table 139-8
Change Power budget (for maximum TDECQ):
From 6.6 dB to 6.7 dB for 50GBASE-FR
From 9.3 dB to 9.4 dB for 50GBASE-LR.
Allocation for penalties (for maximum TDECQ):
From 2.6 dB to 2.7 dB for 50GBASE-FR
From 3 dB to 3.1 dB for 50GBASE-LR.

Table 139-14
Change maximum value for each discrete reflectance:
From -39 dB to -40 dB for 8 reflectances for 50GBASE-FR
From -40 dB to -41 dB for 10 reflectances for 50GBASE-FR
From -38 dB to -39 dB for 10 reflectances for 50GBASE-LR

Proposed Response   *Response Status* **O**

Cl **139**   *SC* **139.6.1**   *P* **283**   *L* 36   # 152

Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

PAM4 optics is still new and raw, we are still debugging the specification methodology, and we have seen too little experimental information showing technical and economic feasibility. However, stassar_061417_3cd_adhoc-v2 shows plenty of receiver sensitivity margin (although not yet shown with SSPRQ). As more measurements with with new receiver designs and the new TDECQ method become available, it appears the optical power levels can be reduced and the spec as in this draft will be uneconomic (particularly 50GBASE-FR which should be low cost, low power, convenient for quad or octal packaging).

SuggestedRemedy

Bring more evidence for what optical power levels and TDECQ limits are right, including TDECQ measurements with SSPRQ, and correlation to actual receiver performance.
Based on evidence, reduce all the optical power levels for 50GBASE-FR and 50GBASE-LR by 0.5, 1 or 1.5 dB (with other adjustments for other reasons). Review the TDECQ limit.

Proposed Response   *Response Status* **O**

Cl **139**   *SC* **139.6.1**   *P* **283**   *L* 47   # 153

Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

Following up on D1.2 comments 138 and 200, D1.3 comment 44, and changes in 802.3bs D3.2 Clause 122. A lower extinction ratio limit allows for cost reduction of a range of optical transmitter technologies, and, depending on technology, improved performance. See dawe_3cd_01_0517 and references, anslow_01_0517_smf, king_3cd_02_0317, and stassar_061417_3cd_adhoc-v2, which shows that this PMD type has receiver sensitivity margin available.

SuggestedRemedy

Reduce the extinction ratio limit from 4.5 dB to 3.5 dB.
In Table 139-7, reduce the unstressed and stressed receiver sensitivities by 0.1 dB.
In Table 139-8, increase the power budgets and allocations for penalties by 0.1 dB.
In Table 139-14, for 50GBASE-FR, change -39 to -40 and -40 to -41, and for 50GBASE-LR, change -38 to -39.

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **139**
SC **139.6.1**

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2017-06-27 1:47:09 PM

Cl **139**   *SC* **139.6.1**   *P* **284**   *L* **1**   # 16

Hajduczenia, Marek   Charter Communicatio

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

Footnotes to Table 139-6 got separated from the pain table

SuggestedRemedy

Please glue the footnotes to table, unless it is physically impossible to make them stay with the table.

Proposed Response   *Response Status*   **O**

Cl **139**   *SC* **139.7.1**   *P* **285**   *L* **49**   # 125

Dawe, Piers   Mellanox

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

Scrambled idle used in this project isn't defined in 82.2.11. Table 136-13 says "Scrambled idle encoded by RS-FEC", and Table 95-9, Test patterns, has a note "The pattern defined in 82.2.11 as encoded by Clause 91 RS-FEC for 100GBASE-SR4."

SuggestedRemedy

Add note in the style of Table 95-9.

Proposed Response   *Response Status*   **O**

Cl **139**   *SC* **139.7.1**   *P* **286**   *L* **19**   # 126

Dawe, Piers   Mellanox

Comment Type   **TR**   *Comment Status*   **D**

For SRS testing, while Table 138-12 following 802.3by Table 95-10 allows PRBS31Q, scrambled idle (with FEC) or valid 50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4 signal, but this Table 139-10 (following the older 802.3ba?) allows only PRBS31Q and scrambled idle. The 58-bit scrambler is so long that we can't tell the statistics of RS-FEC encoded scrambled idle from any other valid 50GBASE-R signal. RF, which is a valid 50GBASE-R signal, is often more convenient than scrambled idle. Table 89-10 (40GBASE-FR) also allows PRBS31, scrambled idle or valid 40GBASE-R signal.

SuggestedRemedy

Change "3 or 5" to "3, 5, 6 or valid 50GBASE-R signal". Also in Table 140-10.

Proposed Response   *Response Status*   **O**

Cl **139**   *SC* **139.7.2**   *P* **286**   *L* **25**   # 149

Dawe, Piers   Mellanox

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

We included TIA/EIA-455-127-A in e.g. 802.3ba because IEC 61280-1-3:1998 lacked some features of the newer TIA spec. But now 1.3 refers to IEC 61280-1-3:2010, which I believe is suitable for measuring wavelength, and also SMSR. It would be good if someone else could confirm this. Clause 115 refers to IEC 61280 and not TIA/EIA-455-127-A, which should be TIA-455-127-A anyway.

SuggestedRemedy

Change the subclause heading from "Wavelength" to "Wavelength and side mode suppression ratio (SMSR)". Delete "TIA/EIA-455-127-A or", here and in 140.7.2. Revise the PICS.

Proposed Response   *Response Status*   **O**

Cl **139**   *SC* **139.7.5.1**   *P* **287**   *L* **41**   # 161

Ghiasi, Ali   Ghiasi Quantum and

Comment Type   **TR**   *Comment Status*   **D**

Assuming we change the TDECQ equalizer from 5 T/2 spaced to 5 T spaced it would better to slighlty reduce the BW
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest using a BW of 16 GHz

Proposed Response   *Response Status*   **O**

Cl **139**   *SC* **139.7.5.2**   *P* **288**   *L* **40**   # 17

Hajduczenia, Marek   Charter Communicatio

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

DGD used without definition

SuggestedRemedy

First definition is on page 293 under Table 139-12. Need to be moved in here since it is the first use in text

Proposed Response   *Response Status*   **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **139**   Page 36 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **139.7.5.2**   2017-06-27 1:47:09 PM
SORT ORDER: Clause, Subclause, page, line

Cl **139**   *SC* **139.7.5.3**   *P* **288**   *L* **44**   # 154

Dawe, Piers   Mellanox

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

After the change in reference receiver bandwidth, we need to either increase the TDECQ limits and make consequent changes including to budget and unstressed sensitivity; and/or change the definition (zero basis) of TDECQ.

SuggestedRemedy

Changing the zero point of TDECQ (in P802.3bs Eq 121-12) seems easy to do in the short term and less confusing in the long term, which would involve a small or no adjustment to the optical spec numbers in this draft.

Proposed Response   *Response Status* **O**

Cl **139**   *SC* **139.7.5.4**   *P* **288**   *L* **49**   # 162

Ghiasi, Ali   Ghiasi Quantum and

Comment Type **TR**   *Comment Status* **D**

Based on 802.3bs contributions 5 T/2 equalizer will be to short to equalize the link and will result in excessive yield loss
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest replacing 5 T/2 equalizer with 5 T spaced equalizer

Proposed Response   *Response Status* **O**

Cl **139**   *SC* **139.7.5.4**   *P* **288**   *L* **49**   # 40

Anslow, Pete   Ciena

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

Comment r01-21 against P802.3bs D3.1 has changed the reference equalizer for 200GBASE-FR4, 200GBASE-LR4, 400GBASE-FR8, and 400GBASE-LR8 to a 5 tap, T spaced equalizer.
Keep the TDECQ definition for 50GBASE-FR and 50GBASE-LR consistent with this change.

SuggestedRemedy

Change "5 tap, T/2 spaced" to "5 tap, T spaced"

Proposed Response   *Response Status* **O**

Cl **139**   *SC* **139.7.7**   *P* **289**   *L* **15**   # 133

Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

With the lower receiver bandwidth, measuring RIN in approximately the signaling rate (twice as much) seems too much; 1/2 to 3/4 would be better. A T-spaced equalizer cannot independently adjust for good ISI and RIN filtering, so can an adequate estimate of RIN can be obtained as a by-product of the TDECQ procedure? While a T/2-spaced equalizer could enhance the RIN, it would not choose to do so if RIN were a problem, so a T-spaced reference equalizer and a T/2-spaced product equalizer are compatible from this point of view, I think. As 52.9.6 says, this RIN method is intended for components (TOSAs) not a "system level test" suitable for a complete optical module.
This is much the same as P802.3bs D3.2 comment r02-39.

SuggestedRemedy

Review; reduce the bandwidth and simplify RIN measurement to a Qsq measurement (see 68.6.7) or eliminate as appropriate. Remove 135.5.10.2.4 Square wave (quaternary) test pattern and any associated registers.
Similarly in 140.7.9.

Proposed Response   *Response Status* **O**

Cl **139**   *SC* **139.10.3**   *P* **294**   *L* **27**   # 58

Brown, Matt   MACOM

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

"400GBASE-LR" should be "50GBASE-LR"

SuggestedRemedy

Change "400GBASE-LR" to "50GBASE-LR"

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general   *Cl* **139**   Page 37 of 41
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn   *SC* **139.10.3**   2017-06-27 1:47:09 PM
SORT ORDER: Clause, Subclause, page, line

Cl **140**   *SC* **140.6.1**   *P* **306**   *L* **33**   # 128
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

PAM4 optics is still new and raw, we are still debugging the specification methodology, and we have seen too little experimental information showing technical and economic feasibilty. As measurements with the new TDECQ method and with new receiver designs become available, it may be that optical power levels can be reduced and the spec as in this draft would be uneconomic.

SuggestedRemedy

Bring more evidence for what optical power levels and TDECQ limits are right; in particular, TDECQ measurements with SSPRQ, and correlation to actual receiver performance. Based on evidence, reduce all the optical power levels for 100GBASE-DR by 0.5 or 1 dB (with other adjustments for other reasons). Review the TDECQ limit.

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.6.1**   *P* **306**   *L* **40**   # 46
King, Jonathan   Finisar

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

Consequent to the changes to TDECQ to use a T spaced reference equalizer and the approx half symbol rate bandwdth reference receiver, TDECQ measurements will increase by 0.9 dB.
In order not to fail transmitters that would pass the D2.0 definiton of TDECQ, the TDECQ value should increase by 0.9dB. Other specs are also affected

SuggestedRemedy

Subject to task force review, implement the changes proposed for clause 140 in king_3cd_03_0617with editorial license .

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.6.1**   *P* **306**   *L* **43**   # 59
Hayakawa, Akinori   Fujitsu Laboratories

Comment Type **TR**   *Comment Status* **D**

An extinction ratio of 100GBASE-DR should be consistent with 400GBASE-DR4.

SuggestedRemedy

In Table 140-6, change the Extinction ratio (min) value from 5 to 3.5 dB.

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.6.1**   *P* **306**   *L* **43**   # 129
Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

Following up on D1.2 comments 139 and 211, D1.3 comment 47, and changes in 802.3bs D3.2 Clause 140. A lower extinction ratio limit allows for cost reduction of a range of optical transmitter technologies, and, depending on technology, improved performance. See dawe_3cd_01_0517 and references, king_3cd_02_0317, king_3cd_01_0517 and anslow_3cd_01_0517.

SuggestedRemedy

Reduce the extinction ratio limit from 5 dB to 3.5 dB. Change the OMA-TDECQ limit to -1.3 dBm for Ext R >= 5 dB (as now), -1 dBm for Ext R < 5.
Modify note b from:
Even if the TDECQ < 1 dB, the OMAouter (min) must exceed these values.
to: Even if the TDECQ < 1 dB for an extinction ratio of >= 5 dB or TDECQ < 0.9 dB for an extinction ratio of < 5 dB,
the OMAouter (min) must exceed this value.
In Table 140-8, change the power budget from 5.6 to 5.6, 5.9 depending on extinction ratio. Change the allocation for penalties to 5.6, 5.9 minus max channel insertion loss per Table 140-12, depending on extinction ratio.
In Table 140-12, change the maximum channel insertion loss for 6 x -35 dB reflectances from 2.7 to 2.6 dB
Editorially, follow the example of Clause 122.

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.6.2**   *P* **307**   *L* **15**   # 130
Dawe, Piers   Mellanox

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

The damage threshold here is +6.5 dBm while the max Tx power is +4. For 400GBASE-DR4 the damage threshold is +6.5 dBm while the max Tx power is +4 again, so the usual 1 dB margin. Is there another transmitter type at max 6.5?

SuggestedRemedy

Should this damage threshold be changed to +5?

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **140**
SC **140.6.2**

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Cl **140**   *SC* **140.7.4**   *P* **309**   *L* **14**   # 28

Anslow, Pete   Ciena

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

Space missing in "Table 140–6.The"

SuggestedRemedy

Add the space.

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.7.4**   *P* **309**   *L* **14**   # 132

Dawe, Piers   Mellanox

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

140–6.The

SuggestedRemedy

missing space

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.7.5**   *P* **288**   *L* **37**   # 158

Ghiasi, Ali   Ghiasi Quantum and

Comment Type **TR**   *Comment Status* **D**

Due to potential movement in reference equalizer in Cl 121 suggest to explicitly define the reference EQ in CL140

SuggestedRemedy

Suggest replacing 5 T/2 equalizer with 5 T spaced equalizer

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.7.5**   *P* **308**   *L* **48**   # 131

Dawe, Piers   Mellanox

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

Most of these definitions identify the pattern to use by reference to Table 140-10. 140.7.5 (TDECQ) and 140.7.9 (SRS) don't, leaving the associated rows in the table without effect.

SuggestedRemedy

For consistency, should 140.7.5 and 140.7.9 identify the pattern too?

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.7.5**   *P* **309**   *L* **47**   # 41

Anslow, Pete   Ciena

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

Comment r01-21 against P802.3bs D3.1 has changed the TDECQ measurement bandwidth for 400GBASE-DR4 to "approximately 26.5625 GHz".
Keep the TDECQ definition for 100GBASE-DR consistent with this change.

SuggestedRemedy

Change:
"The combination of the O/E converter and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of 38.68 GHz" to:
"The combination of the O/E converter and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of approximately 26.5625 GHz."

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.7.5**   *P* **309**   *L* **47**   # 157

Ghiasi, Ali   Ghiasi Quantum and

Comment Type **TR**   *Comment Status* **D**

Assuming we change the TDECQ equalizer from 5 T/2 spaced to 5 T spaced it would better to slighlty reduce the BW
See http://www.ieee802.org/3/bs/public/17_05/way_3bs_01a_0517.pdf
http://www.ieee802.org/3/bs/public/17_05/traverso_3bs_01a_0517.pdf

SuggestedRemedy

Suggest using a BW of 32 GHz

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **140**
SC **140.7.5**

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Cl **140**	*SC* **140.7.5**	*P* **309**	*L* **47**	*#* 53

Hanan, Leizerovich   MultiPhy

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

The bandwidth of 38.68GHZ is not updated to 400GBASE-DR4

SuggestedRemedy

Either update the value or place a reference to 124.8.5.

Proposed Response   *Response Status* **O**

Cl **140**	*SC* **140.7.5**	*P* **309**	*L* **48**	*#* 60

Hayakawa, Akinori   Fujitsu Laboratories

Comment Type **TR**   *Comment Status* **D**

A bandwidth of a fourth-order Bessel-Thomson filter response for TDECQ measurement should be consistent with 400GBASE-DR4.

SuggestedRemedy

Change "38.68 GHz" to "approximately 26.5625 GHz".

Proposed Response   *Response Status* **O**

Cl **140**	*SC* **140.7.9**	*P* **310**	*L* **28**	*#* 134

Dawe, Piers   Mellanox

Comment Type **TR**   *Comment Status* **D**

The lack of consistency between the low frequency jitter specs in 802.3bs affects 802.3cd also. Here is P802.3bs D3.2 comment r02-40 for those who have not been following this issue. Depending how this inconsistency is fixed, there may be little or no explicit change in the P802.3cd draft.

Following up on P802.3bs D3.0 comment 153 and D3.1 comment 55: if the jitter corner frequency for 26.5625 GBd (NRZ and PAM4) is 4 MHz, the low frequency ends of the jitter masks must align or be in the right order if expressed in time vs. frequency, i.e. should scale with signalling rate if in UI. If this is not done, the required depth of the LF jitter buffer in the 2:1 muxes in a 400GBASE-DR4 module is unbounded and the low frequency jitter generation requirements on the module become unreasonable. Compare 87.8.11.4 and 88.8.10: 4 MHz for 10.3125 GBd, 10 MHz for 25.78125 GBd. History: anslow_3bs_04_0316 does not contain reasoning, refers to ghiasi_3bs_01_0316 which does not address wander and buffering. ghiasi_3bs_01a_0116.pdf#page=15 shows FIFOs but does not establish a workable spec. Slide 14 shows they can be avoided: this is what we have for 400GAUI-8 or 400GAUI-16 with 400GBASE-xR8. I have no evidence that the problems described in the [fourth] sentence have been considered or solved by the [P802.3bs] committee.

SuggestedRemedy

Add another exception for the SRS procedure, with a table like Table 121-12 replacing second row after the header row:
80 kHz < f <= 250 kHz   4e5/f
250 kHz < f <= 500 kHz   1e11/f^2
1 MHz < f <= 4 MHz   2e5/f
Or, with the UIs doubled vs. Table 121-12:
f < 40 kHz   Not specified
40 kHz < f <= 4 MHz   4e5/f
4 MHz < f <= 10 LB   0.1
Increase the TDECQ limit to share the burden appropriately between transmitter and receiver.
This option means the 100G/lane receiver has to tolerate no more timing slew rate (in ps/us) than that agreed for 50G/lanes.
Or, increase jitter by 50% and corner frequency by 33%:
f < 40 kHz   Not specified
40 kHz < f <= 6 MHz   4e5/f
5.333 MHz < f <= 10 LB   0.075
and add an exception in 124.8.5 that the CRU corner frequency is 5.333 MHz. Increase the TDECQ limit to share the burden between transmitter and receiver.
To do the job properly with the first option, in 124.8.5 we should add another exception to the CRU with a corner frequency of 4 MHz and a slope of 20 dB/decade (in 121.8.5.1): add a pole at 250 kHz and a zero at 500 kHz. I am advised that this can be done in hardware (in software, anything is possible).

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **140**
SC **140.7.9**

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Cl **140**   *SC* **140.9**   *P* **312**   *L* **32**   *#* 43

King, Jonathan   Finisar

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

Table 140-12 has incorrect values for some of the connector combinations, because the MPI penalty was underestimated.

SuggestedRemedy

Change the allowed insertion loss for the cell for 6 x 35 dB connectors to 2.6 dB.

Change the allowed insertion loss for the cell for 6 x 35 dB plus 1 x 45 dB connectors to 2.5 dB.
see presentation king_3cd_01_0517

Proposed Response   *Response Status* **O**

Cl **140**   *SC* **140.11.4**   *P* **318**   *L* **1**   *#* 57

Shariff, Masood   CommScope

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

The terms OM3, OM4, and OM5 are used in several place in the standard to designated Optical Multimode cables as defined by ISO/IEC/JTC 1/SC 25/WG 3. It is confusing to use the same designations for other purposes in this document.

SuggestedRemedy

hange the designations of the Optical Masurement Method to OMM instead of OM

Proposed Response   *Response Status* **O**

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line

Cl **140**
SC **140.11.4**

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