Cl **00** *SC* **0** *P* *L* # 25

Anslow, Pete — Ciena

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

Now that Clause 74 has been brought in to the draft, there are some instances of "Clause 74" or "74" (in tables) that should be links.
These are:
Page 29, line 42
Page 30, lines 6, 10 and 11
Page 33, lines 42 and 43
Page 98, line 15
Page 99, lines 8 and 33
Page 100, lines 21 and 22
Page 105, line 5
Page 110, line 6
Page 140, line 27
Page 148, line 38

SuggestedRemedy

Make them links.

Proposed Response *Response Status* **O**

Cl **00** *SC* **0** *P* *L* # 147

Anslow, Pete — Ciena

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

In 92.5, 93.5 and 94.3.4 we have the text:
"and specified at the points SP1 to SP6 shown in Figure 80–4 and Figure 80–5."
but these are all PMDs that use RS-FEC, so the appropriate diagram is Figure 80-5a and the skew specification includes SP0 and SP7

SuggestedRemedy

In 92.5, 93.5 and 94.3.4 change:
"and specified at the points SP1 to SP6 shown in Figure 80–4 and Figure 80–5." to:
"and specified at the points SP0 to SP7 shown in Figure 80–5a."

Proposed Response *Response Status* **O**

Cl **00** *SC* **0** *P* **29** *L* **42** # 102

Healey, Adam — LSI Corporation

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

Clause 74 is now in the draft and is no longer an external cross-reference.

SuggestedRemedy

Add appropriate cross-references for each instance of "Clause 74" in the draft.

Proposed Response *Response Status* **O**

Cl **01** *SC* **1.4.60** *P* **24** *L* **39** # 20

Anslow, Pete — Ciena

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

For the definition of 40GBASE-R, there is no need to state: "and a PMD that employs 2-level pulse amplitude modulation.".
This text is not present for 10GBASE-R. It is needed for 100GBASE-R to distinguish it from 100GBASE-P, but this is not the case for 40GBASE-R.
None of the PMDs for 40GBASE-R say that they use "2-level pulse amplitude modulation", so this addition just causes confusion.

SuggestedRemedy

Delete "and a PMD that employs 2-level pulse amplitude modulation."

Proposed Response *Response Status* **O**

Cl **01** *SC* **1.5** *P* **25** *L* **3** # 21

Anslow, Pete — Ciena

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

The editing instructions says "Insert the following new abbreviation into the definitions list ..." but this should be the abbreviations list.

SuggestedRemedy

Change:
"... into the definitions list ..." to:
"... into the abbreviations list ..."

Proposed Response *Response Status* **O**

Cl **01** *SC* **1.5** *P* **25** *L* **6** # 56

Slavick, Jeff — Avago Technologies

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

RS-FEC should be added as an abbreviation.

SuggestedRemedy

RS-FEC Reed-Solomon Forward Error Correction

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.12.2.1.30** *P* **34** *L* **12** # 16

Marris, Arthur — Cadence Design Syste

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

This is a Boolean rather than an Integer

SuggestedRemedy

Change to Boolean
also change aLldpXdot3LocTxFwEcho, aLldpXdot3LocRxFw, aLldpXdot3LocRxFwEcho, aLldpXdot3RemTxFw, aLldpXdot3RemTxFwEcho and aLldpXdot3RemRxFwEcho to Boolean.

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.2.5** *P* *L* # 22

Anslow, Pete — Ciena

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

The cross-references in Table 30-1e and Table 30-7 are not formatted correctly.

SuggestedRemedy

Page 26, line 27 "30.5.1" should be in green font
Page 27, line 23 "30.5.1" should be in green font
Page 27, line 50 "30.12.2" should be black and a link
Page 28, line 18 "30.12.3" should be black and a link

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.5.1.1.15** *P* **29** *L* **44** # 24

Anslow, Pete — Ciena

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

In the paragraph: "If a Clause 45 MDIO Interface is present, then this attribute will map to the FEC capability register (see 45.2.8.2 or 45.2.1.89).;"
"Clause 45" should be a link. (same for 30.5.1.1.16 through 30.5.1.1.18 and 30.5.1.1.26 through 30.5.1.1.31)
Also "or 45.2.1.89" should be in underline font as it has been added.

SuggestedRemedy

Make "Clause 45" a link here and in 30.5.1.1.16 through 30.5.1.1.18 and 30.5.1.1.26 through 30.5.1.1.31
Underline "or 45.2.1.89"

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.5.1.1.2** *P* **28** *L* **52** # 23

Anslow, Pete — Ciena

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

The "1" in 100GBASE-P is not underlined

SuggestedRemedy

Underline the "1"

Proposed Response *Response Status* **O**

Cl **30** *SC* **30.5.1.1.30** *P* **32** *L* **36** # 57

Slavick, Jeff — Avago Technologies

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

aRSFECBypassEnable and aRSFECIndicationEnable MDIO registers are in section 45.2.1.92a

SuggestedRemedy

Change the "see 45.2.1.92b" to "45.2.1.92a" for both.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.7.4** *P* **40** *L* **22** # 135

Dawe, Piers IPtronics

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

Try to keep a consistent order - easier for the readers to find things. I believe that lists of port types and similar that aren't constrained by bit definitions go slow to fast, short to long, wide to narrow - or the reverse.

SuggestedRemedy

40GBASE-FR
100GBASE-KP4
100GBASE-KR4
100GBASE-CR4
100GBASE-LR4, 100GBASE-ER4

Same for the receive fault table.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.79** *P* **0** *L* **0** # 80

Slavick, Jeff Avago Technologies

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

45.2.1.79 lists the clauses that use this register, Clause 92-95 also use this register.

SuggestedRemedy

Add Clause 93, 93 and 94 to the list of clauses.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.8** *P* **33** *L* **2** # 136

Dawe, Piers IPtronics

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

Most of this paragraph is a table without the formatting. It keeps on getting more unwieldy.

SuggestedRemedy

Please use a table, like Table 45-9 and Table 45-10.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92b** *P* **45** *L* **10** # 60

Slavick, Jeff Avago Technologies

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

PCS align status is part of the Encode path of the RS-FEC.

SuggestedRemedy

Change 1.201.15 description to use encoder instead of decoder.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92b** *P* **45** *L* **10** # 117

Shah, Sameer Broadcom

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

Based on Line #15 on Page #177 in Clause #91, "PCS align status" for Transmitter incorrectly listed here in 1.201.15.

SuggestedRemedy

Remove "PCS align status" bit from 1.201.15 and list it in 1.283.15

Proposed Response *Response Status* **O**

<Commenter is not an 802.3 voting member. Editor changed comment type from TR to T.>

Cl **45** *SC* **45.2.1.92h** *P* **48** *L* **14** # 58

Slavick, Jeff Avago Technologies

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

BIP error counters are non-rollover but missing that property.

SuggestedRemedy

Add the NR property to the R/W column and define it in the footnote.

Note that 45.2.3.44 (base standard PCS BIP error counter is also missing this property).

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92i** *P* **48** *L* **21** # 59

Slavick, Jeff Avago Technologies

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

45.2.1.92h calls the error counter "RS-FEC BIP error counter lane 0"

SuggestedRemedy

Remove the word "PCS" from the end of the first sentence.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92l** *P* **49** *L* **5** # 61

Slavick, Jeff — Avago Technologies

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

The following is attached to this section (and 45.2.91n), but really applies to all the RS-FEC PCS alignment, BIP checking, mapping registers.

A device that does not implement a separated RS-FEC shall return a zero for all bits in the RS-FEC PCS alignment status 1 register. It is the responsibility of the STA management entity to ensure that a port type is supported by all MMDs before interrogating any of its status bits.

SuggestedRemedy

Add this text to 45.2.1.92h, 45.2.1.92j, 45.2.1.92b.4 as well. Or find a more general location to state it once and refer to that text from all necessary sections.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92l.2** *P* **49** *L* **50** # 26

Anslow, Pete — Ciena

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

In 45.2.1.92l.2 through 45.2.1.92l.8, the second sentence ends with a double full stop "..".
In 45.2.1.92m.2 through 45.2.1.92m.12, the second sentence ends without a full stop ".".

SuggestedRemedy

In 45.2.1.92l.2 through 45.2.1.92l.8, delete one full stop.
In 45.2.1.92m.2 through 45.2.1.92m.12, add the full stop.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92o.12** *P* **56** *L* **50** # 41

Anslow, Pete — Ciena

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

This has "1.283.8" instead of "1.283.0" in two places.
It also has "lane 0" instead of "lane 8" in two places.

SuggestedRemedy

Change "1.283.8" to "1.283.0" in two places.
Change "lane 0" to "lane 8" in two places.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.92o.7** *P* **56** *L* **17** # 40

Anslow, Pete — Ciena

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

This has "1.281.28" instead of "1.283.5" in three placed including the title.

SuggestedRemedy

Change "1.281.28" to "1.283.5" in three placed including the title.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.98a** *P* **57** *L* **15** # 7

Marris, Arthur — Cadence Design Syste

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

It is not clear what the polynomial identifier is for. It is not explained in 92.7.12

SuggestedRemedy

Either delete bits 12 and 11 or give a proper explanation of what these two bits are used for. It seems they are redundant as it is already possible to set a unique seed for each PMD lane.

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.1.98a** *P* **57** *L* **5** # 27

Anslow, Pete — Ciena

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

The first sentence says "The assignment of bits in the PMD training pattern registers, lane 0 through 3, is shown in Table 45–72a." but the table is specific to Register 1.1450.
Also, the name of the register is "PMD training pattern lane 0 register"

SuggestedRemedy

Change the sentence to:
"The assignment of bits in the PMD training pattern lane 0 register is shown in Table 45–72a. The assignment of bits in the PMD training pattern lanes 1 through 3 registers are defined similarly to lane 0.".
Change the title of Table 45-72a to "PMD training pattern lane 0 bit definitions"

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.3.9** *P* **60** *L* **11** # 146

Dawe, Piers IPtronics

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

With 802.3bm, we'll need two registers for EEE control and capability register bits.

SuggestedRemedy

Consider putting all the 40G and 100G type-by-type support bits in Register 3.21, with the bits for each type in exactly the same positions as in Table 45-15, 40G/100G PMA/PMD extended ability register (Register 1.13).

Proposed Response *Response Status* **O**

Cl **45** *SC* **45.2.3.9.a** *P* **60** *L* **41** # 154

Dan Dove Applied Micro

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

"fast wake for LPI operation" Fast Wake mode and Deep Sleep mode terminology varies from one part of the document to the next. Its inconsistent.

SuggestedRemedy

Define Deep Sleep Mode and Fast Wake Mode in an appropriate definition table/location and then use consistent naming for each throughout the document.

Proposed Response *Response Status* **O**

Cl **69** *SC* **69.1.1** *P* **68** *L* **7** # 12

Marris, Arthur Cadence Design Syste

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

These should be kept as separate paragraphs

SuggestedRemedy

Use the following editing instructions for 69.1.1 instead of the text in draft 2.1 and for the second paragraph instructions underline "full duplex", ", or 100 Gb/s providing a bit error ratio (BER) better than or equal to 10-12 at the MAC/PLS service interface" and "For 100 Gb/s operation, the 100GBASE-R family is extended to include 100GBASE-KR4 and 100GBASE-KP4 that operate over four lanes.":
Change the second paragraph as shown:
Backplane Ethernet supports the IEEE 802.3 full duplex MAC operating at 1000 Mb/s, 10 Gb/s, or 40 Gb/s, or 100 Gb/s providing a bit error ratio (BER) better than or equal to 10-12 at the MAC/PLS service interface. For 1000 Mb/s operation, the family of 1000BASE-X Physical Layer signaling systems is extended to include 1000BASE-KX. For 10 Gb/s operation, two Physical Layer signaling systems are defined. For operation over four logical lanes, the 10GBASE-X family is extended to include 10GBASE-KX4. For serial operation, the 10GBASE-R family is extended to include 10GBASE-KR. For 40 Gb/s operation, there is 40GBASE-KR4 that operates over four lanes. For 100 Gb/s operation, the 100GBASE-R family is extended to include 100GBASE-KR4 and 100GBASE-KP4 that operate over four lanes.

Replace the third paragraph with the following:
Auto-Negotiation enables PHY selection amongst Backplane Ethernet Physical Layer signaling systems.

Replace the fourth paragraph with the following:
Energy Efficient Ethernet (EEE) is optionally supported for all Backplane Ethernet PHYs.

Also consider including the original "69.1.2 Objectives" subclause with strike throughs for consistancy with 80.1.2

Proposed Response *Response Status* **O**

Cl **69** *SC* **69.1.2** *P* **68** *L* **18** # 39

Anslow, Pete Ciena

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

As discussed by comment #31 against D1.1, the editing instruction for 69.1.2 says "Delete subclause 69.1.2."
When applied, this will have the effect of renumbering 69.1.3 to be 80.1.2.
The modifications to what was formerly 80.1.3 just below should explicitly note this change. (it has been renumbered silently)
The response to comment #6 against D1.1 (referred to by the response to comment #31 was:
ACCEPT IN PRINCIPLE.
The resolution to #432 neatly avoids this issue by retaining a vestigial subclause.
For future cases where a subclause might be deleted, there are two options:
a) Leave a vestigial placeholder (subclause heading) with the note that the content of this subclause has been deleted.
b) Delete the subclause and include editing instructions to renumber accordingly.
The group recommends option a) for future cases.

Note, the same issue for 80.1.2 is the subject of a separate comment.

SuggestedRemedy

Either:
Adopt option a) in the response copied above and leave the subclause heading and a note that the content of this subclause has been deleted
or:
Change the editing instruction to "Delete 69.1.2 and renumber subsequent subclauses accordingly."
For 69.1.3 move the editing instructions above the title, leave the number as 69.1.2 and amend the editing instruction to refer to:
"Change item h) of 80.1.3 (now renumbered to 80.1.2) as shown."

Proposed Response *Response Status* **O**

Cl **69** *SC* **69.1.3** *P* **70** *L* **36** # 18

Anslow, Pete Ciena

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

Comment #43 against D2.0 caused an additional item to be added to the list. However, the editing instruction has not been amended in accordance with this.
Also, the inserted item g) should not be in underline font as it is an insert editing instruction.

SuggestedRemedy

Change the editing instruction to:
"Change item f) and insert items g) and h) as shown:"
Show item g) in normal font

Proposed Response *Response Status* **O**

Cl **69** *SC* **69.1.3** *P* **70** *L* **43** # 19

Anslow, Pete Ciena

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

The P802.3bm draft amendment changes the title of Annex 83A to include "ten-lane".
Also, the IEEE style manual says "In general text, isolated numbers less than 10 should be spelled out." but also "Numbers applicable to the same category should be treated alike throughout a paragraph; numerals should not be used in some cases and words in others."

SuggestedRemedy

In item f) change "4 lane" to "four-lane"
In item g) change "10-lane" to "ten-lane"
In item h) change "four lane" to "four-lane"

Proposed Response *Response Status* **O**

Cl **69** *SC* **69.5** *P* **72** *L* **48** # 6

Marris, Arthur Cadence Design Syste

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

Add Clause 84 to the list of backplane Clauses

SuggestedRemedy

Add Clause 84 to the list of backplane Clauses

Proposed Response *Response Status* **O**

Cl **74** *SC* **74.7.4.8** *P* **78** *L* **16** # 62

Slavick, Jeff Avago Technologies

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

Better wording.

SuggestedRemedy

Change
"The locations of the Rapid Alignment Markers, though consistent for each Rapid FEC block for each entry into the wake or refresh states, can be different for a different entry."
to:
"The locations of the Rapid Alignment Markers within the Rapid FEC block is constistent for a given entry into the wake or refresh states, but the locations can vary for subsequent entries."

Proposed Response *Response Status* **O**

Cl **78** *SC* **78.1.4** *P* **81** *L* **9** # 139

Dawe, Piers IPtronics

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

Try to keep a consistent order - easier for the readers to find things. I believe that lists of port types and similar that aren't constrained by bit definitions go slow to fast, short to long, wide to narrow - or the reverse, as in AN priority resolution.

SuggestedRemedy

10GBASE-KR
40GBASE-KR4
40GBASE-CR4
XLAUI/CAUI
100GBASE-KP4
100GBASE-KR4
100GBASE-CR10
100GBASE-CR4
Similarly in Table 78-2.

Proposed Response *Response Status* **O**

Cl **78** *SC* **78.4.2.3** *P* **83** *L* **10** # 2

Barrass, Hugh Cisco

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

There are several mentions of FW_enable without any definition. This should refer to LPI_FW in the LPI transmit and receive state diagrams in Clause 82.

SuggestedRemedy

Change all instances of FW_enable to LPI_FW

Add a definition of LPI_FW in 78.4.2.3

LPI_FW

Boolean variable controlling the wake mode for the LPI transmit and receive functions as defined in 82.2.18.2.2.

Proposed Response *Response Status* **O**

Cl **78** *SC* **78.4.2.3** *P* **84** *L* **15** # 17

Anslow, Pete Ciena

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

The whole of Table 78-3 was brought into the draft due to comment #37 against D2.0. However, the editing instruction is still "Insert the following rows" which is inappropriate.

SuggestedRemedy

Change the editing instruction to:
"Change Table 78-3 as shown:"

Proposed Response *Response Status* **O**

Cl **78** *SC* **78.5** *P* **90** *L* **1** # 1

Barrass, Hugh Cisco

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

In Table 78-4 there are many lines devoted to the fast wake timing for all of the PHYs. Since this function is defined in the PCS it is common for all PHYs of the same speed so this space is wasted. Furthermore, a new project defining EEE for optical PHYs will be forced to open thi sclause in order to write the same information redundantly.

SuggestedRemedy

Delete all of the rows defined for fast wake.

Add a row for 40G and a row for 100G with the same information from those rows.

Delete the references to fast wake in the definition of the cases on page 89.

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.1.1** *P* **96** *L* **15** # 10

Marris, Arthur Cadence Design Syste

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

"40 Gigabit and 100 Gigabit Ethernet is defined for full duplex operation only." is the second paragrap in the base standard so should not be part of the first paragraph.

SuggestedRemedy

Delete repeated text:
"40 Gigabit and 100 Gigabit Ethernet is defined for full duplex operation only."

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.1.2** *P* **96** *L* **25** # 38

Anslow, Pete Ciena

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

As discussed by comment #6 against D1.1, the editing instruction for 80.1.2 says "Delete subclause 80.1.2 as shown."
When applied, this will have the effect of renumbering 80.1.3 through 80.1.5 to be 80.1.2 through 80.1.4.
The modifications to what were formerly 80.1.3 through 80.1.5 just below should reflect this change.
The response to comment #6 against D1.1 was:
ACCEPT IN PRINCIPLE.
The resolution to #432 neatly avoids this issue by retaining a vestigial subclause.
For future cases where a subclause might be deleted, there are two options:
a) Leave a vestigial placeholder (subclause heading) with the note that the content of this subclause has been deleted.
b) Delete the subclause and include editing instructions to renumber accordingly.
The group recommends option a) for future cases.

Note, the same issue for 69.1.2 is the subject of a separate comment.

SuggestedRemedy

Either:
Adopt option a) in the response copied above and leave the subclause heading and a note that the content of this subclause has been deleted
or:
Change the editing instruction to "Delete 80.1.2 and renumber subsequent subclauses accordingly."
For 80.1.3 through 80.1.5, move the editing instructions above the titles, renumber to 80.1.2 through 80.1.4 and amend the editing instruction to refer to:
"80.1.x (now renumbered to 80.1.y)"

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.1.3** *P* **97** *L* **8** # 28

Anslow, Pete Ciena

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

References to Clauses 84, 93 and 94 have been added to item h), but these are text rather than links.

SuggestedRemedy

Make Clause 84, Clause 93 and Clause 94 cross-references.

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.1.4** *P* **98** *L* **15** # 11

Marris, Arthur Cadence Design Syste

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

Inconsistant capitalisation

SuggestedRemedy

Change to:
"Physical Layer devices"

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.1.5** *P* **98** *L* **48** # 29

Anslow, Pete Ciena

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

In the clean version of D2.1 the text:
"The generic term 40 Gigabit and 100 Gigabit Ethernet refers to any use of the 40 Gb/s and 100 Gb/s IEEE 802.3 MAC (the 40 Gigabit and 100 Gigabit Ethernet MAC) coupled with any IEEE 802.3 40GBASE or 100GBASE Physical Layer implementations."
Has disappeared from the draft.
If it is to be deleted, then it must be shown in strikeout font.

SuggestedRemedy

Show the deleted text in strikeout font.

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.2.4** *P* **100** *L* **29** # 30

Anslow, Pete Ciena

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

This says:
"... the PMA specific to the 100GBASE-KP4 is specified in Clause 94." but would be better as:
"... the PMA specific to the 100GBASE-KP4 PHY is specified in Clause 94."

SuggestedRemedy

Insert "PHY" after "100GBASE-KP4"

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.2.4** *P* **100** *L* **29** # 8

Marris, Arthur — Cadence Design Syste

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

Delete the word "the"

SuggestedRemedy

Change:
"the PMA specific to the 100GBASE-KP4 is specified in Clause 94"
To:
"the PMA specific to 100GBASE-KP4 is specified in Clause 94"

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.3.2** *P* **103** *L* **37** # 42

Anslow, Pete — Ciena

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

According to 80.3.1, the four additional primitives are only defined if the deep sleep mode option is supported.
However, Figure 80-3b title is:
"Optional inter-sublayer service interfaces for EEE support"
and the figure contains a note:
Note: this diagram illustrates only the service interfaces associated with the optional EEE function.
This suggests that the extra primitives are required for any EEE support, not just for the deep sleep option.
Same issue for Note1 in Figures 82-2 and 91-2

SuggestedRemedy

Change Figure 80-3b title to:
"Optional inter-sublayer service interfaces for EEE deep sleep support"
Change the note in Figure 80-3b to:
Note: this diagram illustrates only the service interfaces associated with the optional EEE deep sleep function.
Change Note1 in Figures 82-2 and 91-2 to:
NOTE 1—FOR OPTIONAL EEE DEEP SLEEP CAPABILITY

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.5** *P* **108** *L* **11** # 137

Dawe, Piers — IPtronics

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

This is getting even more unwieldy. You wouldn't write:
A and B and C and D and E and F and G and H and I

SuggestedRemedy

See 83.5.3.3, 84.5, 85.5, 86.3.2, 87.3.2, 88.3.2, 89.3.2, 92.5, or 93.5 and similarly below.

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.5** *P* **108** *L* **29** # 64

Slavick, Jeff — Avago Technologies

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

Bad math.<approximately>49ns / 193.939393ps

SuggestedRemedy

253 UI
Change 258 for "At RS-FEC transmit", "At PCS receive (w/ RS-FEC)" and in table 82.2.12 to 253

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.5** *P* **108** *L* **38** # 31

Anslow, Pete — Ciena

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

A new note e has been added to Table 80-4 which ends "... with a signaling rate of 25.78125 Gb/s.", but all of the other notes to this table give signaling rates in GBd

SuggestedRemedy

Change "Gb/s" to "GBd"

Proposed Response *Response Status* **O**

Cl **80** *SC* **80.5** *P* **109** *L* **29** # 63

Slavick, Jeff — Avago Technologies

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

Skew Variation values in the table are set to N/A for RS-FEC operations.

SuggestedRemedy

Update Table 80-5 with the following values.

At RS-FEC Transmit | 0.4 | N/A | <approximately>10
At RS-FEC receive | 4 | N/A | <approximately>103
At PCS receive (w/)| 0.4 | N/A | <approximately>2

Proposed Response *Response Status* **O**

Cl **82** *SC* **82.2.18.2.2** *P* **124** *L* **15** # 3

Barrass, Hugh — Cisco

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

The LPI_FW variable is used in both teh transmit and receive functions.

SuggestedRemedy

Change the first sentence of the definition to:

Boolean variable controlling the wake mode for the LPI transmit and receive functions. This variable is set true when the link is to use the Fast Wake mechanism, and false when the link is to use the optional deep sleep mechanism for each direction.

Proposed Response *Response Status* **O**

Cl **82** *SC* **82.2.8a** *P* **121** *L* **53** # 43

Anslow, Pete — Ciena

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

At the end of 82.2.8a which is about Rapid alignment marker insertion, we have text which now says:
The BIP statistics will be first updated after transitioning from RAMs to normal AMs on the first received normal AM when LPI_FW is FALSE and on the second received AM when LPI_FW is TRUE.
But this subclause is about rapid alignment marker insertion, so LPI_FW is never TRUE when this subclause applies.
Also, the second received AM after what? There is no transition from RAMs in fast wake.
This is not an appropriate place to put information on when the BIP is updated when the transmitter is in fast wake mode. An implementer building a fast wake only PHY does not need to read this subclause.

SuggestedRemedy

Move this information and add text which says that BIP is only valid during RX_ACTIVE to 82.2.8 BIP calculations since that is the location of the text that defines the BIP calculation for the normal alignment markers used for fast wake.

Proposed Response *Response Status* **O**

Cl **82** *SC* **82.6** *P* **136** *L* **25** # 65

Slavick, Jeff — Avago Technologies

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

down_count isn't used in FAST-WAKE operation

SuggestedRemedy

Remove the down_count <= 192 from the TX_FW box.

Proposed Response *Response Status* **O**

Cl **83** *SC* **83.1.1** *P* **140** *L* **20** # 32

Anslow, Pete — Ciena

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

"does not provide the PMD service interfaces" should be "does not provide the PMD service interface" i.e. interface singular.

SuggestedRemedy

Change "interfaces" to "interface"

Proposed Response *Response Status* **O**

Cl **83** *SC* **83.6** *P* **141** *L* **46** # 103

Healey, Adam — LSI Corporation

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

Editorial instruction indicates "fast wake and stop enable." I don't see what Table 83-2 has to do with fast wake.

SuggestedRemedy

Change instruction to "Insert rows at the end of Table 83-2 for stop enable:"

Proposed Response *Response Status* **O**

Cl **83A** *SC* **83A.3.2a** *P* **325** *L* **14** # 110

Healey, Adam — LSI Corporation

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

The electrical interface that connects PMA sublayers, XLAUI or CAUI, does not provide a means to communicate the primitives required for correct operation of the optional EEE deep sleep capability.

Therefore EEE deep sleep cannot be used with XLAUI or CAUI. Since XLAUI/CAUI shutdown is also incompatible with the optional EEE fast wake capability, it appears that this feature cannot be used at all.

SuggestedRemedy

There a number of ways to address this issue. Two suggestions.

1. Specify that the optional EEE deep sleep capability cannot be used with XLAUI and CAUI. Remove XLAUI and CAUI shutdown from the draft.
2. Incorporate the changes proposed in healey_3bj_01_0713.

Proposed Response *Response Status* **O**

Cl **84** *SC* **84.1** *P* **144** *L* **20** # 138

Dawe, Piers — IPtronics

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

"may enter the Low Power Idle mode" reads oddly. Are they allowed to leave it?

SuggestedRemedy

Change to use? enter and exit? 5 times.

Proposed Response *Response Status* **O**

Cl **84** *SC* **84.1** *P* **144** *L* **20** # 126

Dawe, Piers — IPtronics

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

I don't believe that EEE is at the bottom of the layer stack like AN. It seems to involve interactions between an RS client and PCS for Fast Wake mode, or RS client and PCS/PMA/PMD for Deep Sleep mode.

SuggestedRemedy

For consistency with Fast Wake only clauses, put the new EEE row above the PMA in Table 84-1, perhaps just below or above the RS. Similarly for the other 40G and 100G clauses with similar tables.

Proposed Response *Response Status* **O**

Cl **84** *SC* **84.2** *P* **144** *L* **37** # 109

Healey, Adam — LSI Corporation

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

The text includes the following note. "Note: if Clause 74 FEC is in use, only the values DATA, QUIET and ALERT may be passed through the FEC to the PMD."

This sounds like a requirement for the Clause 74 BASE-R FEC sublayer but it is not enforced there. For 10GBASE-R PHYs tx_mode is passed through to the PMA service interface but for 40GBASE-R and 100GBASE-R PHYs no behavior is defined.

SuggestedRemedy

Add the appropriate requirements to Clause 74 (now that it is open) and remove this note if necessary.

This note also appears in Clause 85.

Proposed Response *Response Status* **O**

Cl **85** *SC* **85.1** *P* **148** *L* **15** # 35

Anslow, Pete — Ciena

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

In Table 85-1 in the base document, all of the clause numbers are links, so 78 should be a link also.

SuggestedRemedy

Make "78" a cross-reference.

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.2** *P* **154** *L* **28** # 104

Healey, Adam — LSI Corporation

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

For the optional EEE deep sleep capability, the RS-FEC sublayer, via the FEC service interface, receives the parameters tx_mode and rx_mode. The values of these parameters should be passed to the PMA service interface.

In addition the RS-FEC sublayer does not assign a value to the energy_detect parameter that is communicated across the service interface. This should be set to the value that was received from the PMA service interface.

SuggestedRemedy

Add a paragraph to the end of 91.2 that explains these assignments.

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.5.2.6** *P* **159** *L* **16** # 66

Slavick, Jeff — Avago Technologies

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

The new AM mapping scheme has the Rx restore the ideal markers back into the data stream. But the Tx swizzles lanes 4-15, and inserts ideal copies of lane 0 & 16. Since BIP coverage is not used over the RS-FEC link, and we're going to put the ideal markers back at the end of the RS-FEC link, we should insert ideal markers in both sides. This will save area and power.

SuggestedRemedy

Change lines 17-33 to:

For x=0 to 19, amp_tx_x<63:0> is constructed as follows.
a) if x <= 3 lane_num = 0 else if x >= 16 lane_num = 16 else lane_num = x
b) amp_tx_x<23:0> is set to M0, M1, and M2 as shown in Figure 82–9 (bits 25 to 2) using the values in Table 82–2 for PCS lane number lane_num. If am_tx_x corresponds to a Rapid Alignment marker, then the M4, M5, and M6 values are used instead (see Figure 82–9b).
c) amp_tx_x<31:24> = am_tx_x<33:26>
d) amp_tx_x<55:32> is set to M4, M5, and M6 as shown in Figure 82–9 (bits 57 to 34) using the values in Table 82–2 for PCS lane number lane_num. If am_tx_x corresponds to a Rapid Alignment marker, then the M0, M1, and M2 values are used instead (see Figure 82–9b).
e) amp_tx_x<63:56> = am_tx_x<65:58>

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.5.2.6** *P* **159** *L* **35** # 118

Shah, Sameer — Broadcom

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

With reference to lines 21 and 32, the fixed bytes for alignment markers corresponding to PCS lanes 0 and 16 are being regenerated. Description on Line#35 is not consistent with this.

SuggestedRemedy

Update lines 35-37 to reflect the same -
On line 35, change "PCS lanes 1, 2, and 3" with "PCS lanes 0, 1, 2, and 3"

Proposed Response *Response Status* **O**

<Commenter is not an 802.3 voting member. Editor changed comment type from TR to T.>

Cl **91** *SC* **91.5.2.6** *P* **159** *L* **36** # 9

Marris, Arthur — Cadence Design Syste

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

Missing word "the"

SuggestedRemedy

Change:
"it replaces fixed bytes"
to:
"it replaces the fixed bytes"

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.5.3.5** *P* **165** *L* **53** # 125

Liu, Zhenyu — Marvell Semiconductor

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

Here the description is "If rx_coded<0> is 0 and any rx_xcoded<j+1>=1..."

As the reverse of subclause 91.5.2.5 and from other context, this sentence should read:

"If rx_coded<0> is 0 and any rx_xcoded<j+1>=0 for j=0 to 3...."

SuggestedRemedy

Change as suggested.

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.5.4.2.1** *P* **169** *L* **21** # 100

Healey, Adam — LSI Corporation

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

Variables are not in alphabetical order (e.g. rx_align_status is the first variable defined).

SuggestedRemedy

Re-order the variable definition to be alphabetical.

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.5.4.2.1** *P* **170** *L* **14** # 119

Shah, Sameer — Broadcom

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

There is no recommendation on how to derive the FEC lane number from the AM payload sequence. Is it left to user's implementation.

For example: Is tolerating 3/12 nibble errors acceptable when looking at AM for PCS lanes 4-7.

SuggestedRemedy

Clarify tolerating 3/12 nibble errors acceptable when looking at AM for PCS lanes 4-7.

Proposed Response *Response Status* **O**

<Commenter is not an 802.3 voting member. Editor changed comment type from TR to T.>

Cl **91** *SC* **91.5.4.3** *P* **172** *L* **47** # 67

Slavick, Jeff — Avago Technologies

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

The RS-FEC uses Rapid Alignment Markers (RAMs) to infer the LPI state of the PCS. In Fast-Wake mode, the transmission of RAMs has been removed. So the addition of the LPI transmit and receive State Machines are only necessary if EEE capabilty with Deep Sleep mode is supported.

SuggestedRemedy

Change Page 172 Line 46: "When the optional EEE capability is supported" to "When the optional EEE capability is supported and deep sleep operation is supported"

In Figures 91-10 and 91-11
Remove the transition to A from TX_TEST_NEXT and RX_TEST_NEXT
Remove fec_lpi_fw from transition from TX_TEST_NEXT -> TX_QUIET
Remove fec_lpi_fw from transition from RX_TEST_NEXT -> RX_QUIET
Add "AND !fec_lpi_fw" to the exit condition from TX_ACTIVE and RX_ACTIVE

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.6** *P* **177** *L* **1** # 33

Anslow, Pete — Ciena

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

The reference to 45.2.1 should be a link

SuggestedRemedy

Make 45.2.1 a cross-reference

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.6** *P* **177** *L* **47** # 4

Szczepanek, Andre — Inphi

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

The location of the "Block x lock" variables is listed as "RS-FEC PCS alignment status register", whereas clause 45 uses the register names "RS-FEC PCS alignment status 1" and "RS-FEC PCS alignment status 2"

The location of the "Lane x aligned" variables is listed as "RS-FEC PCS alignment status register", whereas clause 45 uses the register names "RS-FEC PCS alignment status 3" and "RS-FEC PCS alignment status 4"

SuggestedRemedy

Use concistent register names

Proposed Response *Response Status* **O**

<Editor changed subclause from 91-4 to 91.6. Presumably the commenter was referencing Table 91-4.>

Cl **91** *SC* **91.6** *P* **177** *L* **51** # 5

Szczepanek, Andre — Inphi

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

The location of register bit "PCS lane alignmnet status" is inconsistent between Clause 45 and 91.
In clause 45 the register bit is at MDIO address 201.15 (RS-FEC status register)
In Clause 91, Table 91-4, it is at MDIO address 283.15

SuggestedRemedy

Resolve the inconcistency between the clauses.

I think the (RS-FEC status register) is probably a better location for the status bit.
However if the PCS alignmnet status bit is to be moved there, shouldn't the "FEC Alignment status" bit currently in the FEC lane mapping register (206.15), also be moved to the RS-FEC status register, for concistency ?

Proposed Response *Response Status* **O**

<Editor changed subclause from "Table 91-4" to 91.6.>

Cl **91** *SC* **91.6.2** *P* **178** *L* **12** # 14
Marris, Arthur Cadence Design Syste

Comment Type **T** *Comment Status* **X**
This is a variable rather than a bit

SuggestedRemedy
Change "bit" to "variable" and add PICs item.

Proposed Response *Response Status* **O**

Cl **91** *SC* **91.7.4.2** *P* **184** *L* **9** # 13
Marris, Arthur Cadence Design Syste

Comment Type **T** *Comment Status* **X**
RF11 and RF13 look like duplicates

SuggestedRemedy
Delete RF11 because RF13 looks like a more accurate description

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.1** *P* **185** *L* **18** # 34
Anslow, Pete Ciena

Comment Type **E** *Comment Status* **X**
For the Physical Layer clauses associated with ... tables introduced by the P802.3ba project, the clause numbers at the left of each row are links.
This is a useful feature allowing the user to jump straight to the relevant associated clause. However, this has not been done for Table 92-1, Table 93-1 or Table 94-1

SuggestedRemedy
Make the clause numbers in Table 92-1, Table 93-1 and Table 94-1 cross-references.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10** *P* **207** *L* **47** # 46
Richard, Mellitz Intel Corporation

Comment Type **TR** *Comment Status* **X**
MDNEXT and MDFEXT loss are replaced by COM

SuggestedRemedy
Delete last 2 lines in table 92-11 for MDNEXT and MDFEXT loss

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.10** *P* **215** *L* **14** # 49
Richard, Mellitz Intel Corporation

Comment Type **TR** *Comment Status* **X**
MDFEXT loss is replaced by COM

SuggestedRemedy
Delete Clause 92.10.10

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.11** *P* **215** *L* **35** # 50
Richard, Mellitz Intel Corporation

Comment Type **TR** *Comment Status* **X**
ICN is replaced by COM

SuggestedRemedy
Delete Clause 92.10.11

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.11** *P* **216** *L* **9** # 143
Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **X**
This has a 3 dB reference receiver bandwidth of 18.75 GHz (scaled from Clause 85). But 3/4 of signalling rate would be 19.34 GHz.

SuggestedRemedy
Consider if the reference receiver bandwidth should be 19.34 GHz.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.3** *P* **210** *L* **24** # 144
Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **X**
There is no cable assembly insertion loss deviation (ILD) in this draft, but there are still ILD of other things.

SuggestedRemedy
Delete "cable assembly", 5 times, and move the subclause to the definitions section ;-)

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.3** *P* **210** *L* **24** # 47

Richard, Mellitz — Intel Corporation

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

ILD is replaced by COM

SuggestedRemedy

Delete Clause 09.10.3

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.3** *P* **210** *L* **24** # 107

Healey, Adam — LSI Corporation

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

Cable assembly insertion loss deviation (ILD) is defined but never used (it was overtaken by the COM-based cable assembly specification).

SuggestedRemedy

Delete 92.10.3.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.8** *P* **212** *L* **51** # 121

DiMinico, Christopher — MC Communications

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

Revise 92.10.8 Cable assembly channel operating margin text to correct implementation of cable assembly COMs derivation.

SuggestedRemedy

Replace text in 92.10.8 Cable assembly channel operating margin with text below

The cable assembly COM for each victim signal path (receive lane) is derived from measurements of the cable assembly victim signal path (measured from TP1 to TP4) and the four individual near-end crosstalk paths (measured at TP1 or TP4) and the three far-end crosstalk paths (measured from TP1 to TP4) that can couple into a victim signal path. The derivation method is specified in 93A.1 Channel operating margin.

92.10.8.1 Channel signal path
The channel signal path between TP0 and TP5 for the cable assembly (COM) consists of the cable assembly signal path measurements between TP1 and TP4 and the signal paths TP0 to MDI and TP5 to MDI to account for the transmitter and receiver PCB signal paths and the MDI signal paths. The transmitter or receiver PCB signal paths are calculated using the method defined in 93A.1.2.3. A 1 mm section of the PCB is defined by Equation (93A–9), Equation (93A–10), and the parameters values in Table 92–13. The PCB model consists of one hundred and eighty five 1 mm sections representing an insertion loss of 6.26 dB at 12.89 GHz.

The channel signal path to be used in COM (93A.1.2) is the concatenation of the cable assembly signal path measurement and the TP0 to MDI and TP5 to MDI signal paths (derived above) using the cascade function defined in 93A.1.2.1 given in Equation (92–19).

SCHSp^(k)=cascade(cascade(S^(HOSP) S^(CASP)) S^(HOSP)) equation (92-19)
Where: SCHSp^(k)= channel signal path
S^(CASP)= cable assembly signal path
S^(HOSP)= TP0 to MDI or TP5 to MDI signal paths
k=0

92.10.8.2 Channel crosstalk paths
The channel structure includes three far-end and four near-end crosstalk paths. The MDI is the significant contributor to the channel crosstalk. The MDI crosstalk contribution is included in and characterized by the cable assembly crosstalk measurements. The cable assembly crosstalk signal paths to be used in COM are the four individual near-end crosstalk paths and the three far-end crosstalk paths that can couple into a victim signal path adjusted by the TP0 to MDI or TP5 to MDI signal paths (calculated in 92.10.8.2) using the cascaded function defined in 93A.1.2.1 given in Equation (92–21) and Equation (92–22).

SCHNXTp^(k)=cascade(cascade(S^(HOSP), S^(CANXTk)), S^(HOSP)) equation (92-21)
Where: SCHNXTp^(k)= channel near-end crosstalk path adjusted by TP0 to MDI or TP5 to MDI signal paths
S^(CANXTk)= cable assembly near-end crosstalk path k
S^(HOSP)= TP0 to MDI or TP5 to MDI signal paths calculated in 92.10.8.2.
k= 1 to 4 near-end crosstalk paths

SCHFXTp^(k)=cascade(cascade(S^(HOSp), S^(CAFXTk)), S^(HOSp)) equation (92-21)
Where: SCHFXTp^(k)=channel far-end crosstalk path adjusted by TP0 to MDI or TP5 to MDI signal paths
S^(CAFXTk)= cable assembly far-end crosstalk path k
S^(HOSp)= TP0 to MDI or TP5 to MDI signal paths calculated in 92.10.8.2
k= 1 to 3 far-end crosstalk paths

The cable assembly COM shall be greater than or equal to 4 dB.

Proposed Response *Response Status* **O**

<Late comment. Editor changed Comment Type from TR to T.>

Cl **92** *SC* **92.10.8** *P* **212** *L* **54** # 51

Richard, Mellitz Intel Corporation

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

Description is not correct. COM is derived from the path response of differential mode s-parameters and not insertion loss and crosstalk losses.

SuggestedRemedy

Delete
"The cable assembly COM is derived from the cable assembly scattering parameter measurements of the insertion loss of a receive lane and the four individual pair-to-pair differential NEXT losses and three individual pair-to-pair differential FEXT losses that can couple into a receive lane."
Replace with:
The cable assembly COM is derived from the cable assembly differential mode scattering parameter measurements, S^(k)_ca, of each thru path and the associated four near plus three far end crosstalk paths as defined in 93A.1.1 except the measurement is between TP1 and TP4. Differential scattering parameters for COM are required to represent the path between TP0 and TP5.

Delete lines 5 page 213 to line 41 page 214
Keep table 92-13.

Replace with:

The channel path between TP0 and TP5 shall be determined by cascading the board transmission line, S^(lc), paths between TP0 and MDI and MDI and TP5 around the differential scattering parameter measured between TP1-TP5 so that:

S^(k) =cascade(cascade (S^(lc), S^(k)_ca), S^(lc)_ca))

S^(k) is use to determine COM.

Editorial licence granted

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.8** *P* **213** *L* **1** # 108

Healey, Adam — LSI Corporation

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

The text of this clause refers to the "scattering parameter measurements of the insertion loss" and similarly to "NEXT losses" and "FEXT losses". This can be confusing since "loss" refers to the magnitude, in dB, of the inverse of a scattering parameter. The concatenation of the cable assembly with models of the host transmitter and receiver PCB traces that is described in the subclause require both the magnitude and phase of all differential-mode scattering parameters for the signal path.

SuggestedRemedy

Rewrite the text to refer to the scatter parameters of cable assmebly "signal paths" using 93A.1.1 for guidance.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.8** *P* **213** *L* **19** # 124

Ben-Artsi, Liav — Marvell

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

The representation of 1mm trace used to create the host board may introduce small amount of non-causality

SuggestedRemedy

Will provide updated coefficients

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.8** *P* **213** *L* **47** # 36

Anslow, Pete — Ciena

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

In the "where" section of equations, the variable description should start with "is" as per the IEEE style manual 16.3 Presentation of equations.
For example:
S(CHILp) Channel insertion loss between TP0 and TP5
should be:
S(CHILp) is the channel insertion loss between TP0 and TP5

SuggestedRemedy

Change the "where" sections of Equations 92-19 through 92-22 to start the variable descriptions with "is"

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.8** *P* **213** *L* **6** # 77

Ben-Artsi, Liav — Marvell

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

The Rx side host board and Tx side host board are defined as 6.26dB @ Fb/2 while the worst case crosstalk would be having as low loss as reasonably possible which would cause higher near end crosstalk / far end crosstalk.

SuggestedRemedy

Recommend that the host boards (and the corresponding 2xhost board in the case of near end aggression path / Far end aggression path) be 3dB @ Fb/2 (though the minimal allowed is lower). Will provide the amount of concatenated sections.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.10.9** *P* **214** *L* **44** # 48

Richard, Mellitz — Intel Corporation

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

MDNEXT loss is replaced by COM

SuggestedRemedy

Delete Clause 92.10.9

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.11.1** *P* **217** *L* **3** # 142

Dawe, Piers IPtronics

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

Response to D2.0 comment 222 on test fixture terminology says "Test fixture used in base document; IEEE Std 802.3ba-2010; 84.8.1.1 Test fixture; 85.8.3.5 Test fixture. "Test fixture" is well understood description of function performed."
It turns out it's not so simple and there are test fixture within test fixtures.
The test fixture in 84.8.1.1 (as defined for 10GBASE-KR in 72.7.1.1) presents an AC-coupled 2x50 ohm load to the transmitter under test without insertion loss. At least two of the test fixtures in 55.5.2.1 similarly present a 100 ohm load without insertion loss.
By contrast, in 85.8.3.5 Fig 85-5 there is a lossy "TP2 or TP3 test fixture" within a "transmitter test fixture". Similarly, Figure 92-14 shows one test fixture within another.
Further, this project has added further test fixtures in Clause 93. It would help to have fewer things called "test fixture", and some of them have well established names.
Consistency across 802.3 has been lost already.

SuggestedRemedy

As "Host Compliance Board" is well established in the industry, change "TP2 or TP3 Test fixture", or "test fixture" (when referring to this test fixture not the TP1/TP4 or TP0a/TP5a test fixtures or the Transmitter and receiver test fixture), to "Host Compliance Board".

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.11.1.2** *P* **217** *L* **42** # 134

Dawe, Piers IPtronics

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

It would help to have a graph like Figure 86A-2, Reference differential insertion losses of HCB, MCB excluding connector

SuggestedRemedy

Please add graph.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.11.1.2** *P* **217** *L* **42** # 132

Dawe, Piers IPtronics

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

D2.0 comment 237: "Are the 100GBASE-CR4 HCB, MCB PCB losses achievable in practice? If not, make adjustments, keeping consistency with the OIF/InfiniBand EDR specifications. REJECT. Confidence expressed that current specifications can be met. Implementations to verify are pending."
Repeating the question, specifically for the HCB: has this been verified yet and are the losses achievable?

SuggestedRemedy

If the reference loss is too low, make adjustments, keeping consistency with the OIF and InfiniBand EDR specifications.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.11.3.2** *P* **220** *L* **4** # 140

Dawe, Piers IPtronics

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

Blank line(s).

SuggestedRemedy

Remove.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.11.3.3** *P* **220** *L* **1** # 141

Dawe, Piers IPtronics

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

Blank line(s).

SuggestedRemedy

Remove. Also p222, 223.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.7.12** *P* **193** *L* **18** # 94

Ran, Adee Intel

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

The response time requirement is dependent on the status of frame_lock_i which may be difficult to verify (e.g. if the MDIO interface is unavailable) and synchronize with a captured waveform. In addition, it is not available to the link partner.

It is relatively easy to make the lane frame lock state available as part of the status report field. This information would be very useful in analyzing link training issues and thus promote interoperability.

Comment applies to clauses 93 and 94 as well.

SuggestedRemedy

In clauses 92 and 93, assign cell 14 of the status report field (currently reserved) to represent the value of the PMD status variable frame_lock_i.

In clause 94, use cell 7 of the status report field instead of cell 14 (14 is already assigned, 7 is currently reserved).

Editorial license granted.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.7.12** *P* **193** *L* **31** # 68

Slavick, Jeff Avago Technologies

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

PMD PRBS polynomial selection is mentioned in this paragraph. In the MDIO registers (1.1450-1.1453) definitions there is a shall statement that states each lane will use a different polynomial. We should have a PICs for the shall statement either in clause 92 or Clause 45, not sure where. It also may make sense to move the unique polynomial requirement to Clause 92 since in the MDIO registers you will have transiant states where 2 MDIO registers are configured to the same value as you change from [0,1,2,3] -> [3,2,1,0] which may to go through [3,1,2,3].

SuggestedRemedy

Add a shall statement to 92.7.12 that requires the polynomial_i values to be unique when training is started.
Add a PICs for it to Clause 92 as well.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.7.12** *P* **193** *L* **32** # 79

Slavick, Jeff Avago Technologies

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

seed_i could be configured set to 0x000 which produces an all zero's pattern.

SuggestedRemedy

Add the following sentence:
If seed_i is set to 0x000 then a seed of 0x7FF shall be used as the initial state of the generator at the start of training.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3** *P* **194** *L* **41** # 130

Dawe, Piers IPtronics

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

Following up on D2.0 comment 240: inconsistency between S-parameter frequency range and waveform measurement frequency range. Response says "The capability of an instrument to measure higher frequencies is not a justification to specify them." Adding to that, the cost and increased noise of measuring them is a justification to NOT specify them. Notice that in 92.10.11 Cable assembly integrated crosstalk noise (ICN), the 3 dB reference receiver bandwidth is set to 18.75 GHz.

SuggestedRemedy

In clauses 92 and 93, Reduce the observation bandwidth for waveforms, jitter and similar from 33 GHz to between 18.75 GHz and 25 GHz TBD (e.g. 19.34).
Make an exception for transition time.
Alternatively, increase the S-parameter frequency range to the signalling rate, as OIF does.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3** *P* **195** *L* **22** # 115

Hidaka, Yasuo Fujitsu Laboratories of

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

Far-end transmit output noise is defined in different ways between table 92-6 and equations 92-4 or 92-5.

SuggestedRemedy

Replace the value (2) of far-end transmit output noise (max) for low insertion loss channel in table 92-6 with the right hand side (sqrt(sigma_l^2+2^2)) of equation 92-4.
Replace the value (1) of far-end transmit output noise (max) for high insertion loss channel in table 92-6 with the right hand side (sqrt(sigma_h^2+1^2)) of equation 92-5.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3** *P* **195** *L* **32** # 127

Dawe, Piers IPtronics

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

Depending what happens to the jitter specs, an output noise spec will likely be needed

SuggestedRemedy

If jitter specs don't cover it, add Qsq or SNDR spec.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3** *P* **195** *L* **35** # 129

Dawe, Piers IPtronics

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

Total Jitter (BER=1e-12) is not relevant for CR4 with FEC, and it may not be reasonable to keep it below 0.28 UI regardless of the transmit equalization setting for the host channel of 92A.5 (D2.0 comments 165, 227). Without TJ we can't specify Effective Random Jitter as proposed.

SuggestedRemedy

Either do the work to show that it is reasonable to keep TJ below 0.28 UI regardless of the transmit equalization setting for the host channel of 92A.5, or change the spec for CR4.
E.g. replace the spec for TJ-DDJ with one for J5-
DDJ, find Effective Random Jitter for CR4 from J3 and J5.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.4** *P* **197** *L* **49** # 114

Hidaka, Yasuo Fujitsu Laboratories of

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

There is no space between the last line of 92.8.3.4 and the section title of 92.8.3.5.

SuggestedRemedy

Insert a blank line before the section title of 92.8.3.5 Transition time.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.6** *P* **198** *L* **21** # 145

Dawe, Piers IPtronics

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

"scrambled idle" is defined in 82.2.10 without RS-FEC. Here, we should allow RS-FEC encoded scrambled idle. Non-FEC scrambled idle would be fine as a crosstalk generator but it's not what a Clause 92 transmitter is supposed to generate.

SuggestedRemedy

Revise the terminology to allow RS-FEC encoded scrambled idle as appropriate. 8 places in this draft. Coordinate with P802.3bm.
Consider if in any of these cases an RS-FEC encoded scrambled Remote Fault would be an acceptable additional alternative (RF is what a transmitter will emit by default when it doesn't detect an input).

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.7** *P* **200** *L* **1** # 99

Moore, Charles Avago Technologies

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

Method given in 85.8.3.3 for computing coefficients c(-1), c(0), and c(1) can give different values for the coefficients for the same transmitter at the same equalization setting if different channel are interposed between the transmitter and the measurement. The coefficient value are supposed to measure the transmitter independent of the channel.

Note: Clause 93.8.1.6 has similar problems although not as severe. It probably should be changed as well.

Also: Clause 94.3.12.6 has similar problems although not as severe. It probably should be changed as well.

SuggestedRemedy

I will have a presentation detailing needed changes.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.9** *P* **202** *L* **33** # 123

Zivnhy, Pavel Tektronix

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

Subclause 92.8.3.9.2 "Total jitter" defines "Total jitter excluding data dependent jitter" in a difficult to measure and physically incorrect way; details in zivny_3bj_01_0715.
Subclause 92.8.3.9.4 "Effective deterministic and random jitter" defines "effective random jitter (RJ)" in a difficult to measure way; details in zivny_3bj_01_0715
Same subclause then defines "Effective deterministic jitter excluding data dependent jitter" in a difficult to measure and physically incorrect way; details in zivny_3bj_01_0715.
This comment is a pile-in to comment # 165.

SuggestedRemedy

Use the methodology given in zivny_3bj_01_0715 to define "Effective deterministic jitter excluding data dependent jitter", "Effective random jitter" and "Total jitter excluding data dependent jitter".

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.9** *P* **202** *L* **34** # 116

Hidaka, Yasuo Fujitsu Laboratories of

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

TJ excluding DDJ is defined regardless of the transmit equalization setting.
This is a problem, because TJ excluding DDJ depends on DDJ as well as the transmit equalization setting.
For instance, if the transmit equalization is changed too weak for insertion loss from TP0 to TP2, while all jitter sources other DDJ are kept same, slow edge due to large ISI increases DDJ as well as TJ excluding DDJ.
TJ excluding DDJ shall be measured with some equalizer which compensates for large ISI. The equalizer may be the transmit equalization function or CTLE in the measurement instrument.

SuggestedRemedy

Replace line 33 and 34 of page 202 with the following:

Total jitter excluding data dependent jitter is the difference between TJ and DDJ and shall be less than or equal to 0.28UI.
TJ shall be measured either with the transmit equalization enabled or after a continuous-time filter function.
If TJ is measured with the transmit equalization, c(-1) shall be set to zero, c(0) shall be set to minimum, and c(1) shall be set to the value which minimizes DDJ.
If TJ is measured after a continuous-time filter function, the filter shall have a transfer function defined by equation (93A-20) and g_DC shall be set to the value which minimizes DDJ.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.9** *P* **202** *L* **6** # 122

Zivnhy, Pavel Tektronix

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

Subclause 92.8.3.9 "Transmitter output jitter" sets normative requirements on components of jitter, but does so with a test pattern too long for jitter component separation; total jitter @ BER is not limited and pathological devices might thus be erroneously evaluated as passing.

SuggestedRemedy

Specify the TJ @ BER for pattern PRBS31 (see 83.5.10) or scrambled idle (see 82.2.10) as TJ @BER to be less or equal to 0.28 UI for each link BER target.
Other jitter components should be specified on shorter, measurable patterns, e.g. as proposed in zivny_3bj_01_0715 .

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.9.2** *P* **202** *L* **27** # 131

Dawe, Piers IPtronics

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

The continuing discussion about jitter definitions goes to show that TJ, DDJ, EDJ and ERJ as used in this project are proper nouns because they have definitions that are not the obvious meaning of the phrases: TJ is not all the jitter there is, DDJ is not all the data-dependent jitter, ERJ could contain any fraction that's random, EDJ is not all the deterministic jitter. Other clauses may have used similar but uncapitalized terms without definition (making them common nouns, if ambiguous), or may have simply ignored the editorial rules on proper nouns in Merriam-Webster. Our terms mean what we say they mean and should not be confused with theirs by making different things look the same! Making our newly defined terms look "consistent with similar terms in 802.3-2012" would be misleading the reader.

SuggestedRemedy

Use Total Jitter, Data Dependent Jitter, Effective Random Jitter (ERJ) and Effective Deterministic Jitter (EDJ) (all with capitals) as these are undeniably proper nouns.
Also, Even-odd Jitter can be treated as a proper noun because it has a definition, although its definition agrees with the meaning of the words.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.3.9.2** *P* **202** *L* **33** # 128

Dawe, Piers — IPtronics

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

D2.0 comment 227 observed that while these jitter metrics must be met regardless of the transmit equalization setting, for a maximum host channel with the transmitter at Preset, this might be challenging because the eye at TP2 is pretty closed up. But this is not relevant to real-world use with an equalizer. Comment 165 also points out difficulties with the way jitter is specified. For CR4, with FEC, TJ isn't relevant anyway.

SuggestedRemedy

Determine if "regardless of the transmit equalization setting" is too wide, and if the specifications should apply above some threshold of emphasis. Don't use TJ for CR4.

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.4.4** *P* **104** *L* **25** # 96

Ran, Adee — Intel

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

We recently adopted a change in the receiver tolerance test of clause 93 to use to SER after RS-FEC (using errored symbol counters) instead of BER target before FEC, and added an option of using a transmitter that incorporates training.

The reasons for these changes, presented in moore_3bj_02a_0513, are valid for clause 92 as well.

The test calibration method used in clause 92 does not need to change.

SuggestedRemedy

Use RS-FEC symbol error ratio as the test requirement, with same values as in table 93–7, read from FEC_symbol_error_counter_i (see 91.6.10).

In 92.8.4.4.3 and 92.8.4.4.5, specify using only encoded scrambled idles pattern across all lanes (described in another comment on 93.8.2.3).

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.8.4.4** *P* **204** *L* # 76

Ben-Artsi, Liav — Marvell

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

The receiver interference tolerance test as described at 92.8.4.4 lacks correlation to COM and therfore may introduce understress or overstress.

SuggestedRemedy

Add the following sentence:
Each lane shall also comply with the "Cable assembly channel operating margin" as described in 92.10.8

Proposed Response *Response Status* **O**

Cl **92** *SC* **92.9** *P* **207** *L* **16** # 120

DiMinico, Christopher — MC Communications

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

Revise 92.9 and 92.10 to addresses changes in CL92 and annex 92A from D2 to D2.1 not included in 92.9 and 92.10 text.

SuggestedRemedy

Replace 92.9 text with text below:

The 100GBASE-CR4 channel is defined between TP0 and TP5 to include the transmitter and receiver differential controlled impedance printed circuit board and the cable assembly as illustrated in Figure 92-2. The channel parameters insertion loss, return loss, channel operating margin (COM) and the transmitter and receiver differential controlled impedance printed circuit boards for each differential lane are provided informatively in 92A.4 through 92A.7.
(2)Add sentence (new paragraph) to 92.10 Cable assembly characteristics
The cable assembly channel operating margin is specified in 92.10.8.

(3)Update Table 92–11—Cable assembly differential characteristics summary with additional differential parameters included in D2.1 from D2.0.

Proposed Response *Response Status* **O**

<Late comment. Editor changed Comment Type from TR to T.>

Cl **92** *SC* **92.9** *P* **207** *L* **22** # 45

Richard, Mellitz — Intel Corporation

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

Insertion Loss, ILD, and ICN are not sufficient channel characteristics for determining Channel Operating Margin. They are replace by COM requirements.

SuggestedRemedy

Delete lines 20-22
Insert:
Channel Operating Margin is determined from differential mode channel s-paremeters for signal paths and is defined 93A.1.1.

Editorial licence granted.

Proposed Response *Response Status* **O**

Cl **92A** *SC* **92A.7** *P* **340** *L* **44** # 70

Ben-Artsi, Liav — Marvell

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

The interconnect target COM recommendation of being greater or equal to 3dB does not line up with the required margin for implementation.

SuggestedRemedy

Will supply a presentation

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.1.1** *P* *L* # 133

Dawe, Piers — IPtronics

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

The compliance boards in SFP+, Annex 86A (nPPI), InfiniBand FDR and Clause 92 each have a defined reference insertion loss curve. A user has an actual compliance board with a similar but not identical loss. For S-parameter measurements, he can de-embed his actual loss and re-embed the reference loss and get an accurate result. The documents also give a loss range, defining what is a good-enough pair of compliance boards. The ideal (reference) compliance board does not have intentional reflections.

Clause 93's test fixtures are defined differently. There is a range of losses, and only at one frequency. Some ILD and reflections are allowed.
A user with an actual compliance board can de-embed his actual loss, but has to re-embed a loosely specified loss, an ILD, and the reflections of Eq 93-1. Depending what he is measuring, he needs to re-embed the least or the most loss, ILD and/or reflections. He has to do the work at least twice over, possibly more times depending how many corners are relevant. Both in design/simulation and in measurement. The allowed test fixture variability leaks into measurement results unless everyone agrees which corners are relevant for which measurements (e.g. least insertion loss, most return loss of the test fixture for measuring product return loss, most loss for linear fit pulse peak, and so on).

SuggestedRemedy

Use the range of losses, ILD and return loss as guidance for an adequate test fixture. But define the REFERENCE (ideal) test fixture with a specific insertion loss (preferably with an equation) and without deliberate ILD or return loss, as the other specs that use compliance boards do.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.1.4** *P* **249** *L* **37** # 151

Ghiasi, Ali — Broadcom

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

The common mode return loss crosses differential return loss at 6.05 GHz and even for ideal driver/pacakge the common mode return loss can only be as good as differetnial not better

SuggestedRemedy

Please change common mode return loss to follow differetnial return loss of equation 93-2 but 3 dB worse
RLcm(f)>=9.05–f□0.05<=f<=6 GHz
= 3.45–0.075f 6<=f<19 GHz

Proposed Response *Response Status* **O**

<Editor changed subclause from 8.1.4 to 93.8.1.4.>

Cl **93** *SC* **93.8.2.3** *P* **254** *L* **43** # 88

Ran, Adee Intel

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

Missing hyperlinks to figure 93C-2 (twice in this paragraph).

SuggestedRemedy

Add hyperlinks.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.3** *P* **255** *L* **10** # 55

Richard, Mellitz Intel Corporation

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

There are 4 test values columns defined in Table 93-7.
Test 2 values and Test 3 values columns' channel loss limit curves are the same. Test 2 values column is without error correction. Test 3 values column is with error correction. Test 4 values column seems more demanding the Test 3 values column. Both are with error correction. Test 3 seems superfluous.

SuggestedRemedy

Remove Test 3 values column from Tabel 97-3

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.3** *P* **255** *L* **2** # 85

Ran, Adee Intel

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

The criterion for this test (in table 93-7) is RS-FEC symbol error rate. The test pattern should enable counting symbol errors using the errored symbol counter (step 11 of 93C.2). This means the RS-FEC decoder has to be functional; it requires the data to be transcoded and RS-FEC encoded, and specifically include alignment markers (for RS-FEC codeword alignment).

PRBS31 generation is an optional function of a PMA sublayer, so the PMA can theoretically override the RS-FEC output with PRBS31; but in that case, the received signal would not be RS-FEC decodable so the RS-FEC error counters would not function. Using an optional PMA sublayer between RS-FEC and PCS (as described in 91.3) would not solve this problem either, since PRBS31 is not encodable by RS-FEC (no valid 66-bit blocks and no alignment markers).

Note that if transcoding and RS-FEC encoding are used, then any valid PCS output (not just idles) would enable using the RS-FEC errored symbol counter. I don't see a reason to restrict the pattern to scrambled idles only.

Note that clause 94 interference tolerance test uses only the scrambled idles test pattern.

SuggestedRemedy

Change "either PRBS31 or the scrambled idles test pattern" to "scrambled idles or valid PCS output, encoded by the RS-FEC sublayer", with editorial license.

Consider noting in 91.3 that the optional PMA test patterns in 83.5.10 cannot be used as input to the RS-FEC sublayer.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.3** *P* **255** *L* **28** # 71

Ben-Artsi, Liav Marvell

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

The Rx interference tolerance test Target COM of 1.5dB does not line up with required margin for implementation

SuggestedRemedy

Will supply a presentation

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.3** *P* **255** *L* **28** # 54

Richard, Mellitz — Intel Corporation

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

Table 93-7 specifies COM of 1.5 dB for the Test 4 values column.

For a 35dB loss channel the headroom over the noise is only 2.8 mV (pre amplification). i.e. available signal - noise.
That seems excessively demanding of a reciever.

SuggestedRemedy

Change to COM 2.5 dB for the Test 4 values column

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.3** *P* **255** *L* **30** # 90

Ran, Adee — Intel

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

Missing hyperlinks to 93C.2 and figure 93C-4 (twice).

SuggestedRemedy

Add hyperlinks.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.3** *P* **255** *L* **30** # 101

Healey, Adam — LSI Corporation

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

The references to Annex 93C in the footnotes of Table 93-7 are not "live".

SuggestedRemedy

Please add the appropriate cross-references.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.4** *P* **256** *L* **1** # 86

Ran, Adee — Intel

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

If jitter tolerance test is done with PRBS31, then BER can be measured at the PMD service interface if it is exposed, or at the PMA if the optional PRBS31 check is implemented, or externally if the optional PMA remote loopback is implemented.

If it is done with scrambled idles, measuring BER prior to RS-FEC correction is impossible - the recovered scrabmled idles test pattern is only available at the PCS, after RS-FEC decoding that either corrects errors or marks them (complete bypass is not allowed); so it can only be checked there.

The current test definition works only with PRBS31, and even then depends on optional features. To enable using scrambled idles (or any valid PCS output), without requiring optional features, we should allow measuring SER instead of BER, and define the required SER in that case.

Note that clause 94 jitter tolerance test (93.8.2.4) uses only the scrambled idles test pattern, and counts symbols errors rather than bit errors.

Comment also applies to the jitter tolerance test in 92.8.4.5, where the test patterns are defined indirectly. It also applies to interference tolerance test (92.8.4.4.5) which currently uses only BER; this is addressed by another comment.

SuggestedRemedy

Change
"The BER at the output of the receiver under test, and prior to error correction by the RS-FEC sublayer, is measured."

to

"If PRBS31 is used, the BER is measured at the PMA sublayer (see 83.5.10). If scrambled idles pattern is used, the BER is estimated by dividing FEC_symbol_error_counter_i (see 91.6.10), where i is the lane under test, by 10."

Apply similarly to 92.8.4.5 and possibly 92.8.4.4.5.

Editorial license granted.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.8.2.4** *P* **256** *L* **4** # 105

Healey, Adam — LSI Corporation

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

For consistency with the receiver interference tolerance requirements, the receiver jitter tolerance requirements should be expressed in terms of FEC symbol error ratio.

SuggestedRemedy

Change:
"The BER shall be less than or equal to 10^(-5) for each case listed in Table 93-8."

To:
"The RS-FEC symbol error ratio, measured using the errored symbol counter FEC_symbol_error_i where i is the lane number of the receiver under test, shall be less than or equal to 10^(-4) for each case listed in Table 93-8."

Note that in both cases (interference and jitter tolerance) it is unclear how the RS-FEC symbol error ratio can be measured with the cited counter and a PRBS31 pattern. It is likely that the test pattern also needs to be limited to scrambled idles or a different way of arriving a symbol error ratio needs to be defined.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.9.1** *P* **256** *L* **43** # 78

Ben-Artsi, Liav — Marvell

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

The Channel COM margin of 3 dB is not aligned with the required margin for implementation.

SuggestedRemedy

Will supply a presentation

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.9.1** *P* **256** *L* **43** # 112

Kochuparambil, Beth — Cisco Systems

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

With multiple changes in COM since adoption in the draft, analysis of range of compliant channels has only been done on limited submitted channels.

System analysis needs to be done to verify broad market potential.

SuggestedRemedy

Once COM changes taper, channel verification is needed to confirm if 3dB limit is a realistic channel design limit.

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.9.1** *P* **257** *L* **12** # 72

Ben-Artsi, Liav — Marvell

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

The Device package model includes Single ended ball capacitance and not Single ended board capacitance

SuggestedRemedy

Change the description of Cb in table 93A-1 to Single-ended ball capacitance

Proposed Response *Response Status* **O**

Cl **93** *SC* **93.9.1** *P* **257** *L* **43** # 83

Ran, Adee — Intel

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

The value of eta_0 was supposed to cause equation 93A-32 to yield sigma_N = 1 mV (see response to comment #73 on D2.0). However, calculation according to the new equations in annex 93A results in <approximately>0.92 mV.

The value used is probably based on an estimate done during the May meeting, which did not include the effect of the CTLE with g_DC=0.

Same value of eta_0 should be used in clause 94 as well.

SuggestedRemedy

Change value of eta_0 from 5.2e-8 to 6.0e-8, in table 93-9 and in table 94-18.

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1** *P* **341** *L* **24** # 81

Ran, Adee Intel

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

A_n currently has two meanings in this annex - total noise peak, and NEXT amplitude. The letter n is also commonly used as an enumerator, including several occurrences in this annex. More meaningful labels are preferred.

For uniformity, replacing A_f is also suggested.

SuggestedRemedy

Use A_noise instead of A_n in equation 93A-1 and 93A.1.7.

Use A_NEXT instead of A_n and A_FEXT instead of A_f in table 93A-1 and 93A.1.5.

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1** *P* **341** *L* **9** # 148

Dawe, Piers IPtronics

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

COM is a proper noun (not the ordinary English meaning of the three words "channel operating margin" but this particular figure of merit defined by this particular mathematical computation.

SuggestedRemedy

Change to Channel Operating Margin throughout.

Proposed Response *Response Status* **O**

<Late comment.>

Cl **93A** *SC* **93A.1.2.1** *P* **343** *L* **35** # 98

Moore, Charles Avago Technologies

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

At the time my Comment 91 to D2.0 was discussed we decided to accept in principle, but i was asked to provide some real analysis on the difference between worst case slow (for victim) and worst case fast (for NEXT) package models. I have done this analysis and come to the following conclusions

1. Changing Cd and Cb values is not the best approach, we should change zp, the package trace length.
2. Current zp value of 12mm used in 93.9.1, and 94.4.1 could be a good value for NEXT channel but victim needs a longer package.
3. changing zp will require changes in zp in 93.9.1 and 94.4.1 and to peak/vf in 93.8.1.6., 94.3.12.6, and possibly 92.8.3.7.1

SuggestedRemedy

I will have a presentation detailing needed changes.

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1.2.4** *P* **344** *L* **50** # 73

Ben-Artsi, Liav Marvell

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

The Tx/Rx PKG is the result of cascading the die cap + PKG trace and ball capacitance. No board capacitance was taken into account in the PKG modeling, therefore any board related discontinuity is expected to be a part of the measured/simulated/extracted channel S-parameters

SuggestedRemedy

Change: "... are the result of the cascade connection of the device capacitance, package transmission line, and board capacitance as defined..." to: "... are the result of the cascade connection of the device capacitance, package transmission line, and ball capacitance as defined..."
Perform the same change also to the Rx PKG description on page 345 line 24.

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1.2.4** *P* **345** *L* **5** # 69

Ben-Artsi, Liav Marvell

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

The representation of the 1mm PKG trace may introduce a small non-causality

SuggestedRemedy

Updated values will be supplied

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1.6** *P* **347** *L* **7** # 91

Ran, Adee Intel

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

The title of this subclause "Signal Amplitude" does not represent its content.

SuggestedRemedy

Change the title to "Linear equalization".

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1.6** *P* **348** *L* **24** # 84

Ran, Adee Intel

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

Transmitter noise (other than jitter efects) is not included in FOM and COM calculations.

SuggestedRemedy

A presentation expanding on the comment and proposing a remedy will be supplied.

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.1.7.1** *P* **349** *L* **17** # 82

Ran, Adee Intel

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

The note recommends using voltage bin size of 0.1 mV. For some high loss channels (e.g. 35 dB in patel_01_0511.zip) A_s can become lower than 10 mV and FEXT/NEXT impulses below 0.1 mV can be significant, but may be zeroed out by the quantization. When that happens, results might be too optimistic.

For the channel mentioned above, setting bin size to 0.01 mV instead of 0.1 mV results in a degradation of 0.6 dB in COM, which is non-negligible.

Proposed remedy is to recommend Delta_y to be small enough to prevent zeroing out any contribution.

SuggestedRemedy

Change
"It is recommended that Delta_y be no larger than 0.1 mV in order to limit the error"

to
"In order to limit the error, it is recommended to set Delta_y to a small enough value so that equation 93A-36 is not reduced to a single Dirac Delta function at y=0, for any interference component to which h(n) corresponds. A value of 0.01 mV is usually a safe choice".

Proposed Response *Response Status* **O**

Cl **93A** *SC* **93A.12.4** *P* **344** *L* **5** # 152

Ghiasi, Ali Broadcom

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

Current set of cofficent in table 93A-2 produces non passive s-paramters. To fdurther improve the fit and reduce the resonance number of section may need to be increased.

SuggestedRemedy

Need to get on Adhoc plate toward a resolution for Sept meeting

Proposed Response *Response Status* **O**

<Editor changed subclause from 12.4 to 93A.12.4>

Cl **93A** *SC* **93A-1** *P* **342** *L* **12** # 74

Ben-Artsi, Liav — Marvell

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

The Device package model includes Single ended ball capacitance and not Single ended board capacitance

SuggestedRemedy

Change the description of Cb in table 93A-1 to Single-ended ball capacitance

Proposed Response *Response Status* **O**

<Changed subclause from 93A-1 to 93A.1. Presumably the commenter was referencing to Table 93A-1.>

Cl **93C** *SC* **93C** *P* **354** *L* **23** # 150

Dawe, Piers — IPtronics

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

The new interference tolerance test for clauses 93 and 94 allows a wide range of transmitter bandwidths, which will affect the results. There is no equivalent of the correction for transition time in eq. 92-9.

SuggestedRemedy

Use the transition time measured at TPta of Figure 93C-3 in the COM calculation. At present, COM does not contain an internal transition time. Add one, and/or in Table 93-9 and Table 94-18, adjust zp, within limits, to best fit the observed waveform.

Proposed Response *Response Status* **O**

<Late comment.>

Cl **93C** *SC* **93C** *P* **354** *L* **3** # 149

Dawe, Piers — IPtronics

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

(informative) - not

SuggestedRemedy

Delete.
Also please try to get the format fixed so that annex titles appear in the pdf bookmarks.

Proposed Response *Response Status* **O**

<Late comment.>

Cl **93C** *SC* **93C** *P* **354** *L* **3** # 106

Healey, Adam — LSI Corporation

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

Annex 93C cannot be both informative and normative.

SuggestedRemedy

Pick one (suspect normative) and remove the other.

Proposed Response *Response Status* **O**

Cl **93C** *SC* **93C** *P* **354** *L* **30** # 93

Ran, Adee — Intel

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

Annex 93C is a significant step forward in specifying receiver requirements. People implementing this test should have a clear understanding of what passing or failing the test means.

The clauses that invoke the test specify the items listed in the introduction to the annex. The way they are specified in clauses 93 and 94 should be understood as minimum stress values; the test can be performed with higher stress parameters (e.g. higher-than-minimum thru channel loss) and be within its specification.

There is a common interpretation that "if a test is performed with parameters within its specification, it should pass". This interpretation is unsuitable here; higher stress values can clearly cause any device to fail the test. If that is interpreted as disqualifying the device, then all devices can be disqualified, and the test is meaningless.

To avoid confusion between vendors, testers, and customers, we should clarify the intended interpretation - qualify, rather than disqualify; a device is only expected to pass the test under some conditions that meet the requirements.

SuggestedRemedy

Add a note after the list of items:

"Note: The PMD clause specifies the items above as minimum stress conditions. Tests can be performed with higher stress for practical reasons, but a device is not expected to pass the test under any stress conditions, and failing an over-stressed test does not disqualify a device, as long as it passes the test under lower stress conditions that are within the specifications".

With editorial license.

Proposed Response *Response Status* **O**

Cl **93C** *SC* **93C.1** *P* **355** *L* **20** # 89

Ran, Adee Intel

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

Interference tolerance test is done with all lanes on both devices active. Since training is performed during the test, and FEC decoding requires all lanes to be received, all the signals must be routed between the DUT and the remote device (test setup) just as in a regular link, and the FEXT/NEXT transmitters can't be turned off or terminated.

Crosstalk in the test fixture is not taken into account in the noise calibration procedure, and can create an over-stressed test.

Test fixture design may or may not be driven to minimize NEXT and FEXT; it is worth stating the implication explicitly.

SuggestedRemedy

Add a note in 93C.1:
FEXT and NEXT in the test fixture are not accounted for in the test channel calibration (93A.2). It is recommended that test fixtures be designed to minimize these effects.

Proposed Response *Response Status* **O**

Cl **93C** *SC* **93C.1** *P* **355** *L* **20** # 95

Ran, Adee Intel

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

Following comment #234 on D2.0, the test setup now requires that "During the test, the transmitters of the PMD under test transmit the pattern specified by the PMD clause that invokes this method, with the transmitters in the preset condition."

But, since training requires transmitting a training sequence, the "pattern specified by the PMD clause" mentioned above can only be applied after the training procedure is completed (step 10 of 93C.2).

SuggestedRemedy

Move the requirement of setting the local transmitter pattern and equalization state to step 10 of 93C.2.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.1** *P* **269** *L* **11** # 37

Anslow, Pete Ciena

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

In the second paragraph of 94.1 "Figure 94-1" and "Clause 45" should be links

SuggestedRemedy

Make "Figure 94-1" and "Clause 45" cross-references

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.11.1** *P* **297** *L* **1** # 44

Lusted, Kent Intel

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

The text says ""The distinguishing differences are that the training pattern is truncated to 48 training frame words (4320 bits)..."

However, 1 training frame work (TFW) is 92 bits. The ALERT frame training pattern is 48 TFW *92 bits/TFW = 4416 bits

SuggestedRemedy

Change 4320 to 4416.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.12.4** *P* **301** *L* **47** # 153

Ghiasi, Ali Broadcom

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

The common mode return loss crosses differential return loss at 6.05 GHz and even for ideal driver/pacakge the common mode return loss can only be as good as differetnial not better

SuggestedRemedy

Please change common mode return loss to follow differetnial return loss of equation 94-5 but 3 dB worse
RLcm(f)>=9.05–f□0.05<=f<=6 GHz
= 3.45–0.075f 6<=f<10 GHz

Proposed Response *Response Status* **O**

<Editor changed subclause from 3.12.4 to 94.3.12.4.>

Cl **94** *SC* **94.3.12.7** *P* **304** *L* **49** # 92

Ran, Adee Intel

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

"The transmitter far-end output noise is a source of noise in addition to the channel integrated crosstalk noise (ICN) specified in 94.4.3."

This sentence is outdated. 94.4.3 deals with recommended channel return loss. ICN is not used in clause 94.

SuggestedRemedy

Delete this sentence.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.12.7** *P* **304** *L* **49** # 52

Richard, Mellitz Intel Corporation

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

Clause 94.4.3 is "Return Loss" and ICN is not specified.

SuggestedRemedy

Delete first sentence of 94.3.12.7

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.12.7** *P* **304** *L* **51** # 87

Ran, Adee Intel

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

The procedure defined in 85.8.3.2 uses the square wave pattern specified in 83.5.10 (PMA clause). But the the 100GBASE-KP4 PHY does not use this PMA - and the PMA defined in 94.2 does not have a square wave test pattern. Therefore, this measurement can't be conducted as specified.

SuggestedRemedy

A few alternatives for task force consideration:

1. Add the square wave test pattern to the PMA, use same method.
2. Add a 4-level slow pattern (such as the one described in 94.3.11.6 in D1.1) to the PMA, instead, and change the method to match it; has larger coverage than (1).
3. Remove this subclause, as its requirements somewhat parallel the SNDR.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.12.9** *P* **306** *L* **25** # 97

Ran, Adee Intel

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

SNDR requirement is not completely aligned with the TX and channel specifications. It may also be difficult to measure and pass with any allowable transmit equalizer setting.

COM assumes TX is fully linear except for jitter; jitter typically causes the "worst-SNDR phase" to be near transitions, and leaves a better SNDR in the desired sampling phase. An SNDR-compliant TX may have additive noise instead of jitter, with a "flat" SNDR that would have worse impact on the receiver performance. COM does not represent this type of transmitter well.

As a consequence, RX interference tolerance test calibration which adds BBN at the TX side in order to reach the target SNDR, might stress for the receiver more than using a high-jitter transmitter.

SuggestedRemedy

A presentation expanding on the comment and proposing a remedy will be supplied.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.3.13.3** *P* **308** *L* **9** # 53

Richard, Mellitz Intel Corporation

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

Table 94-16 specifies COM of 1.5 dB for the Test 2 values column.

For a 33dB loss channel the headroom over the noise is only 3.6 mV (pre amplification). i.e. available signal - noise.
That seems excessively demanding of a reciever.

SuggestedRemedy

Change to COM 2.5 dB for the Test 2 values column.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.4.1** *P* **310** *L* **16** # 111

Kochuparambil, Beth — Cisco Systems

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

Annex 93A in its entirety does not discribe the COM procedure. Actually 93A.1 is all that is needed.

Current text:
"The channel operating margin (COM) computed using the procedure in Annex 93A and the parameters in Table 94–18 [...]"

SuggestedRemedy

Change "Annex 93A" to "93A.1" ... this remedy is also consistant with text in clause 93.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.4.1** *P* **310** *L* **17** # 113

Kochuparambil, Beth — Cisco Systems

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

With multiple changes in COM since adoption in the draft, analysis of range of compliant channels has only been done on limited submitted channels.

System analysis needs to be done to verify broad market potential.

SuggestedRemedy

Once COM changes taper, channel verification is needed to confirm if 3dB limit is a realistic channel design limit.

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.4.1** *P* **310** *L* **32** # 75

Ben-Artsi, Liav — Marvell

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

The Device package model includes Single ended ball capacitance and not Single ended board capacitance

SuggestedRemedy

Change the description of Cb in table 93A-1 to Single-ended ball capacitance

Proposed Response *Response Status* **O**

Cl **94** *SC* **94.6.4.2** *P* **318** *L* **12** # 15

Marris, Arthur — Cadence Design Syste

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

Remove redundant PICs entries for SP2

SuggestedRemedy

Delete DFS3 on line 11
Delete DFS2 on line 13

Proposed Response *Response Status* **O**