Cl **00** *SC* **0** *P* *L* # 180

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

The content of the P802.3bj draft seems to be sufficiently stable that the content of Clause 45, Clause 30 Annex 91A and the various PICS proforma should now be populated.

SuggestedRemedy

Complete the content of Clause 45, Clause 30 Annex 91A and the various PICS proforma.

Response *Response Status* **C**

ACCEPT.

Cl **00** *SC* **0** *P* *L* # 172

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

Now that IEEE Std 802.3-2012 has been approved, update all references in the draft to reflect 2012 and remove the reference to "Draft 3.1" in the frontmatter.

SuggestedRemedy

Update all 802.3 references in the draft to be "IEEE Std 802.3-2012" and remove the reference to "Draft 3.1" in the frontmatter.

Response *Response Status* **C**

ACCEPT.

The frontmatter will be updated under the guidance of the Working Group chair.

In addition, replace all references to the base document with IEEE Std 802.3-2012.

Cl **45** *SC* **45.2.1.12** *P* **21** *L* **1** # 272

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

40G/100G PMA/PMD extended ability register big definitions subclauses do not have entries for the new 802.3bj PHY types.

SuggestedRemedy

Add entries for 100GBASE-CR4, 100GBASE-KR4, and 100GBASE-KP4 between 45.2.1.12.1 and 45.2.1.12.2.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.8** *P* **21** *L* **1** # 270

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

PMD transmit disable register paragraph in P802.3bh draft 3.1 does not list the new 802.3bj PHY types.

SuggestedRemedy

Append to the end of the first paragraph:

"The transmit disable function for 100GBASE-CR4 is described in 92.7.6. The transmit disable function for 100GBASE-KR4 is described in 93.7.6. The transmit disable function for 100GBASE-KP4 is described in 94.3.6.6."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.80** *P* **21** *L* **1** # 40

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

The current text for the BASE-R PMD status register does not reference the new Clause 92 and Clause 93 PMDs.

SuggestedRemedy

Update the text to read "The BASE-R PMD status register is used for 10GBASE-KR and other PHY types using the PMDs described in Clause 72, Clause 84, Clause 85, Clause 92, or Clause 93."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.81** *P* **21** *L* **1** # 41

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

The current text for the BASE-R LP coefficient update register does not reference the new Clause 92 and Clause 93 PMDs.

SuggestedRemedy

Update the text to read "The BASE-R LP coefficient update, lane 0 register is used for 10GBASE-KR and other PHY types using the PMDs described in Clause 72, Clause 84, Clause 85, Clause 92, or Clause 93."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.82** *P* **21** *L* **1** # 42

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

The current text for the BASE-R LP status report register does not reference the new Clause 92 and Clause 93 PMDs.

SuggestedRemedy

Update the text to read "The BASE-R LP status report, lane 0 register is used for 10GBASE-KR and other PHY types using the PMDs described in Clause 72, Clause 84, Clause 85, Clause 92, or Clause 93."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.83** *P* **21** *L* **1** # 43

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

The current text for the BASE-R LP coef update register does not reference the new Clause 92 and Clause 93 PMDs.

SuggestedRemedy

Update the text to read "The BASE-R LD coefficient update, lane 0 register is used for 10GBASE-KR and other PHY types using the PMDs described in Clause 72, Clause 84, Clause 85, Clause 92, or Clause 93."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.84** *P* **21** *L* **1** # 44

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

The current text for the BASE-R LD status register does not reference the new Clause 92 and Clause 93 PMDs.

SuggestedRemedy

Update the text to read "The BASE-R LD status report, lane 0 register is used for 10GBASE-KR and other PHY types using the PMDs described in Clause 72, Clause 84, Clause 85, Clause 92, or Clause 93."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.3.9** *P* **21** *L* **1** # 46

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *bucket*

EEE capability register bit definitions subclauses do not list 100GBASE-CR4, 100GBASE-KR4, 100GBASE-KP4, 40GBASE-KR4, 40GBASE-CR4 and 100GBASE-CR10.

SuggestedRemedy

Add appropriate subclauses for 100GBASE-CR4, 100GBASE-KR4, 100GBASE-KP4, 40GBASE-KR4, 40GBASE-CR4 and 100GBASE-CR10 in 45.2.3.9.x

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.7.12** *P* **22** *L* **9** # 220

Marris, Arthur — Cadence

Comment Type **T** *Comment Status* **A**

The order that the 100G port types is listed is different from Table 73-5 which lists the port's priorities.

SuggestedRemedy

Swap KP4 and KR4 in Table Table 45-189 so that bit 9 is for 100GBASE-KP4 and bit 10 for 100GBASE-KR4.

Do similar change in Table 45-190 and Table 45-191 for consistancy.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make the proposed changes and.

Swap KP4 & KR4 in 73-4 (Technology Ability Field)

Cl **45** *SC* **45.2.7.13** *P* **23** *L* **9** # 96

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

Comment #128 on D1.0 proposed that the two wake modes for EEE should be made optional. There was insufficient discussion at the time to conince the BRC to make the change. However, since that time some convincing arguments have been made:

Requiring simple modules (PMA/PMD only) to support line quiescence could consume more energy than would be saved during LPI. Furthermore, modules built before the definition of EEE could support Fast Wake but not normal wake.

Because Fast Wake is the simplistic implementation of EEE (that requires no changes to the PMA/PMD/FEC) it makes sense for Fast Wake to be the default behavior for EEE PHYs, with normal wake being an optional extra mode. Changes will be required in multiple places to support this operation, the resolution of this comment should serve as a reference.

SuggestedRemedy

Add a row and adjust the reserved row accordingly:

7.60.14 - Fast Wake only - 1 = Advertise that the PHY supports only Fast Wake mode : 0 - Do not advertise that the PHY supports only Fast Wake mode

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll in ad-hoc & TF

(Chicago rules) If EEE supported.
Both modes required (ad hoc: 1, TF: 0)
Fast Wake mandatory, quiescent mode optional (ad hoc: 5, TF: 23)
Quiescent mode mandatory, fast wake optional (ad hoc: 1, TF: 3)
Both modes independently optional (ad hoc: 0, TF: 0)

Add a row and adjust the reserved row accordingly:

7.60.14 - Both EEE modes - 1 = Advertise that the PHY supports both EEE modes : 0 - Do not advertise that the PHY supports both EEE modes (the PHY supports only Fast Wake).

Cl **45** *SC* **45.2.7.13.1a** *P* **24** *L* **41** # 30

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

Comment #35 against D 1.0 has been incorrectly implemented.
The (accepted) Suggested remedy changed the editing instruction to:
"Insert 45.2.7.13.a through 45.2.7.13.d before 45.2.7.13.1 as follows:"
However, the editing instruction is now:
"Insert 45.2.7.13.1a through 45.2.7.13.1f before 45.2.7.13.1 as follows:"

The agreed format for numbering insertions is:
"It has been agreed with staff that where a subclause is inserted prior to the existing first subclause it is labelled [existing subclause - one level].[a through z]. Where a subclause is inserted after an existing subclause - assuming it is not the last - the new subclause it is labelled [subclause number][a through z].
For example to insert two subclauses before 43.2.1 the subclauses would be numbered 43.2.a and 43.2.b. Two subclauses between 43.2.1 and 43.2.2 would be numbered 43.2.1a and 43.2.1b. Two subclauses added after the last subclause 43.2.2 would be numbered 43.2.3 and 43.2.4."

SuggestedRemedy

Change:
"Insert 45.2.7.13.1a through 45.2.7.13.1f before 45.2.7.13.1 as follows:" to:
"Insert 45.2.7.13.a through 45.2.7.13.d before 45.2.7.13.1 as follows:"
and change the numbering of the text to be inserted accordingly.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.7.13.1a** *P* **24** *L* **41** # 97

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted there needs to be a description of the new register bi

SuggestedRemedy

Insert an extra new subclause 45.2.7.13.1a before the existing one and renumber the rest.

45.2.7.13.1a Fast Wake only (7.60.14)

Support for Fast Wake only, as defined in 82.2.18.2.2, shall be advertised if this bit is set to one. This bit is not set for PHYs less than 40 Gb/s and for PHYs that support both wake mode. Note that this bit defaults set for PHYs greater than or equal to 40 Gb/s.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

45.2.7.13.1a Both EEE modes (7.60.14)

Support for both EEE modes, as defined in 82.2.18.2.2, shall be advertised if this bit is set to one. This bit is not set for PHYs less than 40 Gb/s and for PHYs that support only Fast Wake mode.

Cl **45** *SC* **45.2.7.13.1a** *P* **24** *L* **45** # 98

Barrass, Hugh Cisco

Comment Type **E** *Comment Status* **A** *bucket*

Although the spelling of "advertized" is aesthetically pleasing, it does not fit the degenerate style permeating the rest of the document.

SuggestedRemedy

Change "advertized" to "advertised" in 6 locations.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.7.14** *P* **25** *L* **29** # 105

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted there needs to be a new register bit.

SuggestedRemedy

Add a row and adjust the reserved row accordingly:

7.61.14 - Fast Wake only - 1 = Link partner is advertising that the PHY supports only Fast Wake mode : 0 - Link partner is not advertising that the PHY supports only Fast Wake mode

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a row and adjust the reserved row accordingly:

7.61.14 - Both EEE modes - 1 = Link partner is advertising that the PHY supports both EEE modes : 0 - Link partner is not advertising that the PHY supports both EEE modes.

Cl **45** *SC* **45.2.7.14** *P* **25** *L* **32** # 1

Barrass, Hugh Cisco

Comment Type **E** *Comment Status* **A** *bucket*

Typo 10G instead of 100G in Table 45-191

SuggestedRemedy

Change 10G to 100G in 8 instances.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **Table 45-10** *P* **21** *L* **1** # 269

Lusted, Kent Intel

Comment Type **TR** *Comment Status* **A** *bucket*

receive fault description location table does not list the new PHY types in 802.3bj project.

SuggestedRemedy

Add the following entries to the end of the table:

100GBASE-CR4 | 92.7.11
100GBASE-KR4 | 93.7.11
100GBASE-KP4 | 94.3.9

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **Table 45-105** *P* **21** *L* **1** # 45

Lusted, Kent Intel

Comment Type **TR** *Comment Status* **A** *bucket*

EEE capability register bit definitions table does not list 100GBASE-CR4, 100GBASE-KR4, 100GBASE-KP4, 40GBASE-KR4, 40GBASE-CR4 and 100GBASE-CR10.

SuggestedRemedy

Add entries for 100GBASE-CR4, 100GBASE-KR4, 100GBASE-KP4, 40GBASE-KR4, 40GBASE-CR4 and 100GBASE-CR10.

Add appropriate subclauses for each entry in 45.2.3.9.x

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **Table 45-15** *P* **21** *L* **1** # 271

Lusted, Kent Intel

Comment Type **TR** *Comment Status* **A** *bucket*

40G/100G PMA/PMD extended ability register big definitions table does not have entries for the 802.3bj PHY types.

SuggestedRemedy

Add entries for 100GBASE-CR4, 100GBASE-KR4, and 100GBASE-KP4 in place of 1.13.14:12.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **Table 45-7** *P* **21** *L* **1** # 267

Lusted, Kent Intel

Comment Type **TR** *Comment Status* **A** *bucket*

Table 45-7 "PMA/PMD Control 2 register bit definitions" does not list the new PMDs in the 802.3bj project.

SuggestedRemedy

Remove entry 101100 = reserved for future use

Add the following entries:

101100 = 100GBASE-CR4 PMA/PMD
101101 = 100GBASE-KR4 PMA/PMD
101110 = 100GBASE-KP4 PMA/PMD
101111 = reserved for future use

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace 1011xx = reserved for future use

With

101100 = 100GBASE-KR4 PMA/PMD
101101 = 100GBASE-KP4 PMA/PMD
101110 = 100GBASE-CR4 PMA/PMD
101111 = reserved for future use

Cl **45** *SC* **Table 45-9** *P* **21** *L* **1** # 268

Lusted, Kent Intel

Comment Type **TR** *Comment Status* **A** *bucket*

Transmit fault description location table does not list the new PHY types in 802.3bj project.

SuggestedRemedy

Add the following entries to the end of the table:

100GBASE-CR4 | 92.7.10
100GBASE-KR4 | 93.7.10
100GBASE-KP4 | 94.3.8

Response *Response Status* **C**

ACCEPT.

Cl **69** *SC* **69.1.2** *P* **28** *L* **29** # 31

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A**

The editing instruction says "Delete 69.1.2."
When applied to the base document, this will have the effect of renumbering 69.1.3 to be 69.1.2.
The modification to what was formerly 69.1.3 just below should reflect this change.

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

SuggestedRemedy

Change the editing instruction to "Delete 69.1.2 and renumber 69.1.3 to 69.1.2 accordingly."
For 69.1.3, move the editing instruction above the title, renumber to 69.1.2 and amend the editing instructon to be:
"Change the first paragraph of 69.1.3 (now renumbered to 69.1.2) as shown:"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This subclause will be handled in a manner consistent with the treatment of 80.1.2 (see comment #6).

Cl **69** *SC* **69.1.2** *P* **28** *L* **32** # 106

Barrass, Hugh — Cisco

Comment Type **E** *Comment Status* **A**

For consistency - and also so that commenters can see what is changing - show the deleted text.

SuggestedRemedy

Show the deleted text.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #31.

Cl **69** *SC* **69.1.3** *P* **28** *L* **51** # 2

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The editing instruction says "Change Figure 69-1 and insert Figure 69-1a as shown:" but Figure 69-1 does not show any changes, it is a replacement figure.

SuggestedRemedy

Change the editing instruction to:
"Replace Figure 69-1 and insert Figure 69-1a as shown:"

Response *Response Status* **C**

ACCEPT.

Cl **69** *SC* **69.1.3** *P* **29** *L* **16** # 423

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

For consistency with Fig 80-1,

SuggestedRemedy

Mark the FEC for 10GBASE-KR, and 40GBASE-KR4 (Fig 69-1a), as optional.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Also change FEC to RS-FEC for 100GBASE-KR4 and 100GBASE-KP4 (Figure 69-1a).

Cl **69** *SC* **69.1.3** *P* **30** *L* **45** # 436

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A**

Not so fast! It's still the case that a 2-lane 10GBASE-KX4 wouldn't be compliant, and so on. As the channel or medium isn't normative for older BPE, and MDI is shown in other places, it may be convenient to attach this requirement to the MDI.

SuggestedRemedy

Reinstate item f but change "as specified in" to "of". Add the new PMD types. Rework to say MDIs for types A, B, C have one pair/differential electrical path in each direction while X, Y, Z have four. No need for clause numbers:
f) The MDI for 1000BASE-KX and 10GBASE-KR uses one pair of electrical connections for each direction, while 10GBASE-KX4, 40GBASE-KR4 and ... have four pairs.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

During consideration of this comment, it was observed that XLAUI is not included in the list fo 40GBASE-KR4.

Replace item f):
"f) The PMA service interface, which, when physically implemented as XLAUI (40 Gigabit Attachment Unit Interface) at an observable interconnection port, uses a 4 lane data path as specified in Annex 83A or Annex 83B."

Add item g):
"g) The MDI for 1000BASE-KX and 10GBASE-KR use a serial data path while the MDI for 10GBASE-KX4, 40GBASE-KR4, 100GBASE-KR4, and 100GBASE-KP4 use a four lane data path."

Cl **69** *SC* **69.2.4** *P* **32** *L* **6** # 3

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The cell borders for Table 69-1a in the Nomenclature row are not consistent for clauses 91, 93 and 94

SuggestedRemedy

Change the left and right borders in the Nomenclature row for clauses 91 and 93 to be "very thin"

Response *Response Status* **C**

ACCEPT.

Cl **69** *SC* **69.5** *P* **32** *L* **47** # 20

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

The text:
"The supplier of a protocol implementation that is claimed to conform to any part of IEEE Std 802.3, Clause 70 through Clause 74, demonstrates compliance by completing a protocol implementation conformance statement (PICS) proforma." has been changed to:
"The supplier of a protocol implementation that is claimed to conform to any part of IEEE Std 802.3 demonstrates compliance by completing a protocol implementation conformance statement (PICS) proforma."
But this is not a true statement. There are many clauses in 802.3 that do not have an accompanying PICS proforma.
Same issue for 80.7

SuggestedRemedy

Remove the deletion of ", Clause 70 through Clause 74," in 69.5 and also remove the deletior of ", Clause 45, Clause 73, Clause 74, Clause 81 through Clause 89, and related annexes" from 80.7.
Augment these two statements as required to reflect the new clauses added by the amendment.

Response *Response Status* **C**

ACCEPT.

Cl **73** *SC* **73.10.7** *P* **35** *L* **12** # 424

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

Make the document easier to use with consistent ordering.

SuggestedRemedy

Put the PMAs and PMDs in the reverse order to Table 73-5 Priority Resolution. Also the list for single_link_ready.

Response *Response Status* **C**

ACCEPT.

Cl **73** *SC* **73.7.2** *P* **34** *L* **30** # 437

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **A**

Wordsmithing:
"... the Receive Switch function shall connect the MDI to ... and to the receive path of the 1000BASE-KX ... and 100GBASE-CR4 if the PHY is present."

SuggestedRemedy

"... the Receive Switch function shall connect the MDI to ... and to the receive path of each PMD that is present and has Auto-Negotiation enabled."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Considering 73.6.10 and 73.7.2 from the base document, it appears that the Transmit/Receive switch functions connect the HCD PHY to the medium once Auto-Negotation has completed.

This is reinforced by the requirement in 73.6.10 that only "DME page generator" is connected to the MDI during Auto-Negotiation.

To be consistent with 73.6.10, 73.7.2 should state that, during Auto-Negotiation, the DME page receiver and the receive path of the 1000BASE-KX and 10GBASE-KX4 (if present) to support parallel detection.

It would also be valuable to quantify what it means to be "in Auto-Negotiation."

[Change these two subclauses as shown.]

73.6.10 Transmit Switch function

Prior to entry into the AN_GOOD_CHECK state, the Transmit Switch function shall connect only the DME page generator controlled by the Transmit State Diagram to the MDI.

Upon entry into the AN_GOOD_CHECK state, the Transmit Switch function shall connect the transmit path from a single technology-dependent (highest common denominator) PHY to the MDI.

When a PHY is connected to the MDI through the Transmit Switch function, the signals at the MDI shall conform to all of the PHY's specifications.

73.7.2 Receive Switch function

Prior to entry into the AN_GOOD_CHECK state, the Receive Switch function shall connect the DME page receiver to the MDI. For the Parallel Detection function, the Receive Switch function shall also connect the receive path of the 1000BASE-KX and 10GBASE-KX4 PHY to the MDI when those PHYs are present.

Upon entry into the AN_GOOD_CHECK state, the Receive Switch function shall connet the receive path from a single technology-dependent (highest comment denominator) PHY to the MDI.

Cl **74** *SC* **74.7.4.4** *P* **37** *L* **1** # 68

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **R** *EEE FEC*

Clause 74 needs to be changed so that compatibility with .3ba PHYs can be maintained.

The FEC block needs to be aligned so that RAMs are at the start of a block to allow rapid block lock.

SuggestedRemedy

Add the following at the end of clause 74.7.4.4

For PHYs operating at 40 Gb/s and above that include the optional Energy Efficient Ethernet (EEE) capability with the normal wake mode option (see Clause 78, 78.3), the FEC encoder shall force the start of a new FEC block following the transition of tx_mode from QUIET to another state. The FEC blocks following this transition shall start with a Rapid Alignment Marker (RAM) that includes a down_count divisible by 4 (see 82.2.8a).

Response *Response Status* **C**

REJECT.

The minimal change to Clause 74 is preferred. The use of scrambler bypass may not be optimal, but the impact is small compared to the disruption of changes to Clause 74 FEC.

Cl **74** *SC* **74.7.4.8** *P* **37** *L* **1** # 69

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **R** *EEE FEC*

Clause 74 needs to be changed so that compatibility with .3ba PHYs can be maintained.

The rapid block lock needs to take into account RAMs for 40/100G

SuggestedRemedy

Change the first part of subclause 74.7.4.8 from "If the optional EEE capability is supported" to "If the optional EEE capability is supported for PHYs operating at 10Gb/s"

Add a new paragraph at the end of the subclause:

If the optional EEE capability is supported for PHYs operating at or above 40Gb/s a similar FEC rapid block lock is required. When transitioning out of the sleep state, the remote FEC encoder starts FEC blocks with Rapid Alignment Markers incluing a down_count divisible by 4

Response *Response Status* **C**

REJECT.

The minimal change to Clause 74 is preferred. The use of scrambler bypass may not be optimal, but the impact is small compared to the disruption of changes to Clause 74 FEC.

Cl **78** *SC* **78** *P* **37** *L* **1** # 4

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The title of clause 78 is "Energy efficient Ethernet (EEE)"

SuggestedRemedy

Add the " (EEE)" to the title of Clause 78

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1** *P* **37** *L* **30** # 216

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A** *40G*

Need to add the 40GBASE-CR4 and 40GBASE-KR4 PHYs t othe overview

SuggestedRemedy

Change:
"...PHY. For operation over twinax cable, EEE supports may be supported by the 100GBASE-CR10 and the 100GBASE-CR4 PHY
To:
"...PHY. For operation over twinax cable, EEE supports may be supported by the 40GBASE-CR4, 100GBASE-CR10 and the 100GBASE-CR4 PHY
Change:
"For operation over electrical backplanes, EEE may be supported by the 1000BASE-KX PHY, the 10GBASE-KX4 PHY, the 10GBASE-KR PHY, the 100GBASE-KR4 PHY, and the 100GBASE-KP4 PHY
To:
"For operation over electrical backplanes, EEE may be supported by the 1000BASE-KX PHY, the 10GBASE-KX4 PHY, the 10GBASE-KR PHY, the 40GBASE-KR4 PHY, the 100GBASE-KR4 PHY, and the 100GBASE-KP4 PHY"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #107, 108

Cl **78** *SC* **78.1** *P* **37** *L* **30** # 331

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A** *40G*

The paragraph does not mention 10BASE-Te, 40GBASE-CR4, or 40GBASE-KR4

SuggestedRemedy

Add these PHYs in their respoective positions in the paragraph

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #107, 108

Cl **78** *SC* **78.1** *P* **37** *L* **32** # 107

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change "100GBASE-CR10" to "40GBASE-CR4 PHY, the 100GBASE-CR10 PHY"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1** *P* **37** *L* **34** # 108

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change "the 100GBASE-KR4 PHY," to "the 40GBASE-KR4 PHY, the 100GBASE-KR4 PHY,"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1.4** *P* **38** *L* **1** # 148

Ran, Adee — Intel

Comment Type **E** *Comment Status* **A** *bucket*

According to the changes in 78.1, PHYs may support EEE, not the other way around. The title of this subclause should reflect that.

SuggestedRemedy

Change "EEE supported PHY types" to "PHY types which may support EEE".

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1.4** *P* **38** *L* **21** # 425

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A**

Make the document easier to use with consistent ordering.

SuggestedRemedy

Order Table 78-1 in the reverse order to Table 73-5 Priority Resolution.

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1.4** *P* **38** *L* **5** # 21

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

The title of Table 78-1 has been modified to:
"Clauses associated with each PHY type"
but "XGXS (XAUI)" and "XLAUI/CAUI" are not PHY types

Note: a related comment proposes to make similar changes to Tables 78-2 and 78-4

SuggestedRemedy

Change the title of Table 78-1 to:
"Clauses associated with each PHY or interface type"
Change the left hand column heading to:
"PHY or interface type"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1.4** *P* **38** *L* **5** # 327

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A** *bucket*

Table 78-1

Most PHY types list the PCS and PMA/PMD clauses that they are associated with. The PCS is not listed for XGXS or 1000BASE-KX.

SuggestedRemedy

For XGXS list "47, 48" and for 1000BASE-KX list "70, 36" instead of "70, 35"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.2** *P* **38** *L* **37** # 5

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

In 78.2 the only change is to Table 78-2 (as reflected by the editing instruction) so there is no need to show the sentence "Table 78-2 summarizes three key EEE parameters (Ts, Tq, and Tr) for supported PHYs."

SuggestedRemedy

Remove this sentence from the draft as it is not modified.

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.2** *P* **39** *L* **1** # 22

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

The title of Table 78-2 is "Summary of the key EEE parameters for supported PHY" and the title of Table 78-4 is Summary of the LPI timing parameters for supported PHYs"
Also, the left hand column heading in both tables is now "PHY type"
However, both tables contain rows that are not PHYs - "XGXS (XAUI)" and "CAUI"

Note: a related comment proposes to make similar changes to Table 78-1

SuggestedRemedy

Change the title of Table 78-2 to:
"Summary of the key EEE parameters for supported PHYs or interfaces" and change the title of Table 78-4 to:
"Summary of the LPI timing parameters for supported PHYs or interfaces"

Also, change the left hand column heading in both tables to "PHY or interface type"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.2** *P* **39** *L* **1** # 347

Estes, Dave — UNH - IOL

Comment Type **TR** *Comment Status* **A**

Table 78-2 doesn't include EEE parameters for XLAUI/CAUI

SuggestedRemedy

Add XLAUI/CAUI parameters to table 78-2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add 1 row for XLAUI/CAUI, all parameters TBD.

Cl **78** *SC* **78.5** *P* **38** *L* **44** # 109

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change 100 Gb/s to 40 Gb/s and 100 Gb/s

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.5** *P* **38** *L* **44** # 110

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then the "may" should be used.

SuggestedRemedy

Change "are supported" to "may be supported"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.5** *P* **38** *L* **44** # 445

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *EEE option*

Change
For PHYs with an operating speed of 100 Gb/s (that implement EEE) two modes of LPI operation are supported.

SuggestedRemedy

To
PHYs with an operating speed of 100 Gb/s that implement EEE support the "fast wake" mode of LPI operation and may additionally support the "normal wake" mode. The two modes are not used simultaneously.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #96 (& many others) for resolution.

Cl **78** *SC* **78.5** *P* **38** *L* **44** # 444

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *EEE option*

This says "For PHYs with an operating speed of 100Gb/s (that implement EEE) two modes of LPI operation are supported." So it's both or nothing.

Implementing traditional EEE in a PHY divided by a CAUI involves extra pattern-recognition circuitry that would consume extra power. Gaining lock with the FEC-encoded lanes takes time even with rapid algnment markers. Turning transmitters and receivers with EQ on and off rapidly adds to the signal integrity challenge. The energy/bit in 100G PHYs is vastly less than 10/100/1000 Meg PHYs but there is still energy to be saved above the MAC. In a high-speed core network that never really goes quiet, energy would have to be saved in very short time slots. For other networks that do go truly quiet at night, the link can be powered down by traditional means whether EEE is present or not.

SuggestedRemedy

Have three ability choices: no EEE, fast EEE only or capable of both EEE modes.
Adjust Table 45-190, EEE advertisement register, and Table 45-191, EEE link partner ability, to manage this.
Consider quantitatively (million tons of CO2) whether the slow EEE mode is worthhile, particularly for existing PHY types where fast EEE will be added and the link can be shut down above the MAC for long quiet periods anyway.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #96 (& many others) for resolution.

Cl **78** *SC* **78.5** *P* **38** *L* **44** # 332

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A** *40G*

Is 40G excluded from Fast wake?

SuggestedRemedy

If Fast wake should be supported for EEE then add 40 Gb/s to this paragraph.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #109

Cl **78** *SC* **78.5** *P* **38** *L* **48** # 111

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then there needs to be a description.

SuggestedRemedy

Add a sentence at the end of the paragraph:

Fast wake is mandatory for PHYs that implement EEE; normal wake is an additional option.

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.5** *P* **39** *L* **31** # 112

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

In Table 78-4 add two rows for 40GBASE-CR4 and 40GBASE-KR4

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.5.2** *P* **39** *L* **46** # 344

Estes, Dave — UNH - IOL

Comment Type **T** *Comment Status* **A** *40G*

This section should also include the XLAUI

SuggestedRemedy

Change all references of CAUI to XLAUI/CAUI

Response *Response Status* **C**

ACCEPT.

See #113, 114

Cl **78** SC **78.5.2** P **39** L **46** # 113

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change the title of subclause to:

40 Gb/s and 100 Gb/s PHY extension using XLAUI and CAUI

Response *Response Status* **C**

ACCEPT.

Cl **78** SC **78.5.2** P **39** L **48** # 114

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change the first part of the sentence from

"100 Gb/s PHYs may be extended using CAUI"

to

"40 Gb/s and 100 Gb/s PHYs may be extended using XLAUI and CAUI"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the first part of the sentence from

"100 Gb/s PHYs may be extended using CAUI"

to

"40 Gb/s and 100 Gb/s PHYs may be extended using XLAUI and CAUI"

and replace CAUI with XLAUI/CAUI in the remainder of the paragraph.

Cl **78** SC **78.5.2** P **39** L **53** # 189

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Defintions for how PEASE and PIASE (CAUI shutdown control bits) affect EEE timing exist. However the MDIO bits don't in Clause 45

SuggestedRemedy

Create MDIO register bits for PEASE and PIASE.
Also create bits for indicating the capability for PEASE and PIASE

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Create register bits for LPI_FW; PEASE, PIASE; PEASA; PIASA - see 83.6 - in PMA/PMD register space

1.1810 - EEE Control Register
1.1811 - EEE Status Register

Cl **78** SC **78.5.2** P **39** L **53** # 448

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

Management is optional, and if there is management, the Clause 45 method is itself optional. So the PMA Egress AUI Stop Enable (PEASE) bit (1.n.n) may not exist even if the associated PMA control variable does exist.

SuggestedRemedy

Write the spec in terms of the variables being true or false. The MDIO bits follow along according to the mapping tables. Applies to 81.3a.2.1 and 83.3 also.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

These are all defined in terms of PMA control variables but this clause needs to be reworded to reflect that:

Change "the PMA Egress AUI Stop Enable (PEASE) bit (1.n.n)" to "PMA Egress AUI Stop Enable (PEASE, see 83.3; MDIO register bit 1.n.n)"

Change "the PMA Ingress AUI Stop Enable (PIASE) bit (1.n.n)" to "PMA Ingress AUI Stop Enable (PIASE, see 83.3; MDIO register bit (1.n.n)"

Cl **78** *SC* **78-5** *P* **39** *L* **25** # 348

Estes, Dave UNH - IOL

Comment Type **TR** *Comment Status* **A** *40G*

Table 78-4 does not include any LPI timing parameters for 40G

SuggestedRemedy

Add 40G timing parameters to table 78-4

Response *Response Status* **C**

ACCEPT.

See #112

Cl **80** *SC* **80.1.2** *P* **42** *L* **17** # 328

Estes, Dave UNH - IOL

Comment Type **E** *Comment Status* **R**

In the past the objectives were updated not deleted.

SuggestedRemedy

Update the objectives to include the new PHY types and the support for EEE and RS-FEC.

Response *Response Status* **C**

REJECT.

The TF expressed support for deleting the objectives clause with the intent that it should start a new tradition for projects in 802.3.

Cl **80** *SC* **80.1.2** *P* **42** *L* **17** # 6

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A**

The editing instruction says "Delete the entire section 80.1.2 in the base document."
Firstly, all editing instructions in this amendment relate to the base document, this does not need to be stated.
When applied to the base document, 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.

Note, the same issue for 60.1.2 is the subject of a separate comment.

SuggestedRemedy

Change the editing instruction to "Delete 80.1.2 and renumber subsequent clauses 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)"

Response *Response Status* **C**

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.

Cl **80** *SC* **80.1.2** *P* **42** *L* **25** # 432

Dawe, Piers IPtronics

Comment Type **ER** *Comment Status* **A**

Deleting the objectives doesn't avoid all work. We need to tell the reader that 40/100G is rated at 10^-12 BER. Some clauses specifically refer to the objectives, e.g. "It is possible for a poor quality link to provide sufficient light for a SIGNAL_DETECT = OK indication and still not meet the 10^-12 BER objective."

SuggestedRemedy

If we want to go without the long list and don't want to open three more clauses, have a short subclause:
80.1.2 BER objective
It is an objective of 40 Gigabit and 100 Gigabit Ethernet to provide a bit error ratio (BER) better than or equal to 10^-12 at the MAC/PLS service interface.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.3** *P* **42** *L* **43** # 7

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The editing instructions:
"Change note h) as shown." and
"Add note j) as shown."
refer to "notes" but these are items not notes

SuggestedRemedy

Change the editing instructions to:
"Change item h) as shown." and
"Add item j) as shown."

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.4** *P* **43** *L* **47** # 343

Estes, Dave UNH - IOL

Comment Type **T** *Comment Status* **A**

The wording is incorrect because it implies that the PCS lanes are 2-level PAM or multi-level PAM, when it is really the PMA/PMD that does the multi-level PAM.

SuggestedRemedy

Change lines 47-53 to:

40GBASE-R or 100GBASE-R represents a family of Physical Layer devices using a physical coding sublayer for 40 Gb/s or 100 Gb/s operation over multiple PCS lanes based on 64B/66B block encoding (see Clause 82) and a PMD implementing 2-level pulse amplitude modulation (PAM).

100GBASE-P represents Physical Layer devices using a physical coding sublayer for 100 Gb/s operation over multiple PCS lanes based on 64B/66B block encoding (see Clause 82) and a PMD implementing multi-level pulse amplitude modulation (PAM).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See also #449 & #23 for justification for other changes.

Change lines 47-53 to:

40GBASE-R or 100GBASE-R represents a family of Physical Layer devices using the Clause 82 Physical Coding Sublayer for 40 Gb/s or 100 Gb/s operation over multiple PCS lanes (see Clause 82) and a PMD implementing 2-level pulse amplitude modulation (PAM). Some 100GBASE-R Physical Layer devices also use the transcoding and FEC of Clause 91.

100GBASE-P represents Physical Layer devices using the Clause 82 Physical Coding Sublayer for 100 Gb/s operation over multiple PCS lanes (see Clause 82) and a PMD implementing more than 2-level pulse amplitude modulation (PAM). Some 100GBASE-P Physical Layer devices also use the transcoding and FEC of Clause 91.

Cl **80** *SC* **80.1.4** *P* **43** *L* **48** # 438

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R**

Seeing as we don't define pulse amplitude modulation (PAM) and don't need it outside Clause 94, it would be better not to use the term.

SuggestedRemedy

Change 2/4-level pulse amplitude modulation or 4-level PAM to just 2/4-level modulation, each time (only 8 instances).

Response *Response Status* **C**

REJECT.

PAM is a defined abbreviation in Clause 1.5

Cl **80** *SC* **80.1.4** *P* **43** *L* **49** # 449

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A**

Although they may use a small part of Clause 82, it is not the case that 100GBASE-CR4 or 100GBASE-KR4 use 64B/66B block encoding: this is removed (transcoded) before the PMD so is never present on the line (unlike with KR FEC which is optional). They use 256b/257b block encoding.
It would be better to use language more like the definitions section:
1.4.51 100GBASE-R: An IEEE 802.3 family of Physical Layer devices using the physical coding sublayer defined in Clause 82 for 100 Gb/s operation. (See IEEE Std 802.3, Clause 82.)

SuggestedRemedy

Change to:
40GBASE-R or 100GBASE-R represents a family of Physical Layer devices using the Clause 82 Physical Coding Sublayer for 40 Gb/s or 100 Gb/s operation over multiple PCS lanes based on 2-level pulse amplitude modulation (PAM) and low-overhead block encoding. Some 100GBASE-R Physical Layer devices also use the transcoding and FEC of Clause 91.

Also change to:
1.4.51 100GBASE-R: An IEEE 802.3 family of Physical Layer devices using the physical coding sublayer defined in Clause 82, and in some cases the transcoding and FEC of Clause 91, for 100 Gb/s operation. (See IEEE Std 802.3, Clause 82 and Clause 82.)

Or we could revisit the PHY names, but it seems OK to have the three coding schemes with the same 3.125% overhead (64B/66B, KR FEC, 256b/257b) all use the same letter R.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See also #343 & #23

The point regarding 64B/66B is well made, but the changes to Clause 1.4.51 are not justifiable. Re-opening the PHY naming discussions may not be popular with the Task Force.

See #343 for the detailed wording.

Cl **80** *SC* **80.1.4** *P* **43** *L* **52** # 23

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **A**

The definition of 100GBASE-P only distinguishes itself from 100GBASE-R by changing "2-level pulse amplitude modulation (PAM)" to "multi-level pulse amplitude modulation (PAM)". Since multi-level includes 2, this seems inadequate.

SuggestedRemedy

Change 100GBASE-P to match the definition of 100GBASE-KP4 in 1.4:
"4-level pulse amplitude modulation (PAM)"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See also #343 & #449

The more generic wording may be useful in the future. Change "multi-level" to "more than 2 level" and also include the wording changes captured in #343.

Cl **80** *SC* **80.1.4** *P* **44** *L* **15** # 8

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

In Table 80-1 "33dB" and "35dB" should have a non-breaking space between the number and the unit.

SuggestedRemedy

Change "33dB" and "35dB" to "33 dB" and "35 dB" using non-breaking spaces (Ctrl space)

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.4** *P* **44** *L* **3** # 174

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The editing instruction says to add three rows, but does not say where in the table they should be added. This will make life difficult for subsequent amendments.

Currently the 40G PHYs come first and the 100G PHYs are listed in reach order:
CR10, SR10, LR4, ER4

SuggestedRemedy

Make the insertion points explicit and such to preserve reach order (for KR4 and KP4 use clause order):
KR4, KP4, CR4, CR10, SR10, LR4, ER4

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.5** *P* **44** *L* **22** # 176

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

Now that Table 80-2 has been split into two tables, the reference in 80.1.5 to this table needs to be modified to match.

SuggestedRemedy

Add text to change:
"Table 80-2 specifies the correlation between nomenclature and clauses." to:
"Table 80-2 and Table 80-2a specify the correlation between nomenclature and clauses."

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.5** *P* **44** *L* **27** # 9

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

A Replace editing instruction does not show the replaced object in strikeout

SuggestedRemedy

Remove the old version of Table 80-2 and change the editing instruction to match those used previously:
"Replace Table 80-2 and insert Table 80-2a as shown:"

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.5** *P* **45** *L* **35** # 175

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

In Table 80-2a under Clause 91 it says "BASE-R RS FEC" but Clause 91 refers to it as just "RS-FEC"

SuggestedRemedy

Change "BASE-R RS FEC" to "RS-FEC"

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.5** *P* **45** *L* **47** # 427

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A**

Make the document easier to use with consistent ordering.

SuggestedRemedy

Order Table 80-2a in the opposeite order to 78-5 priority resolution then short to long.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #173 justifies a different order

Cl **80** *SC* **80.1.5** *P* **45** *L* **8** # 173

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A**

Table 80-2 in IEEE Std 802.3-2012 was structured with the clauses along the top in clause order.
Now that it has been split into Tables 80-2 and 80-2a, clause 78 has been added out of order

Also, the PHYs were previously arranged in reach order

SuggestedRemedy

Change the order of the columns in Tables 80-2 and 80-2a to put 78 between 74 and 81

Change the order of the rows in Table 80-2a to preserve reach order (for KR4 and KP4 use clause order):
KR4, KP4, CR4, CR10, SR10, LR4, ER4

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.5** *P* **45** *L* **8** # 10

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The cell borders for Table 80-2 and Table 80-2a in the Nomenclature row are not consistent for clauses 78, 91, 93, 93 and 94

SuggestedRemedy

Change the right border in the Nomenclature row for clause 89 in Table 80-2 and the left and right borders in the Nomenclature row for clauses 91, 92 and 93 to be "very thin" in Table 80-2a

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.2.2** *P* **46** *L* **1** # 10022

Lusted, Kent — Intel

Comment Type **T** *Comment Status* **A** *bucket*

Spec references Clause 83 as the only PMA for a 100GBASE-R device.

see P802.3bh D3.1, sect6, page 62, line 53

SuggestedRemedy

Change ending of first sentence of first paragraph from "and the PMA specification defined in Clause 83." to be "and the PMA specification defined in Clause 83 or Clause 94."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to "and the PMA specifications defined in Clause 83 and Clause 94"

Change page & line references for D1.1

Cl **80** *SC* **80.2.3** *P* **46** *L* **11** # 431

Dawe, Piers — IPtronics

Comment Type **ER** *Comment Status* **R**

10PASS-TS, 1000BASE-PX10, 1000BASE-PX20, 10GBASE-PR-D, 10GBASE-PR-U and 10/1GBASE-PRX-D already use Reed-Solomon FEC, so we can't call this fourth kind "The Reed-Solomon FEC" or "Reed-Solomon Forward Error Correction (RS-FEC) sublayer". We need something distinctive. Also, we recognise RS as Reconciliation Sublayer.

SuggestedRemedy

Change its name to 256B/257B FEC, or Clause 91 FEC.

Response *Response Status* **C**

REJECT.

The naming used in Clause 91 was agreed by the TF. Using different terminology in this instance would introduce confusion. Within this context the use of Reed-Solomon FEC is unambiguous.

Cl **80** *SC* **80.3.1** *P* **46** *L* **44** # 70

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

The behavior of the LPI receive function needs to be redefined. A large number of specific changes will be required to achieve this in the manner proposed in the submitted presentatior This comment may be used as a reference should the proposed method be accepted, rejected or modified.

rx_mode needs to change direction, also energy_detect and rx_lpi_active need to be added.

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request
IS_ENERGY_DETECT.indication
IS_RX_LPI_ACTIVE.request

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.1** *P* **46** *L* **48** # 71

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fix the descriptions of the primitives.

SuggestedRemedy

Delete the 2nd sentence of paragraph, replace with:

The IS_RX_MODE.request primitive is used to communicate the state of the PCS LPI receive function to other sublayers. The IS_RX_LPI_ACTIVE.request primitive is used to communicate to the FEC that the PCS is using its receive LPI function. The IS_ENERGY_DETECT.indication primitive is used to communicate that the PMD has detected the return of energy on the interface following a period of quiescence.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **47** *L* **5** # 115

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change Fig 80-2 in the same way as 80-3.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **48** *L* **13** # 76

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3 - fix LPI interface between PCS & FEC

SuggestedRemedy

Between PCS & FEC:

Change direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indicate
Add FEC:IS_RX_LPI_ACTIVE.request

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **48** *L* **15** # 454

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **R**

KR FEC for 100GBASE-CR10 remains optional.

SuggestedRemedy

Change
NOTE 1-CONDITIONAL BASED ON PHY TYPE
to
NOTE 1-CONDITIONAL, OPTIONAL OR OMITTED DEPENDING ON PHY TYPE
Same in Figure 80-4 and Figure 80-5.
In figures 81-1 and 82-1, leave note 1 as base spec for 40G, create note 3 for 100G FEC:
NOTE 3-CONDITIONAL, OPTIONAL OR OMITTED DEPENDING ON PHY TYPE

Response *Response Status* **C**

REJECT.

Conditional covers optional or ommitted.

Cl **80** *SC* **80.3.2** *P* **48** *L* **21** # 77

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3 - fix LPI interface between FEC & PMA

SuggestedRemedy

Between FEC & PMA:

Change direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indicate

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **48** *L* **28** # 78

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3 - fix LPI interface between PMA(20:10) & PMA(10:n)

SuggestedRemedy

Between PMA(20:10) & PMA(10:n):

Change direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indicate

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **48** *L* **36** # 79

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3 - fix LPI interface between PMA & PMD

SuggestedRemedy

Between PMA & PMD:

Change direction FEC:IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **49** *L* **13** # 80

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3a - fix LPI interface between PCS & FEC

SuggestedRemedy

Between PCS & FEC:

Change direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indicate
Add FEC:IS_RX_LPI_ACTIVE.request

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **49** *L* **16** # 441

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **A**

The 256b/257b PCS/FEC sublayer is mandatory for 100GBASE-CR4/KR4/KP4 so no need for note 1 (compare Figure 80-5a).

SuggestedRemedy

Delete note 1. Also in Figure 91-1.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **49** *L* **21** # 129

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3a - fix LPI interface between FEC & PMA

SuggestedRemedy

Between FEC & PMA:

Change direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indicate

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.2** *P* **49** *L* **28** # 61

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fig 80-3a - fix LPI interface between PMA & PMD

SuggestedRemedy

Between PMA & PMD:

Change direction FEC:IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.4.1** *P* **47** *L* **23** # 430

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

The tx_mode parameter doesn't need eight values at most interfaces.

SuggestedRemedy

Change "one of eight values" to "one of up to eight values".

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.5** *P* **47** *L* **36** # 72

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Change rx_mode definition

SuggestedRemedy

Change title - IS_RX_MODE.request

Delete 1st sentence. Add:
The IS_RX_MODE.request primitive communicates the rx_mode parameter generated by the PCS LPI receive function to other sublayers.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.5** *P* **47** *L* **39** # 440

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **R**

Should this be simplified by combining IS_RX_MODE.indicate (should be IS_RX_MODE.indication) and IS_SIGNAL.indication?

SuggestedRemedy

?

Response *Response Status* **C**

REJECT.

The changes proposed in comment #70 redefine the operation of RX_MODE making such a combination impossible.

Cl **80** *SC* **80.3.3.5.1** *P* **47** *L* **44** # 73

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Change rx_mode direction

SuggestedRemedy

Change indicate to request

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.5.1** *P* **47** *L* **47** # 74

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

No ALERT for rx_mode

SuggestedRemedy

Delete ALERT.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.5.2** *P* **47** *L* **51** # 75

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Change origin of rx_mode

SuggestedRemedy

Change "received signal" to "PCS LPI receive function"

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.6** *P* **49** *L* **53** # 62

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need definitions for rx_lpi_active

SuggestedRemedy

Add subclause 80.3.3.6

80.3.3.6 IS_RX_LPI_ACTIVE.request
The IS_RX_LPI_ACTIVE.request primitive communicates to the FEC that the PCS LPI receive function is active. Without EEE capability, the primitive is never invoked and has no effect.

80.3.3.6.1 Semantics of the service primitive
IS_RX_LPI_ACTIVE.request(rx_lpi_active)

The parameter rx_lpi_active is boolean.

80.3.3.6.2 When generated
This primitive is generated by the PCS LPI receive function.

80.3.3.6.3 Effect of receipt
The specific effect of receipt of this primitive is defined by the FEC sublayer that receives this primitive. In general, when rx_lpi_active is true the FEC sublayer uses rapid block lock to reestablish FEC operation following a period of quiescence.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.3.3.7** *P* **49** *L* **54** # 63

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need definitions for energy_detect

SuggestedRemedy

Add subclause 80.3.3.7

80.3.3.7 IS_ENERGY_DETECT.indicate
The IS_ENERGY_DETECT.indicate primitive is used to communicate that the PMD has detected the return of energy on the interface following a period of quiescence.. Without EEE capability, the primitive is never invoked and has no effect.

80.3.3.7.1 Semantics of the service primitive
IS_ENERGY_DETECT.indicate(energy_detect)

The parameter energy_detect is boolean.

80.3.3.7.2 When generated
This primitive is generated by the PMA, reflecting the state of the signal_detect parameter received from the PMD.

80.3.3.7.3 Effect of receipt
The specific effect of receipt of this primitive is defined by the PCS sublayer that receives this primitive. This parameter is used to indicate that activity has returned on the interface following a period of quiescence.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.4** *P* **50** *L* **20** # 179

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

Table 80-3 Footnotes a and b were modified by comment resolution on D3.1 of the revision project. In both cases, "Note that" was removed from the footnotes.

SuggestedRemedy

Modify the base version of Table 80-3 footnotes a and b to match the recently approved IEEE Std 802.3-2012 by removing "Note that"

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.4** *P* **50** *L* **20** # 435

Dawe, Piers — IPtronics

Comment Type **ER** *Comment Status* **A** *bucket*

Bringing this draft in line with 802.3bh/D3.2 (soon to be 802.3-2012).

SuggestedRemedy

Delete "Note that" twice.
Update "an amendment of IEEE Std 802.3-201X. Draft D3.1" on page 1 line 32 to D3.2, then to IEEE Std 802.3-2012 when available.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.4** *P* **50** *L* **3** # 178

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A**

The editing instruction says to add four rows, but does not say where in the table they should be added. This will make life difficult for subsequent amendments.

Currently the 40G layers come first and the 100G layers are listed stack, then in reach order: CR10, SR10, LR4, ER4

SuggestedRemedy

Make the insertion points explicit and such to preserve existing order (for KR4 and KP4 use clause order):
MAC&RS&MC, PCS, BASE-R FEC, RS-FEC, PMA, KR4, KP4, CR4, CR10, SR10, LR4, ER4

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.7** *P* **54** *L* **1** # 181

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

The title of 80.7 is "Protocol implementation conformance statement (PICS) proforma" not as shown in D1.1: "Protocol implementation conformance statement (PICS) proforma for Clause 80, Introduction to 40 Gb/s and 100 Gb/s networks"

Clause 80 does not have a PICS proforma so the editor's note: "The PICS proforma will be updated when the content of this clause stabilizes." is inappropriate

SuggestedRemedy

Correct the title of 80.7 including removing the copyright release footnote.
Remove the editor's note.

Response *Response Status* **C**

ACCEPT.

Cl **81** *SC* **81.1** *P* **55** *L* **22** # 329

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **R**

Figure 81-1

NOTE 1 will now be the same as NOTE 2

SuggestedRemedy

Delete NOTE 2 and change all references to be NOTE 1

Response *Response Status* **C**

REJECT.

Although the comment is correct, the consolidation of the 2 notes may be more easily achieved during the revision.

Cl **81** *SC* **81.1** *P* **55** *L* **28** # 116

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change CGMII to XLGMII and CGMII

Response *Response Status* **C**

ACCEPT.

Cl **81** *SC* **81.1.5** *P* **55** *L* **28** # 330

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A** *40G*

Bullet point g) does not include XLGMII

SuggestedRemedy

Change "The CGMII may" to "The XLGMII/CGMII may"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to "The XLGMII and CGMII may" - see comment #116

Cl **81** *SC* **81.1.7** *P* **55** *L* **39** # 24

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

This says "as described in 22.6a", but 22.6a does not exist

SuggestedRemedy

Correct the reference

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to 22.7

Cl **81** *SC* **81.3.4** *P* **58** *L* **32** # 499

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **R** *late*

If when a cable is disconnected, a PHY sublayer indicates Local Fault, this forces the PHY to come out of LPI, consume more power, and blast out EMI (if a copper PHY) while transmitting RF (pun intended), "continuously". For ever?
Or will some PHY types give up after a while and go back to AN DME?
I looked in the base spec but could not see if a normal loss of signal event because a cable is disconnected or the far transmitter is shut down counts as "local fault" or not. Where is this made clear?

SuggestedRemedy

It looks like we may want coding for "low power remote fault".

Response *Response Status* **C**

REJECT.

The local and remote fault behavior is unchanged from the current standard. Since this should be an unusual circumstance it is not useful to optimize EEE behavior for this. An energy (or RF) conscious system implementer might take notice of internal alarms following an error condition and minimize wasted energy (or RF pollution) accordingly.

Cl **81** *SC* **81.3.4** *P* **58** *L* **33** # 333

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **R**

Prior to transmitting LF, the RS could be sending MAC data, LPI, or Idle. After receiving faults the device could go back to sending MAC data, LPI, or Idle.

SuggestedRemedy

Change "When this Local Fault status reaches an RS, the RS stops sending MAC data or LPI," to "When this Local Fault status reaches an RS, the RS stops sending MAC data, LPI, or Idle,"

Change "When the RS no longer receives fault status messages, it returns to normal operation, sending MAC data or LPI." to "When the RS no longer receives fault status messages, it returns to normal operation, sending MAC data, LPI, or Idle."

Response *Response Status* **C**

REJECT.

In the base standard for all RS clauses, the term "MAC data" is used to cover whatever is being sent from the MAC - payload data, IFG, etc. That is why it states that a MAC frame "may" be truncated.

Cl **81** *SC* **81.3a** *P* **59** *L* **10** # 160

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **A** *40G*

With the addition of 40GBASE-KR4 and 40GBASE-CR4 optional support for EEE, references to CGMII and CAUI in this subclause should also refer to XLGMII and XLAUI

SuggestedRemedy

Change "CGMII" to "XLGMII/CGMII" in:
Page 59 lines 10,12
Page 61 lines 32,33

Change "CAUI" to "XLAUI/CAUI" in:
Page 60 line 43
Page 61 lines 37,38

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Instead of XLGMII/CGMII, use XLGMII and CGMII

Instead of XLAUI/CAUI, use XLAUI and CAUI

Cl **81** *SC* **81.3a** *P* **59** *L* **35** # 11

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The formatting of the text below Figure 81-9a is not usual (the left margin is indented)

SuggestedRemedy

Correct the formatting

Response *Response Status* **C**

ACCEPT.

Cl **81** *SC* **81.3a.1** *P* **60** *L* **2** # 442

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A** *bucket*

Wrong AN clause!

SuggestedRemedy

Change 28.2.6.1.1 to the correct reference.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to 73.9.1.1

Cl **81** *SC* **81.3a.2** *P* **60** *L* **10** # 497

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

Should this be CARRIER_SENSE.indication or PLS_CARRIER.indication or what?

SuggestedRemedy

?

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

PLS_CARRIER.indication(CARRIER_STATUS)

Cl **81** *SC* **81.3a.2.1** *P* **60** *L* **43** # 334

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A** *40G*

tw_timer only references the CAUI.

SuggestedRemedy

Add XLAUI to the definition

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change CAUI to XLAUI and CAUI

Cl **81** *SC* **81.3a.3.1** *P* **61** *L* # 118

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change CAUI to XLAUI and CAUI - 2 locations.

Response *Response Status* **C**

ACCEPT.

Cl **81** *SC* **81.3a.3.1** *P* **61** *L* **29** # 335

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A**

This subclause only references the CGMII and the CAUI

SuggestedRemedy

Add references to the XLGMII and the XLAUI

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Resolved by #117 & #118

Cl **81** *SC* **81.3a.3.1** *P* **61** *L* **31** # 117

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Change CGMII to XLGMII and CGMII - 2 locations.

Response *Response Status* **C**

ACCEPT.

Cl **81** *SC* **81.3a-2** *P* **61** *L* **8** # 336

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **A** *bucket*

Figure 81-10a

There is a period after "LPI_REQUEST=ASSERT" that should not be there

SuggestedRemedy

Remove the period

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **18.2.18.2.3** *P* **69** *L* **44** # 185

Slavick, Jeff — Avago Technologies

Comment Type **E** *Comment Status* **A** *bucket*

/LI/ should just be included in the list of control characters that don't map to a C vector.

SuggestedRemedy

Change a) to be

a) Eight valid control characters other than /O/,/S/,/T/,/LI/, and /E/;

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82** *P* **65** *L* **34** # 192

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A** *bucket*

Figure 82-2 is missing indication that the tx_mode and rx_mode are optional

SuggestedRemedy

Added an indication in Figure 82-2 that inst.*_MODE.* are only required if EEE is supported

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82** *P* **80** *L* **10** # 202

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **R**

Figure 82-17 LPI Receive state diagram. There is no need to have a RX_TIMER state since the self loop from RX_SLEEP -> RX_SLEEP changes nothing.

SuggestedRemedy

Remove the RX_TIMER state and move the actions of RX_TIMER into RX_SLEEP. Remove the loop from RX_SLEEP -> RX_SLEEP.

In clause 49 there is a self loop of RX_SLEEP -> RX_SLEEP which causes the rx_tq_timer tc restart continously until you begin to see data leave. So leaving the RX_SLEEP -> RX_SLEEP loop in place is an option.

Response *Response Status* **C**

REJECT.

The extra state was added to avoid the continual restarting of the timer (which would make it redundant). See comment #184 in D1.0.

Cl **82** *SC* **82** *P* **80** *L* **8** # 203

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Figure 82-17 LPI Receive state diagram. The transiton from RX_ACTIVE -> RX_TIMER requires that block_lock * rx_block_lock * R_TYPE(rx_coded) = LI. The transition from RX_ACTIVE -> RX_ACTIVE occurs when block_lock != rx_block_lock and align_status != rx_align_status. rx_align_status has to wait for all PCS lanes to achieve rx_block_lock before it can deskew and be set to true. I believe we want remain in RX_ACTIVE until we're aligned and receiving LI blocks.

SuggestedRemedy

Change the transition from RX_ACTIVE -> RX_TIMER to be:
align_status * rx_block_lock * R_TYPE(rx_coded) = LI

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Since rx_align_status takes into account the block_lock for all PCS lanes, it is more efficient t make the transition:

align_status * rx_align_status * R_TYPE(rx_coded) = LI

Cl **82** *SC* **82.1.3** *P* **63** *L* **27** # 337

Estes, Dave — UNH - IOL

Comment Type **E** *Comment Status* **R**

Figure 82-1

NOTE 1 will now be the same as NOTE 2

SuggestedRemedy

Delete NOTE 2 and change all references to be NOTE 1

Response *Response Status* **C**

REJECT.

Although the comment is correct, the consolidation of the 2 notes may be more easily achieved during the revision.

Cl **82** *SC* **82.1.5** *P* **65** *L* **33** # 64

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to fix block diag

SuggestedRemedy

Change direction inst:IS_RX_MODE.request
Add inst:IS_ENERGY_DETECT.indicate
Add inst:IS_RX_LPI_ACTIVE.request

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.12** *P* **67** *L* **26** # 409

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

In 802.3bh, sub-clause 82-2.12, the tolerable skew for the 100GBASE-R PCS is specified to be 180 ns (~1856 bits). Since the FEC re-aligns the PCS lanes, the only skew tolerance is required to account for potentially one or two CAUI interfaces between the FEC and the PCS. The required skew tolerance is therefore around 150 UI. The incumbent requirement for 1856 UI is overkill by a factor of 10.

SuggestedRemedy

Add a new specification for a PCS operating in 100GBASE-CR4, 100GBASEKR4, or a 100GBASE-KP4 PHY specifying a skew tolerance of 150 UI.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This is addressed in comment #26. It requires changes to fig 80-5a as well as 82.2.12.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **1** # 65

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *bucket*

rx_block_lock is defined for each lane.

SuggestedRemedy

Change rx_block_lock to rx_block_lock<x>

Add "for each lane" at the end of the first sentence.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **12** # 81

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to add definition for energy_detect

SuggestedRemedy

Add energy detect:

A parameter generated by the PMA/PMD sublayer to reflect the state of the received signal .In the PMD this has the same definition as parameter signal_detect and is passed through without modification by the PMA (and FEC).

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **15** # 119

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then LPI_FW variable will capture the behavior.

SuggestedRemedy

Change "and false otherwise" to "and false when the transmitter is to use the optional normal wake mechanism"

Add a second sentence "This variable defaults true and may only be set to false if the optiona normal wake mode is supported. "

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **16** # 346
Estes, Dave UNH - IOL

Comment Type **T** *Comment Status* **A**

The possible values for received_tx_mode are not defined

SuggestedRemedy

Define the possible values for received_tx_mode

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Define the possible values to be the same as for tx_mode - i.e.

The value of this variable is inferred from the coding of the RAMs of the incoming data stream and may take the values defined for tx_mode.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **29** # 338
Estes, Dave UNH - IOL

Comment Type **E** *Comment Status* **A** *LPI Rx*

There are three possible values for rx_mode

SuggestedRemedy

Change "four values" to "three values"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #82 reduces this to two values.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **30** # 82
Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to change definition for rx_mode

SuggestedRemedy

Change definition to:

A variable reflecting the state of the LPI receive function as described by the LPI receive state diagram (Fig 82-17). The parameter has one of two values DATA and QUIET.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **31** # 184
Slavick, Jeff Avago Technologies

Comment Type **E** *Comment Status* **A** *LPI Rx*

Text states rx_mode is one of four values, but only 3 are listed.

SuggestedRemedy

Change the word four to three.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

#82 changes definition to only two modes.

Cl **82** *SC* **82.2.18.2.2** *P* **68** *L* **41** # 339
Estes, Dave UNH - IOL

Comment Type **E** *Comment Status* **A** *bucket*

The sentence is not gramatically correct

SuggestedRemedy

Change "When tx_mode is set to QUIET sublayer may go into a low power state" to "When tx_mode is set to QUIET the sublayer may go into a low power state"

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.3** *P* **69** *L* **18** # 12
Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

This says "a block type field of 0x1e" but the rest of this subclause formats Hex characters using upper case letters

SuggestedRemedy

Change to "a block type field of 0x1E"

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.3** *P* **69** *L* **18** # 149

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

Capitalization of hexadecimals should be consistent with previous instances.

SuggestedRemedy

Change "0x1e" to "0x1E".

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.3** *P* **69** *L* **27** # 340

Estes, Dave UNH - IOL

Comment Type **E** *Comment Status* **A** *bucket*

The sentence is not gramatically correct

SuggestedRemedy

Remove the comma to make the sentence "Note: A PCS that does not support EEE classifies vectors containing one or more /LI/ control characters as type E."

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.3** *P* **70** *L* **5** # 341

Estes, Dave UNH - IOL

Comment Type **E** *Comment Status* **A** *bucket*

The sentence is not gramatically correct

SuggestedRemedy

Remove the comma to make the sentence "Note: A PCS that does not support EEE classifies vectors containing one or more /LI/ control characters as type E.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.2.3.1** *P* **71** *L* **36** # 188

Slavick, Jeff Avago Technologies

Comment Type **T** *Comment Status* **R**

In Table 82-5a tx_mode is set to SLEEP in the sleep state.

SuggestedRemedy

Change the Tsl descriptions to be:
Local Sleep Time when entering the TX_SLEEP state and LPI_FW=FALSE
and
Local Sleep Time when entering the TX_SLEEP state and LPI_FW=TRUE

Response *Response Status* **C**

REJECT.

The parameter description is couched in terms of the time from <event> to <event> - and is correct in those terms.

Cl **82** *SC* **82.2.18.2.5** *P* **70** *L* **32** # 342

Estes, Dave UNH - IOL

Comment Type **E** *Comment Status* **A** *bucket*

All timers in this sublause reference a variable called [timer name]_done, however the reference to this variable is gramatically incorrect.

SuggestedRemedy

remove the "the" prior to [timer name]_done. For example, line 38 should end with "it will set one_us_timer_done=true."

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **71** *L* **28** # 13

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The references "TABLE 82-5a" and "TABLE 82-5b" should be "Table 82-5a" and "Table 82-5b"

SuggestedRemedy

Change "TABLE" to "Table" in two places

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **72** *L* **5** # 83

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to change the timing reference in Table 82-5b.

SuggestedRemedy

Change "rx_mode to be set to ALERT or DATA" to "energy_detect to be set to true"

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **79** *L* **40** # 191

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Time spent in TX_WAKE does not allow for all RAMs to be sent for all data rates.

Twl when LPI_FW = TRUE is 240ns minimum
100G-KR4 inserts 1 RAM every other FEC frame and each FEC frame takes 52ns to transmit. This means the minimum time for Twl needs to be 312ns to guarantee you can send 3 RAMs.
100G-CR10 and 40G-CR4 send 36 66b blocks in 240ns, but 100G-CR10 has to share a PMD lane over two PCS lanes, so that means 18 66b blocks. So 100G-CR10 requires 24 66b blocks to insert 3 RAMs which is 307.2ns

Twl when LPI_FW = FALSE is 3.9us minimum
For 100G-KR4 that's 75 FEC frames, so a maximum of 37 RAMs
100G-CR4 it's 9 FEC frames, so a maximum of 36
40G-CR4 it's 19 FEC frames, so a maximum of 76

SuggestedRemedy

Change the value in Table 82-5a for Twl when LPI_FW = TRUE to be 312ns minimum, 332ns maximum
Change down_count value used when LPI_FW = FALSE in TX_WAKE state(s) to be 36

Response *Response Status* **C**

ACCEPT.

Note that this will increase the fast wake time from the value proposed in the baseline. An alternative approach might be to force the PCS to send a RAM immediately after entry into the WAKE state (causing the LP PCS to require a small resynchronization).

Cl **82** *SC* **82.2.18.3.1** *P* **80** *L* # 84

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to add rx_mode assignments in Rx LPI state diagram - Fig 82-17.

SuggestedRemedy

In state RX_ACTIVE, assign rx_mode = DATA

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **80** *L* **16** # 87

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to change state transition conditions in Rx LPI state diagram - Fig 82-17.

SuggestedRemedy

Transitions:

RX_SLEEP > RX_SLEEP; RX_SLEEP > RX_ACTIVE - replace rx_mode = DATA with rx_align_status
RX_SLEEP > RX_QUIET - replace rx_mode = QUIET with !rx_align_status
RX_QUIET > RX_LINK_FAIL - replace rx_mode = QUIET with !energy_detect
RX_QUIET > RX_WAKE - replace rx_mode != QUIET with energy_detect
RX_WAKE > RX_TIMER; RX_WAKE > RX_ACTIVE - replace rx_mode = DATA with rx_align_status
RX_WTF > RX_TIMER; RX_WTF > RX_ACTIVE - replace rx_mode = DATA with rx_align_status

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **80** *L* **25** # 85

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to add rx_mode assignments in Rx LPI state diagram - Fig 82-17.

SuggestedRemedy

In state RX_QUIET, assign rx_mode = QUIET

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **80** *L* **32** # 86

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Need to add rx_mode assignments in Rx LPI state diagram - Fig 82-17.

SuggestedRemedy

In state RX_WAKE, assign rx_mode = DATA

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.3.6** *P* **65** *L* **48** # 223

Gustlin, Mark — Xilinx

Comment Type **T** *Comment Status* **A** *40G*

Since the assumed scope is 40GE also, change:
"when LPI control characters are received from the CGMII."
to
"when LPI control characters are received from the CGMII or XLGMII."

SuggestedRemedy

Per comment.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.8a** *P* **66** *L* **11** # 195

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

No definition for how to transition from normal AM to RAM.

SuggestedRemedy

Add a sentance that states the following to 82.2.8a

"After the LPI transmit state machine transitions from TX_ACTIVE to TX_SLEEP the first RAM is inserted into a continuous stream of LPI blocks after PCSL0 has sent an LPI block and the low two bits of am_counter equal 3"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The am_counter is used by the receiver, not the transmitter. However, in order for the RAMs to coincide with the start of an FEC block, the distance between the last normal AM and the first RAM must be a multiple of 4.

Change to:
"After the LPI Transmit state diagram transitions from TX_ACTIVE to TX_SLEEP, the first RAM shall be inserted after at least one block of /LI/ has been transmitted on PCS lane 0. In order to force the RAMs to coincide with the start of an FEC block, the distance between the first RAM and preceding normal alignment marker shall be a multiple of 4 66-bit blocks."

Cl **82** *SC* **82.2.8a** *P* **66** *L* **14** # 194

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Figure 82-9a.
down_count is decremented each time you send a RAM and the down_count_done variable is set true when the count reaches 0. Therefore the last RAM transmitted is sent with a down_count = 1.

SuggestedRemedy

Change down_count = 1 and down_count = 0 to down_count = 2 and down_count = 1 in Figure 82-9a.

If a path from TX_SLEEP to TX_ACTIVE is added in the LPI transmit state machine, then the change listed above is not correct. The change would then be to change the references to RAM and last RAM since the last RAM you send in TX_SLEEP would have a down_count value of 255 when going from TX_SLEEP to TX_ACTIVE.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the down_count as suggested. A path from TX_SLEEP to TX_ACTIVE should not be added as the link partner will always require the wake sequence in order to re-align its PCS function.

Cl **82** *SC* **82.2.8a** *P* **66** *L* **15** # 224

Gustlin, Mark — Xilinx

Comment Type **T** *Comment Status* **A**

Figure 82.9a is meant to show the blocks being transmitted form right to left, with the small block being the sync header (sync header is sent first). But in this context, the transition from RAMs to normal AMs is backwards, the normal AMs should be to the left of the RAMs with the countdown being reversed.

SuggestedRemedy

Fix the figure to be consistent with the sync header being transmitted first and the transition to normal AMs being after RAMs.

Response *Response Status* **C**

ACCEPT.

Normal AM left-most; 16383 blocks; then down_count = 0; etc.

Cl **82** *SC* **82.2.8a** *P* **66** *L* **43** # 227

Gustlin, Mark — Xilinx

Comment Type **T** *Comment Status* **A** *40G*

In this paragraph table 82-2 is talked about for 100GE, but since we are also assuming for now that 40GE is also in scope for EEE, please add in referecnes to table 82-3 for 40GE encoding of AMs.

SuggestedRemedy

Per the comment.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.8a** *P* **66** *L* **5** # 187

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **R**

The first bit of data sent after the ALERT state is exited should be a RAM. This is desired since both FEC modules need to align the RAM as the first chunk of data in the FEC frame.

SuggestedRemedy

Add text to 82.2.8a stating that no alignment markers are sent during the QUIET and ALERT states. Remove count_down assignments in Figure 82-16 for those states. Add text to 82.2.8a stating that a RAM shall be the first block sent on each PCS lane when the ALERT state is exited.

Response *Response Status* **C**

REJECT.

Sending count_down assignments corresponding to QUIET and ALERT is useful for a detached FEC/PMA/PMD device that could use those values to infer the state of tx_mode.

The PCS does not cease sending RAMs (or scrambled LPI blocks) during QUIET and ALERT. Comment #68 enforces the alignment of RAMs with FEC blocks.

Cl **82** *SC* **82.2.8a** *P* **66** *L* **8** # 193

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A** *40G*

40G runs the PCS lanes at twice the frequency as 100G. So the number of RAMs inserted by a 40G PCS for a given time duration is twice that of the 100G PCS. Since we want RAMs to be sent for the entire duration of the TX_WAKE state to allow for cascaded alignment machines (FEC & PCS) to both see RAMs we need to compensate for this.

SuggestedRemedy

Change the frequency at which RAMs are inserted by a 40G PCS to match that of the 100G PCS by changing the following sentence:
"The RAMs shall be inserted after every 7 66-bit blocks on each PCS lane."
to
"The RAMs shall be inserted after every 7 66-bit blocks on each 100G PCS lane and every 15 66-bit block on each 40G PCS lane."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the frequency at which RAMs are inserted by a 40G PCS to match that of the 100G PCS by changing the following sentence:
"The RAMs shall be inserted after every 7 66-bit blocks on each PCS lane."
to
"The RAMs shall be inserted after every 7 66-bit blocks on each 100G PCS lane and every 15 66-bit blocks on each 40G PCS lane."

Cl **82** *SC* **82.2.8a** *P* **67** *L* **2** # 200

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

The last RAM sent in the WAKE state is sent with a down_count value of 1. So the example values listed are incorrect.

SuggestedRemedy

Change
(therefore the last 5 RAMs on PCS lane 0 would have CD3 values: 0xC5, 0xC2, 0xC3, 0xC0, 0xC1; for PCS lane 1 these would be: 0x99, 0x9E, 0x9F, 0x9C, 0x9D).
To
(therefore the last 5 RAMs sent by a 100GBASE-R PCS on PCS lane 0 would have CD3 values: 0xC4, 0xC5, 0xC2, 0xC3, 0xC0; for PCS lane 1 these would be: 0x98, 0x99, 0x9E, 0x9F, 0x9C).

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.8a** *P* **67** *L* **5** # 455

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

"The CD field ... may also be used by a detached transmit PMA sublayer to infer the state of the PCS."
Not!
If a PMA could do understand RAMs, it would be a PCS. Far too complicated.

SuggestedRemedy

I don't know if there is a remedy apart from use fast EEE, not slow EEE, so this PMA doesn't need to know.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

There is no requirement for a PMA to understand RAMs, however it is a possibility that producers of modules or silicon may wish to use. With the modifications to EEE optionality, it is made clear that PMA implementations do not necessarily need to modify their behavior to support EEE. The most likely case where a detached sublayer might wish to infer tx_mode from the RAMs would be the case of a detached FEC/PMA/PMD - where the FEC would easily be able to decode RAMs.

Change "may also be used by a detached transmit PMA sublayer to infer the state of the PCS."

To "may also be used by a device with a detached PMA or FEC sublayer to infer the state of the PCS."

Cl **82** *SC* **82.2.8a** *P* **67** *L* **7** # 228

Gustlin, Mark — Xilinx

Comment Type **T** *Comment Status* **A**

I think it would be good to clarify this statement:
"BIP statistics are only updated when the receiver is in the DATA state."
It only applies to when EEE is being supported, and here the recevier means the rx_mode of the LPI state machine?

SuggestedRemedy

Per the comment, add additional text to clarify this statement.
Add in that it applies only when EEE is supported and it refers to the LPI RX SM.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #345 addresses the reference to LPI Rx s/m.

Add "If the EEE capability is supported," at the beginning of the sentence.

Cl **82** *SC* **82.2.8a** *P* **67** *L* **7** # 345

Estes, Dave — UNH - IOL

Comment Type **T** *Comment Status* **A** *bucket*

The Data state does not exist in the Figure 82-15 Receive State Diagram or Figure 82-17 LPI Receive State Diagram

SuggestedRemedy

Change this to the RX_ACTIVE state and reference Figure 82-17

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.8a** *P* **66** *L* **10** # 214

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **R**

The use of count down to communicate the tx_mode should be an optional extension

SuggestedRemedy

Change:
The count down field is also used to communicate
some of the states of the tx_mode when it is not being used to coordinate the transition
To:
The count down field may also be used to communicate some of the states of the tx_mode when it is not being used to coordinate the transition

Response *Response Status* **C**

REJECT.

The link partner uses the count down field in received RAMs to derive received_tx_mode

Cl **82** *SC* **82.2.8a** *P* **67** *L* **8** # 215

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A**

It is not clear if BIP should be calculated from the last RAM to the first normal AM or should the first BIP be calculated from the first "normal" AM to the second normal AM?

SuggestedRemedy

Add the following text -
The BIP statistics will be first update when transitioning from RAMs to normal AMs on the second received normal AM

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add the following text -
The BIP statistics will be first updated after transitioning from RAMs to normal AMs on the firs received normal AM

Cl **82** *SC* **82.3.1.** *P* **72** *L* **25** # 456

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *EEE option*

1. Need to be able to switch EEE on or off.
2. For 40G/100G, fast wake should be the first kind of EEE. So, need second variable to allow slow EEE mode.

SuggestedRemedy

Replace this variable and bit with two, one to enable EEE (which will enable the "slow" or "electrical idle" mode, and a second to enable the "fast" mode.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

1) There is no need to "switch EEE on or off" in the PHY. For all speeds, EEE is negotiated and then controlled from the RS. If EEE support is not negotiated then the RS is prohibited from asserting LPI.

2) If the optional behavior proposed in comment #96 is accepted then LPI_FW selects between normal and fast wake operation. The default for LPI_FW is true.

Cl **82** *SC* **82.6** *P* **72** *L* **48** # 14

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The editing instruction "Change 82.6 to add new PHY types (per Marris_01_0312.pdf)" can now have the "(per Marris_01_0312.pdf)" removed

SuggestedRemedy

Remove "(per Marris_01_0312.pdf)"

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.7.6.6** *P* **82** *L* **11** # 121

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *bucket*

The numbering of the table items is unusual.

SuggestedRemedy

Number the items in a simple sequence, starting with LPI-01.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.7.6.6** *P* **82** *L* **6** # 120

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then the PICS must reflect this.

SuggestedRemedy

Add row (1st in table):

LP-01 : Support for both wake modes : 82.2.18.2.2 : Variable LPI_FW may be true or false : LPI:O

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82-16** *P* **79** *L* # 217

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A** *EEE FEC*

The 100GBASE-CR10, 40GBASE-CR4 and 40GBASE-KR4 PHYs may have CL74 FEC enabled. Since for the CL74 doesn't have any requirement on the position of the alignment markers with respect to the FEC block the RAMs are not sufficient to acquire fast FEC lock and scrambler bypass is required in a similar way as for 802.3az.

During the scrambler bypass state the RAMs should be disable to allow for only LPI or Idles t be sent, this can be done by setting down_count_done to TRUE in the scrambler bypass stat as in the suggested remedy or by editing 82.2.8a from: LPI transmit states other than TX_ACTIVE or TX_SCR_BYPASS and down_count_done = FALSE

The change should only be applicable for non FW mode

SuggestedRemedy

Add a new Boolean variables - scr_baypass_enable and scr_bypass. Should use the same description as in 802.3az.
After TX wake add 2 more states - TX_CRS_BYPASS, TX_DESKEW
The transition to TX_CRS_BYPASS should be: LPI_FW = FALSE * tx_tw_timer_done * scr_bypass_enable.
The transition from TX_CRS_BYPASS to TX_DESKEW should be - one_us_timer_done
For the 2 arcs from TX_WAKE to TX_ACTIVE and TX_SLEEP should add "* (!scr_bypass_enable + LPI_FW = TRUE)"
There should be 2 arcs from TX_DESKEW: 1) one_us_timer_done*T_TYPE(tx_raw) = LI - go to TX_SLEEP. 2) one_us_timer_done*T_TYPE(tx_raw) != LI - go to TX_ACTIVE

TX_SCR_BYPASS should have the following content:
scrambler_bypass <= true
Start one_us_timer
timerdown_count_enable <= FALSE
down_count <= 20
down_count_done = TRUE

TX_DESKEW should have the following content:
scrambler_bypass <= true
Start one_us_timer
timerdown_count_enable <= TRUE
down_count <= 19
down_count_done = FALSE

Also table 78-4 will need to add for the 100GBASE-CR10, 40GBASE-CR4 and 40GBASE-KR4 2 cases for the timing in the Normal wake mode

Need to add new TX_MODE - SCR_BAYPASS and TX_DESKEW:80.3.3.4.1 page 47, 85.2 page 87

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment is valid, however the proposed remedy does not adequately cater for the requirements of the FEC rapid lock and the lane deskew of the PCS.

The commenter and other interested people will work to produce a more complete solution and propose it for the next draft.

Add new Boolean variables - scr_bypass_enable and scr_bypass. Use the same description as in 802.3az.

Also table 78-4 will need to add for the 100GBASE-CR10, 40GBASE-CR4 and 40GBASE-KR4, 2 cases for the timing in the Normal wake mode (with and without Cl. 74 FEC).

Cl **83** *SC* **83** *P* **83** *L* **51** # 123

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMA only needs to support the option.

SuggestedRemedy

After "optional Energy Efficient Ethernet (EEE) capability" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.1.1** *P* **83** *L* **23** # 177

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The editing instruction says: "Change the first paragraph of 83.3 as follows:" but it is 83.1.1 that is being modified.

SuggestedRemedy

Change the editing instruction to: "Change the first paragraph of 83.1.1 as follows:"

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.1.1** *P* **83** *L* **31** # 221

Marris, Arthur Cadence

Comment Type **T** *Comment Status* **A** *bucket*

"The 40GBASE-R PMA(s) can support any of the 40 Gb/s PMDs in Table 80-2, except 100GBASE-KP4 (Clause 94)" is a truism.

SuggestedRemedy

Perhaps:
"The 100GBASE-R PMA(s) can support any of the 100 Gb/s PMDs in Table 80-2a, except 100GBASE-KP4 (Clause 94)"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Move ", except 100GBASE-KP4 (Clause 94)" to the following sentence so that it reads as in the suggested remedy.

Cl **83** *SC* **83.1.1** *P* **83** *L* **31** # 154

Ran, Adee Intel

Comment Type **ER** *Comment Status* **A** *bucket*

Following the split of table 80-2 into two tables, it no longer lists 100 Gb/s PMDs.

100GBASE-KP4 is a 100 Gb/s rather than 40 Gb/s PMD and the comment excluding it should refer to table 80-2a.

SuggestedRemedy

Move ", except 100GBASE-KP4 (Clause 94)" one sentence ahead (line 32).

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.1.1** *P* **83** *L* **32** # 25

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **A** *bucket*

This says "The 40GBASE-R PMA(s) can support any of the 40 Gb/s PMDs in Table 80-2, except 100GBASE-KP4 (Clause 94)." but 100GBASE-KP4 is not a 40 Gb/s PMD. It appears that this exception should be applied to the end of the next sentence.

SuggestedRemedy

Move ", except 100GBASE-KP4 (Clause 94)" to immediately after "Table 80-2a"

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.3** *P* **83** *L* **40** # 122

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMA only needs to support the option.

SuggestedRemedy

After "optional Energy Efficient Ethernet (EEE) capability" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.3** *P* **83** *L* **44** # 88

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

rx_mode needs to change direction, also energy_detect needs to be added.

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request
IS_ENERGY_DETECT.indication

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.3** *P* **83** *L* **48** # 89

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fix the descriptions of the primitives.

SuggestedRemedy

Delete 2nd sentence.

Add:
The IS_RX_MODE.request primitive is used to communicate the state of the PCS LPI receive function to other sublayers. The IS_ENERGY_DETECT.indication primitive is used to communicate that the PMD has detected the return of energy on the interface following a period of quiescence.

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.7.3** *P* **85** *L* **12** # 124

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMA only needs to support the option.

SuggestedRemedy

After "Implementation of LPI" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **83A** *SC* **83A.3.2a** *P* **202** *L* **28** # 67

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then XLAUI/CAUI only needs to support the option.

SuggestedRemedy

After "optional Energy Efficient Ethernet (EEE) capability" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **83A** *SC* **83A.3.4.7** *P* **203** *L* **32** # 494

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *late EEE option*

"The global energy detect function is mandatory for EEE capability": only for slow EEE, and then only if this CAUI supports slow EEE ("for" is ambiguous).

Is it possible for a CAUI that doesn't support slow-mode EEE to allow a PMD that does, to use it?

SuggestedRemedy

Change to
The global energy detect function is mandatory for a PMA connected to a CAUI that supports slow-mode EEE capability.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In keeping with other comments change to:

The global energy detect function is mandatory for EEE capability with the normal wake mode option and XLAUI/CAUI shutdown

---

Cl **83C** *SC* **83C** *P* **205** *L* **8** # 18

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The text "The following subclauses provide various partitioning examples. Partitioning guidelines and MMD numbering conventions are described in 83.1.4." is not being modified so it should not be shown.

SuggestedRemedy

Remove the sentence.

Response *Response Status* **C**

ACCEPT.

Cl **84** *SC* **84** *P* **86** *L* **20** # 90

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *40G*

Following the decision to include all 40/100 PHYs...

SuggestedRemedy

Make all the changes to 84 that match the equivalent changes in Clause 85

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.1** *P* **87** *L* **33** # 125

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMD only needs to support the option.

SuggestedRemedy

After "optional Energy Efficient Ethernet (EEE) capability" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.1** *P* **87** *L* **33** # 457

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *EEE option*

1. This is the PMD clause. If you want descriptive text about PHYs as a whole, look at Clause 80.
2. If a PHY has fast mode EEE, it doesn't concern the PMD. Only the slow mode does.
3. We should be able to give a more specific reference, to slow mode LPI.

Wordsmithing attempt below: there may be better official names for fast and slow modes.

SuggestedRemedy

Change
A 100GBASE-CR10 PHY with the optional Energy Efficient Ethernet (EEE) capability may optionally enter the Low Power Idle (LPI) mode to conserve energy during periods of low link utilization (see Clause 78).
to
A 100GBASE-CR10 PMD with the Energy Efficient Ethernet (EEE) slow mode optional capability may optionally enter the slow Low Power Idle (LPI) mode to conserve energy during periods of low link utilization (see 78.x).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The remedy to #125 achieves the same.

Cl **85** *SC* **85.1** *P* **87** *L* **33** # 219

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A** *40G*

40GBASE-CR4 can also enter low power idle

SuggestedRemedy

change "A 100GBASE-CR10 PHY" to "100GBASE-CR10 and 40GBASE-CR4 PHYs"

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.13.3** *P* **90** *L* **13** # 66

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMD only needs to support the option.

SuggestedRemedy

After "Implementation of LPI" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.2** *P* **87** *L* # 126

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMD only needs to support the option.

SuggestedRemedy

After "optional Energy Efficient Ethernet (EEE) capability" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.2** *P* **87** *L* **46** # 91

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

rx_mode needs to change direction

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.2** *P* **87** *L* **50** # 93

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE FEC*

For compatibility with legacy FEC

Add note regarding tx_mode passed through FEC.

SuggestedRemedy

Add note to the end of the paragraph:

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

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.2** *P* **87** *L* **52** # 92

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Fix the descriptions of the primitives.

SuggestedRemedy

Replace the 2 sentences with:

The RX_MODE parameter is used to communicate the state of the PCS LPI receive function and takes the value QUIET or DATA.

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.7.2** *P* **88** *L* **5** # 127

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMD only needs to support the option.

SuggestedRemedy

After "optional Energy Efficient Ethernet (EEE) capability" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change paragraph as suggested in #458

Cl **85** SC **85.7.2** P **88** L **5** # 458

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *EEE option*

A PMD can't generate a pattern. It doesn't even have a clock. Any pattern must come from the adjacent PMA, which might get it from the Clause 91 PCS/FEC.
What alert pattern do we use for EEE fast mode?

SuggestedRemedy

Change
If the optional Energy Efficient Ethernet (EEE) capability is supported (see Clause 78) then when tx_mode is set to ALERT, the PMD will transmit a repeating 16-bit pattern, hexadecimal 0xFF00.
to
If the optional Energy Efficient Ethernet (EEE) slow mode capability is supported (see Clause 78) then when the adjacent PMA sets tx_mode to ALERT, it sends a repeating 16-bit pattern, hexadecimal 0xFF00, to the PMD, which the PMD transmits.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See also #127

Change to

If the optional Energy Efficient Ethernet (EEE) capability with the normal wake mode option is supported (see Clause 78) then when tx_mode is set to ALERT, the adjacent PMA sends a repeating 16-bit pattern, hexadecimal 0xFF00, to the PMD, which the PMD transmits.

Cl **85** SC **85.7.2** P **88** L **6** # 461

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **R**

Changing tap weights quickly and repeatedly and turning up the volume is not good for complexity, signal integrity or power consumption. I have not seen any analysis showing if thi is necessary or worthwhile.

SuggestedRemedy

Do the analysis.
Delete "When tx_mode is ALERT, the transmitter equalizer taps are set to the preset state specified in 85.8.3.3.1."

Response *Response Status* **C**

REJECT.

This behavior is identical to that defined for 10GBASE-KR which shares most requirements and functionality with 40GBASE-CR4 and 100GBASE-CR10. The onus should be on a commenter to demonstrate that the change in tap weights is not required for ALERT function.

Cl **85** SC **85.7.4** P **88** L **14** # 94

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *LPI Rx*

For change of LPI Rx function

Add function for global signal detect.

SuggestedRemedy

Delete editor's note. Add the following:

At the end of the first paragraph add:
When the PHY supports the optional EEE capability, PMD_SIGNAL.indication is also used to indicate when the ALERT signal is detected, which corresponds to the beginning of a refresh or a wake.

At the beginning of the second and third paragraphs add:
When the PHY does not support the EEE capability or if the PHY supports the EEE capability and rx_mode is set to DATA

At the end of the third paragraph add:

When the PHY supports the EEE capability, SIGNAL_DETECT is set to FAIL following a transition
from rx_mode = DATA to rx_mode = QUIET. When rx_mode = QUIET, SIGNAL_DETECT shall be set to
OK within 500 ns following the application of a signal at the receiver input that is the output of a channel that satisfies the requirements of all the parameters of both interference tolerance test channels defined in 72.7.2.1 when driven by a square wave pattern with a period of 16 unit intervals and peak-to-peak differential output amplitude of 720 mV. While rx_mode = QUIET, SIGNAL_DETECT changes from FAIL to OK only after a valid ALERT signal is applied to the channel.

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.7.4** *P* **88** *L* **20** # 462

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *LPI Rx*

re "Following the reception of a data stream containing RAMs with the code indicating tx_mode = SLEEP, rx_mode shall be set to QUIET":
This is only a PMD. It deosn't even have a clock, let alone the ability to parse RAMs.

SuggestedRemedy

It would have to be the Clause 91 PCS/FEC or Clause 82 PCS that parses the RAMs and passes a (another) primitive down the stack to the PMD Rx.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This section is deleted and replaced by comment #94

Cl **85** *SC* **85.7.4** *P* **88** *L* **21** # 459

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *LPI Rx*

re "rx_mode shall be set to QUIET and shal remain in that state until a signal is detected at th receiver input that is the output of a channel that satisfies the requirements of all the parameters of both interference tolerance test channels defined in 72.7.2.1 when driven by a square wave pattern with a period of 16 unit intervals and peak-to-peak differential output amplitude of 720 mV.":
This is only a PMD, not a test lab!

SuggestedRemedy

See e.g. Table 86-5, SIGNAL_DETECT value definition, for an example of a signal detect truth table.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This section is deleted and replaced by comment #94

Cl **85** *SC* **85.7.6** *P* **88** *L* **33** # 128

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *EEE option*

If the new optional behavior is accepted then PMD only needs to support the option.

SuggestedRemedy

After "mandatory if EEE" insert "with the normal wake mode option"

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85-1** *P* **87** *L* **28** # 218

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A** *40G*

change "Not Applicable" to "Optional" for 40GBASE-CR4

SuggestedRemedy

per comment

Response *Response Status* **C**

ACCEPT.

Cl **89** *SC* **1** *P* **30** *L* **10** # 298

Ghiasi, Ali — Broadcom

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

A more deatial disclaimar need to be added inclduing the fact VSR2000-3R2 does not have the same level of interoperability or BER objecctive

SuggestedRemedy

The specifications in this clause therefore use a similar methodology to that used in ITU-T G.693 [Bx1] and not recomended for reuse as it does not provide the same level of interoperability or BER other 40GBASE-R PMDs provide.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **89** *SC* **5.1** *P* **34** *L* **33** # 299

Ghiasi, Ali — Broadcom

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

PMD service interface TP1 and TP4 are not applicable as they are not currenlty defined

SuggestedRemedy

Remove TP1 and TP4
Add XLAUI interface to the PMA

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **89** *SC* **6.3** *P* **37** *L* **36** # 300

Ghiasi, Ali
Broadcom

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

With the transmitter center wavelength at 1550 nm compatible with VSR3, there is not need to require FR receiver be dual wavelength. If the reason to add 1310 nm band for some future 1310 nm targeted for lower power and cost but we already declared at the beginning SONET VSR methodology is not recommended for reuse for not having same level of interoperability as IEEE specifications.

SuggestedRemedy

Remove the 1310 nm window

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **89** *SC* **6.3** *P* **37** *L* **46** # 301

Ghiasi, Ali
Broadcom

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

Receiver jitter tolerance test method missing

SuggestedRemedy

Add receiver jitter tolerance

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **89** *SC* **7.10** *P* **42** *L* **4** # 302

Ghiasi, Ali
Broadcom

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

The receiver jitter toleance here is unstress which is different than 802.3 and note should be added to clarify

SuggestedRemedy

Add note receiver jitter tolerance is unstress

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **89** *SC* **9** *P* **4** *L* **17** # 303

Ghiasi, Ali
Broadcom

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

Definition and test method for dispersion is missing

SuggestedRemedy

Add definition and test method

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **89** *SC* **9** *P* **4** *L* **19** # 304

Ghiasi, Ali
Broadcom

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

Test method for DGD is missing

SuggestedRemedy

Add test method

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **91** *SC* **91** *P* **104** *L* **0** # 196

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

No definitions for counter to track the following have been added to the RS-FEC.

Corrected_block_count
Uncorrected_block_count
Symbol_error_count_0
Symbol_error_count_1
Symbol_error_count_2
Symbol_error_count_3

SuggestedRemedy

Add a new section named RS-FEC Error monitoring capability which defines the following counters and create MDIO access methods for these as well.

Corrected_block_count - 32b counter which increments each time a codeword is successfully corrected when fec_bypass_correction is true.

Uncorrected_block_count - 32b counter which increments each time a codeword is uncorrectable when fec_bypass_correction is false and when the local parity and received parity's don't match when fec_bypass_correction is true.

Symbol_error_count_0..3 - 32b counter, one for each PMD lane, which increments each time a symbol for the given lane is corrected when fec_bypass_correction is true.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a summary of management variables per healey_3bj_02_0912 and define the corresponding register and bits to MMD 1 in Clause 45. Give the editor license to assign registers and bit number, but begin a new contiguous address space starting at 1.200.

Cl **91** *SC* **91.1.2** *P* **91** *L* **29** # 470

Cideciyan, Roy — IBM

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

RS encoding is mandatory, i.e., not conditional based on PHY type.

SuggestedRemedy

Delete "NOTE 1-CONDITIONAL BASED ON PHY TYPE" and omit superscript "1" in sublayers RS-FEC and AN.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

The 100GBASE-R family is not limited to 100GBASE-CR4, 100GBASE-KR4, and 100GBASE-KP4. For example, 100GBASE-LR4 and 100GBASE-ER4 do not include the RS-FEC sublayer. Therefore, inclusion of the RS-FEC sublayer is "conditional based on PHY type."

Cl **91** *SC* **91.2** *P* **92** *L* **21** # 239

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

Now that the FEC synchronization state diagram has been included in the draft, the assignment of the SIGNAL_OK parameter of the FEC:IS_UNITDATA.indication primitive can be defined.

SuggestedRemedy

Specifiy that SIGNAL_OK=OK when align_status=TRUE and SIGNAL_OK=FAIL when align_status=FALSE. Also define the value of the rx_bit parameter for the FEC:IS_UNITDATA_i.indication primitives when SIGNAL_OK=FAIL.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Define SIGNAL_OK per the comment (note the variable name has changes to fec_align_status).

Specify that when SIGNAL_OK=FAIL, the value of rx_bit is undefined.

Cl **91** *SC* **91.2** *P* **92** *L* **33** # 95

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A**

For change of LPI Rx function

rx_mode needs to change direction, also energy_detect and rx_lpi_active need to be added.

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request
IS_ENERGY_DETECT.indication
IS_RX_LPI_ACTIVE

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Clause 91 does not require the IS_RX_LPI_ACTIVE primitive.

Add IS_ENERGY_DETECT and change the direction of IS_RX_MODE per the comment.

Cl **91** *SC* **91.3** *P* **92** *L* **44** # 161

Ran, Adee — Intel

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

RS-FEC is defined only to be a client of the 100GBASE-R PCS where the number of upstream lanes is 20.

Also: the terms p and q only appear in one paragraph in subclause 83.1.4 in a descriptive manner, and are not used or officially defined anywhere else. It would be easier to search for the more unique terms LANES_UPSTREAM and LANES_DOWNSTREAM that appear in 83.7.3. Perhaps a maintenance change in 83.1.4 is also due.

SuggestedRemedy

Change "four upstream lanes" to "20 upstream lanes".
Change "PMA service interface width, p, is set to 4" to "PMA service interface widths LANES_UPSTREAM and LANES_DOWNSTREAM are set to 20 and 4 respectively".

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **91** *SC* **91.4** *P* **92** *L* **52** # 245

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

The Clause 91 architecture has stabilized to the point where a delay constraint can be provided.

SuggestedRemedy

Specify the maximum delay contributed by the RS-FEC sublayer.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #190.

Cl **91** *SC* **91.4** *P* **92** *L* **53** # 190

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Need to replace TBDs with values for maximum delay contributed by the RS-FEC. Clause 74 was set to~3x FEC frame size.

SuggestedRemedy

Change TBDs to be 4096 BT, 158.3ns, 8 pause_quanta

That's~3.01 RS-FEC frames for KP4 and 3.1 for KR4/CR4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It should be noted that the purpose of this Delay specification is to bound the delay through a link for MAC Control PAUSE operation. Low latency implementations are certainly possible.

Set TBD to 80 pause_quanta (derive equivalent for other units). This enables a wide range of implementations.

In addition, comment #241 requests more information on the impact of error marking on FEC latency. The specified value is inclusive of error marking and for the stated purpose of this requirement, a limit without error marking does not need to be specified.

Cl **91** *SC* **91.5.1** *P* **94** *L* **4** # 99

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A**

For change of LPI Rx function

Fix the block diagram in Fig 91-2

SuggestedRemedy

Change the direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indication
Add FEC:IS_RX_LPI_ACTIVE.request

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Clause 91 does not use the IS_RX_LPI_ACTIVE primitive. Implement the other changes in the suggested remedy.

Cl **91** *SC* **91.5.1** *P* **94** *L* **40** # 100

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A**

For change of LPI Rx function

Fix the block diagram in Fig 91-2

SuggestedRemedy

Change the direction FEC:IS_RX_MODE.request
Add FEC:IS_ENERGY_DETECT.indication

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the direction of PMA:IS_RX_MODE.request and add PMA:IS_ENERGY_DETECT.indication

Cl **91** *SC* **91.5.2.2** *P* **93** *L* **27** # 222

Gustlin, Mark Xilinx

Comment Type **T** *Comment Status* **A**

The skew variation of 0.2ns is discussed, but it would be good to also refer to SP1 in this sentance, similar to how it is refrenced in 83.5.3.3.

SuggestedRemedy

Per the comment.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #26. SP1 is not the reference point for these values.

Cl **91** *SC* **91.5.2.4** *P* **93** *L* **46** # 197

Slavick, Jeff Avago Technologies

Comment Type **T** *Comment Status* **A**

Replace TBD with the BIP error counter register that already exist in MDIO.

SuggestedRemedy

Change TBD with 3.200 to 3.219

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

3.200 and 3.129 are PCS bits/registers. As the BIP check is done by the RS-FEC sublayer, new counters should be defined in MMD 1 (Clause 74 FEC register space resides in this MMD, so it is proposed that the Clause 91 register space also reside here).

See comment #196.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **1** # 53

Szczepanek, Andre — Inphi

Comment Type **TR** *Comment Status* **A**

The output of the trancoder for invalid sync headers is not defined.
If for any j=0 to 3, tx_coded_j<1> == tx_coded_j<0> what is tx_xcoded ?

SuggestedRemedy

for any j=0 to 3, tx_coded_j<1> == tx_coded_j<0>
then the transcoded output should be equivalent to the transcode of four Local_fault input words

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Added Clause (91) to Sbcl field for consistent sorting.]

Specify that, if any of the four 66-bit blocks tx_coded_j has an invalid sync. header, then tx_xcoded<0> is set to 0 and tx_xcoded<4:1> is set to 1111. The second nibble from the first 64-bit block payload is deleted.

Specify that, when rx_xcoded is received with rx_xcoded<0>=0 and rx_xcoded<4:1>=1111, then the sync. headers of the blocks rx_coded_j are set to be invalid: 00, 11, 00, 11. The second nibble from the first 66-bit block payload is set to zero and scrambled per the current procedure.

An error not considered by the commenter is the case where an invalid first nibble of the blocl type field is received by the 256B/257B to 64B/66B transcoder. Specify that this case is handled per healey_3bj_02_0912 slide 20.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **12** # 15

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

This says "such that tx_coded_c<1:0>=01."
The usual arrangement for the sync bits is to show them with the first bit transmitted on the le
(i.e. for control, sync = 10).
Consequently, it would be clearer to show each bit separately.

Also, it would keep the sync bits in the usual order if the <0> index was shown first.

Similar issues in 91.5.3.5 and 91.5.3.7

SuggestedRemedy

On line 1, change:
"tx_coded_j<1>=1 and tx_coded_j<0>=0," to:
"tx_coded_j<0>=0 and tx_coded_j<1>=1,"

On line 7 change:
"tx_coded_j<1>=0 and tx_coded_j<0>=1," to:
"tx_coded_j<0>=1 and tx_coded_j<1>=0,"

On line 12 change:
"such that tx_coded_c<1:0>=01." to:
"such that tx_coded_c<0>=1 and tx_coded_c<1>=0

On page 101, line 30 change:
"rx_coded_j<1> = 1 and rx_coded_j<0> = 0" to:
"rx_coded_j<0> = 0 and rx_coded_j<1> = 1"

On page 101, line 35 change:
"rx_coded_j<1> = 0 and rx_coded_j<0> = 1" to:
"rx_coded_j<0> = 1 and rx_coded_j<1> = 0"

On page 101, line 36 change:
"rx_coded_j<1> = 1 and rx_coded_j<0> = 0" to:
"rx_coded_j<0> = 0 and rx_coded_j<1> = 1"

On page 102, line 32 change:
"Finally, am_x<1:0> = 01" to:
"Finally, am_x<0> = 1 and am_x<1> = 0"

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **12** # 240

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A** *bucket*

Clarify the assignment of tx_coded_c<1:0>.

SuggestedRemedy

Change to tx_coded_c<1:0>=01 to tx_coded_c<1>=0 and tx_coded_c<0>=1.

Response *Response Status* **C**

ACCEPT.

See comment #15.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **15** # 56

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **R**

The function for omission of the first codeword "s" nibble is unecessarily terse and makes it dificult to understand what is required. As c only has 4 possible values, why not just state all 4 possible bit muxes.

SuggestedRemedy

Replace :

e)Omit tx_coded_c<9:6>, which is the second nibble (based on transmission order) of the block type field for tx_coded_c, from tx_xcoded per the following expressions.
tx_xcoded<(64c+8):5> = tx_payloads<(64c+3):0>
tx_xcoded<256:(64c+9)> = tx_payloads<255:(64c+8)>

With :
e)Omit tx_coded_c<9:6>, which is the second nibble (based on transmission order) of the block type field for tx_coded_c, from tx_xcoded per the following :
if (c==0) tx_coded <256:5> = tx_payloads<255:8> :: tx_payloads<3:0>
if (c==1) tx_coded <256:5> = tx_payloads<255:72> :: tx_payloads<67:0>
if (c==2) tx_coded <256:5> = tx_payloads<255:136> :: tx_payloads<131:0>
if (c==3) tx_coded <256:5> = tx_payloads<255:200> :: tx_payloads<195:0>

Response *Response Status* **C**

REJECT.

[Added Clause (91) to Sbcl field for consistent sorting.]

The text is correct as written. Illustrations have been added (see Figure 91-3) to help the reader understand the process.

The suggested remedy includes notation for array concatenation "::" that is not used elsewhere in IEEE 802.3. The existing definition does not require new array concatenation notation.

While the mathematical description is precise, it requires the user to do a number of index computations to understand the construction of the codeword. It is not clear that the calculations involving the variable c are more onerous than the others.

See also comment #52.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **20** # 198

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Figure 91-3 doesn't incorporate the XOR function in it's illustration of the transcoding process

SuggestedRemedy

Change
"Several examples that illustrate the transcoding process are shown in Figure 91-3."
to
"Several examples that illustrate the transcoding process steps a-e are shown in Figure 91-3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #155.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **20** # 155

Ran, Adee — Intel

Comment Type **ER** *Comment Status* **A**

It is not absolutely clear from the text whether the XOR occurs only for the case where at leas one 66-bit block is a control block, or for all cases including all-data blocks. I assume the latte is correct, but it is preferable to avoid possible confusion.

The examples in figure 91-3 fail to depict this operation - bits 4:0 are shown as in the original assignment.

Also: the second sentence in this paragraph should be in a separate paragraph.

SuggestedRemedy

Use a temporary variable tx_xcoded_header<4:0> for all the assignments to tx_xcoded<4:0> that occur before this paragraph.

Update figure 91-3 to include both tx_xcoded_header<4:0> and tx_xcoded<4:0>. (May require restructuring the figure).

Change the paragraph in lines 20-22 to the following:
"
Set tx_coded<4:0> to the result of the bit-wise exclusive-OR of tx_xcoded_header<4:0>" and tx_xcoded<12:8>.

Several examples that illustrate the transcoding process are shown in Figure 91-3.
"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In the first paragraph of 91.5.2.5, change reference to tx_xcoded<256:0> to tx_scrambled<256:0>.

Replace the last paragraph of 91.5.2.5 with following definition of tx_scrambled.

"Several examples of the construction of tx_xcoded<256:0> are shown in Figure 91-3.

Finally, scramble tx_xcoded<256:0> to yield tx_scrambled<256:0> as follows.
a) Set tx_scrambled<4:0> to the result of the bit-wise exclusive-OR of the tx_xcoded<4:0> and tx_xcoded<12:8>.
b) Set tx_scrambled<256:5> to tx_xcoded<256:5>."

Re-name Figure 91-3 to be "Examples of the construction of tx_xcoded".

Change 91.5.2.7, page 98, line 8 to "The message symbols are composed of the bits of the transcoded blocks tx_scrambled (including a mapped group of alignment markers when appropriate) such that bit 0 of the first transcoded block in the message (or am_txmapped<0>)."

In Figure 91-6, replace tx_xcoded with tx_scrambled.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **21** # 471

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A**

Figure 91-3 does not show the final change of tx_xcoded<4:0> by using bitwise XOR which is part of the transcoder description.

SuggestedRemedy

Replace sentence "Several examples that illustrate ... in Figure 91-3." by "Several examples that illustrate the transcoding process without the final modification of tx_xcoded<4:0> are shown in Figure 91-3."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #155.

Cl **91** *SC* **91.5.2.5** *P* **95** *L* **7** # 162

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A**

The transcoding procedure does not handle all possible values of tx_coded_j<1:0>. The values 00 and 11 are indeed invalid, but can still occur (e.g. due to errors in reception from upper layers). This is likely to happen more often than once in MTTFPA.

Since the header must be compressed, the reasonable behavior in such cases would be to mark the 66-bit block in question as a control block with /E/ on transmission, to make sure they are discarded by the receiving PCS.

SuggestedRemedy

Change the condition in line 7 to:
"If for all j=0 to 3, tx_coded_j<1>!=tx_coded_j<0>, and for at least one value of j, tx_coded_j<1>=0 and tx_coded_j<0>=1"

Add text based on the following paragraph after line 19 (expand the text inside braces to be technically accurate according to comment):

"
If for any j=0 to 3, tx_coded_j<1>=tx_coded_j<0>, tx_xcoded<256:0> shall be constructed as follows:

a) tx_coded<0>=0
b) tx_xcoded<k+1> = tx_coded_k<1> for k=0 to 3 except for k=j
[c) and on: specify that any blocks where invalid header was found be replaced by control blocks containing /E/]
"

Add a suitable example to figure 91-3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #53.

Cl **91** *SC* **91.5.2.5** *P* **96** *L* **47** # 473

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A** *bucket*

Header bit (first bit) of transcoded block that contains 4 control blocks not correct.

SuggestedRemedy

Replace header bit (first bit) of transcoded block by 0.

Response *Response Status* **C**

ACCEPT.

Comment is against Figure 91-3.

Cl **91** *SC* **91.5.2.6** *P* *L* # 464

Cideciyan, Roy IBM

Comment Type **ER** *Comment Status* **A** *bucket*

Title of subclause is "Alignment mapping and insertion" whereas title of subclause 91.5.3.7 is "Alignment marker mapping and insertion"

SuggestedRemedy

Both subclauses should have the same title, i.e., either "Alignment mapping and insertion" or "Alignment marker mapping and insertion". My preference is that both subclauses have the more descriptive title "Alignment marker mapping and insertion".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change heading of 91.5.2.6 to "Alignment marker mapping and insertion".

Cl **91** *SC* **91.5.2.6** *P* **113** *L* **38** # 206

Zhong, Qiwen Huawei

Comment Type **E** *Comment Status* **A**

"Figure 91 - 64B/66B to 256B/257B transcoding example" Especially "Example 3: Alternating data and control blocks" might misguide readers as the Ethernet Packet with min length of 64 bytes and 8 bytes Preamble+SFD, and with min 12 bytes Interframe GAPs. It means that the example of Alternating data and control blocks in an 256/257 Block would not appeared!

SuggestedRemedy

Remove or modify the example!

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Alternating control and data blocks can appear when errors are enforced during packet transmission. Refer to the possible transition between TX_D and TX_E states in Figure 82-14

However, it would be better to an example that reflects a more common mapping. Change example three to be three data blocks followed by a control block.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **26** # 156

Ran, Adee Intel

Comment Type **ER** *Comment Status* **A**

This subclause describes the mapping operation but it is unclear how the mapped markers are re-inserted into the normal stream, paired with their removal in clause 91.5.2.4.

SuggestedRemedy

A figure showing the input and output of these two operations is required. Unfortunately I do not understand the proposed procedure enough to provide it.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Figure 91-4 was intended to be the requested illustration.

See comment #150.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **40** # 163

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A** *bucket*

x should takes PCS lane values (0..19), but if j=0..5 and i=0..3, x=i+4j can take values from 0 to 23. Seems that j should be only within 0..4.

SuggestedRemedy

Change "j=0 to 5" to "j=0 to 4".

Response *Response Status* **C**

ACCEPT.

[Comment was entered against Subcl 91.5.2.5, but is actually against 91.5.2.6.]

See comment #472.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **40** # 472

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A** *bucket*

j should run from 0 to 4

SuggestedRemedy

Given i=0, j=0 to 4, and x=i+4j, ...

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **40** # 54

Szczepanek, Andre Inphi

Comment Type **TR** *Comment Status* **A** *bucket*

The upper limit of the range of variable "j" is wrong.
The range of j should be 0 to 4 concistent with the 5 AMs per row shown in Figure 91-4

SuggestedRemedy

Replace "j=0 to 5" with "j=0 to 4"

Response *Response Status* **C**

ACCEPT.

[Added Clause (91) to Sbcl field for consistent sorting.]

See comment #472.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **45** # 57

Szczepanek, Andre Inphi

Comment Type **ER** *Comment Status* **A**

This mapping processs really needs a diagram to show what is going on.
A mapping equation though succinct is not descriptive.
A diagram was provided in gustlin_01_0312, why not use it.

SuggestedRemedy

Add mapping diagram based on slide 15 of gustlin_01_0312.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Added Clause (91) to Sbcl field for consistent sorting.]

Figure 91-4 was included for this purpose.

See comment #150.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **50** # 150

Ran, Adee Intel

Comment Type **E** *Comment Status* **A**

The 5-bit pad should better be depicted in figure 91-4 or elsewhere to show the five 257-bit blocks structure.

SuggestedRemedy

Preferably, update figure 91-4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Augment Figure 91-4 to show the inclusion of the 5-bit pad and the transition into the next 257 bit block.

Also clarify the assignment of pad bits in the text.

Cl **91** *SC* **91.5.2.6** *P* **95** *L* **51** # 463

Cideciyan, Roy IBM

Comment Type **T** *Comment Status* **A**

am_txmapped<1284:1280> contains 5 bits whereas 0x05 and 0x1A contain 8 bits. Therefore, the notation is not very clear.

SuggestedRemedy

Replace 0x05 by 00101 and 0x1A by 11010

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Commenter did not specify CommentType. Set to T.]

Given previous comments on the ambiguity of assignment of elements of binary array to a vector variable x<i:j>, the assignment needs to be further clarified.

See comment #150.

Cl **91** *SC* **91.5.2.6** *P* **96** *L* **48** # 182

Slavick, Jeff Avago Technologies

Comment Type **E** *Comment Status* **A** *bucket*

Figure 91-3. Header bit for a All Control blocks TC block is 0, not 1.

SuggestedRemedy

Change the 1 in the 0 bit location of tx_xcoded to a 0 for example 4.

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.2.7** *P* **97** *L* **33** # 48

Szczepanek, Andre Inphi

Comment Type **ER** *Comment Status* **A** *bucket*

Why do we refer to w-bit symbols rather than 10bit symbols.
The rest of this clause has been written on the basis of 10bit symbols,
So "w" is not a variable.

SuggestedRemedy

Replace "GF(2^w) where w=10 is the symbol size in bits"
with "GF(2^10) where the symbol size is 10 bits"

Response *Response Status* **C**

ACCEPT.

[Added Clause (91) to Sbcl field for consistent sorting.]

Substitute the value 10 for all instances of w in Clause 91.

Cl **91** *SC* **91.5.2.7** *P* **97** *L* **41** # 443

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A**

As well us telling us the error correction capability, please tell us the error detection capability of these codes. Also, while a code may be capable of something, the spec needs to say wha an implementation must do.

SuggestedRemedy

Add text giving the error detection capability of these codes, and the expected/required error correction and detection capability of implementations.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The error detection capability of a bounded distance decoder is (n-k) = 2*t symbols. For (n-k+1) or more symbol errors, there is a chance that the decoder will incorrectly recognize the input as a different codeword. In these cases, it is only possible to bound the probability that errors will be detected (see [1]). Methods that achieve this require one additional codeword of decoding latency. However, there are other methods of error detection that offer reduced latency but are not guaranteed to detect all uncorrectable errors. There is no intention to preclude such methods.

The statement of error correcting capability was intended to establish the relevance of the parameter t. Since 91.5.2.7 specifies the operation of the encoder, decoder requirements should not be added here.

76.3.3.3 states the following:

"Implementations shall be capable of correcting up to 16 symbols in a codeword and detecting uncorrectable codewords."

Using this as a model, add the following paragraph after the first paragraph of 91.5.3.3.

"When used to form a 100GBASE-CR4 or 100GBASE-KR4 PHY, the RS-FEC sublayer shall be capable of correcting any combination of up to t=7 symbol errors in a codeword. When used to form a 100GBASE-KP4 PHY, the RS-FEC sublayer shall be capable of correcting any combination of up to t=15 symbol errors in a codeword. The RS-FEC sublayer shall also be capable of detecting uncorrectable codewords."

In 91.5.2.7, remove "This code has the capability to correct any combination of t=? symbols errors in a codeword." These two sentences are redundant with the information proposed to be added to 91.5.3.3.

[1] R. J. McEliece and L. Swanson, "On the decoder error probability for Reed-Solomon codes," IEEE Trans. Inform. Theory, vol. 32, pp. 701-703, Sep. 1986.

Cl **91** *SC* **91.5.2.7** *P* **98** *L* **1** # 465

Cideciyan, Roy — IBM

Comment Type **ER** *Comment Status* **A** *bucket*

Typographical error

SuggestedRemedy

Replace "polynominal" by "polynomial"

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.2.7** *P* **98** *L* **12** # 466

Cideciyan, Roy — IBM

Comment Type **ER** *Comment Status* **A** *bucket*

Typographical error

SuggestedRemedy

Replace "whose the coefficients" by "whose coefficients"

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.2.7** *P* **98** *L* **23** # 467

Cideciyan, Roy — IBM

Comment Type **ER** *Comment Status* **A** *bucket*

Missing blank

SuggestedRemedy

Insert blank between "... is transmitted last." and "The first bit ..."

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.2.7** *P* **98** *L* **47** # 59

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **A**

Why are the generator polynomial coefficients relegated to a (presumably informative) annex ?.
Although they can be derived from field polynomial and number of check symbols this requires a good bit of maths. So why not state them here. The coefficients are normative after all, there is no discretion in their values.

SuggestedRemedy

Add list of generator polynomial coefficients for the two FEC codes, in a format concistent with Figure 91-5.

Response *Response Status* **C**

ACCEPT.

[Added Clause (91) to Sbcl field for consistent sorting.]

See comment #234.

Cl **91** *SC* **91.5.2.7** *P* **99** *L* **1** # 234

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

The RS-FEC encoding is sufficiently stable to define the generator polynomial coefficients and example codewords to assist users of the standard.

SuggestedRemedy

Add Annex 91A with FEC codeword examples in the style of Annex 74A. Include coefficients of the generator polynomial, gi, in Clause 91 or in the proposed annex.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Remove the editor's note. Add a table to the end of 91.5.2.7 that defines the coefficients of the generator polynomials for 100GBASE-KR4 and 100GBASE-KP4.

Add Annex 91A which includes an example of an FEC codeword (input, transcoded output, FEC encoded output).

Refer to langhammer_3bj_01_0912 for a C model of the encoders. These will also be included in the Annex.

Cl **91** *SC* **91.5.2.8** *P* **99** *L* **13** # 151

Ran, Adee — Intel

Comment Type **E** *Comment Status* **A** *bucket*

A cross-reference to the relevant place in clause 94 could be useful.

SuggestedRemedy

After "When used to form a 100GBASE-KP4 PHY" add " (refer to 94.2.1.1.1)".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add "(refer to 94.2.1.1)" to the end of the first sentence.

In 91.5.3.1, add "(refer to 94.2.1.2)" to the end of the last sentence of the last paragraph.

Cl **91** *SC* **91.5.2.8** *P* **99** *L* **9** # 474

Cideciyan, Roy — IBM

Comment Type **TR** *Comment Status* **A** *bucket*

There is no scrambler at Tx of RS-FEC.

SuggestedRemedy

Replace "Once the data is scrambled and encoded, ..." by "Once the data is transcoded and encoded, ..."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #183.

Cl **91** *SC* **91.5.2.8** *P* **99** *L* **9** # 183

Slavick, Jeff — Avago Technologies

Comment Type **E** *Comment Status* **A** *bucket*

We no longer are scrambling the data within the RS-FEC

SuggestedRemedy

Remove the words "scrambled and" along with the comma after encoded. In the first sentence of 91.5.2.8
Remove the words "descrabmling and" from the last sentence in 91.5.3.4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to:

"Once the data has been Reed-Solomon encoded, it shall..."

Cl **91** *SC* **91.5.2.8** *P* **99** *L* **9** # 498

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A** *bucket*

This says "Once the data is scrambled and encoded" yet I can't see any mention of scrambling on the Tx side, nor de-scrambling the 58-bit scrambler in Clause 82. On the receive side, I can see that three bits in 257 are sometimes descrambled and three are scrambled. Also that the received first nibble is scrambled (where were they scrambled?). In 91.5.3.6 receive block distribution, "Once the data is encoded and scrambled" - I wouldn't say the data is scrambled. First, I would not call it data because it should consist of data blocks and also control blocks. Second, if only three block type bits in 66? are scrambled, it would be misleading to imply the whole stream is scrambled.

SuggestedRemedy

Does the Tx process scramble or not? Make the next draft clearer.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Scrambling/descrambling was removed from the RS-FEC sublayer. The paragraph must be updated to reflect this.

See comment #183.

Cl **91** *SC* **91.5.3.1** *P* **99** *L* **31** # 49

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **A**

"FEC Deskew state diagram" is a misnomer. The SM shown in Figure 91-9 has very little to do with deskew (despite inheriting the functions of Figure 82-12), instead it is all about verifying FEC block Lock.

The functions of FEC lane deskew and testing for FEC block lock are functionaly independent and will be implemented at quite different positions in the datapath and possibly in different clock regimes.

I see no real need to combine these two functions into one SM. Why not just re-use Figure 82 12 as is for FEC lane deskew, and provide a seperate FEC block Lock SM.

SuggestedRemedy

Replace Figure 91-1 with a copy of Figure 82-12.
Edit existing Figure 91-1 to use the "align_status" output from the deskew lock SM.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Added Clause (91) to Sbcl field for consistent sorting.]

It is true that the actual "deskew" operation is a small portion of the state diagram and the majority of the functionality pertains to monitoring whether or not proper FEC codewords are being received.

A stand-alone FEC deskew state diagram would be trivial. Relative placement of deskew and FEC decode blocks, clock domains, etc. are implementation-specific considerations that should have little bearing on this generalized description of the required behavior.

From a behavioral point of view, defining operations for each FEC lane (Figure 91-8) and operations for the aggregate (deskew or "lane alignment", error monitoring) is a reasonable way to partition the problem. Both aspects are required to establish and monitor FEC codeword lock.

To avoid giving undue weight to the deskew operation, rename Figure 91-9 to be the "FEC alignment state diagram".

Cl **91** *SC* **91.5.3.1** *P* **99** *L* **32** # 26

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A**

This says "The FEC receive function shall support a maximum Skew of 134 ns between FEC lanes and a maximum Skew Variation of 3.4 ns."

These are the skew and skew variation requirements at SP4 which is the input of the PMD sublayer, but they should be the values at SP5 which is at the output of the PMD sublayer as per the new Figure 80-5a

SuggestedRemedy

Change to:
"The FEC receive function shall support a maximum Skew of 145 ns between FEC lanes and a maximum Skew Variation of 3.6 ns."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change Figure 80-5a to represent the skew point reference model in healey_3bj_02_0912.pdf slide 3.

Also set the Skew and Skew Variation per slide 3 by adding a Table to Clause 80 and assigning SP2 through SP5 values in various PMD clauses.

Update Clause 91 skew tolerances accordingly. Update Clause 82 with a reduced skew tolerance for the case where RS-FEC is used.

Cl **91** *SC* **91.5.3.2** *P* **99** *L* **42** # 152

Ran, Adee — Intel

Comment Type **E** *Comment Status* **A** *bucket*

If lane reordering is mandatory then physical lane swapping should not be considered an error. For some media this may happen intentionally and consistently.

Compare to 82.2.13 where the reason for possible re-ordering is stated as "due to Skew between lanes and multiplexing by the PMA". No "error" is mentioned.

SuggestedRemedy

Change "due to connection errors in the underlying medium" to "due to possible swapping in the underlying medium".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #453.

Cl **91** *SC* **91.5.3.2** *P* **99** *L* **42** # 453

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A** *bucket*

The medium is allowed to mix the lanes up, that's no error. See 86.6 Lane assignments

SuggestedRemedy

Delete "due to connection errors in the underlying medium".

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.3.2** *P* **99** *L* **43** # 50

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **A**

Where is the FEC lane number defined ?. Stating "The FEC lane number is defined by the sequence of alignment markers mapped to each FEC lane" only tells half the story.

SuggestedRemedy

Explicitly state that FEC lane number zero is the lane that caries AM_0, lane 1 AM_1, lane 2 AM_2, and lane 2 AM_3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Commenter submitted the comment against Clause 99. Changed to Clause 91. Added Clause to Sbcl field for consistent sorting.]

The other half of the story is in 91.5.2.6 and Figure 91-4.

In 91.5.3.2, add a cross-reference to 91.5.2.6 at the end of the last sentence of the first paragraph.

In 91.5.2.6, state that alignment marker payloads corresponding to PCS lanes 0, 4, 8, 12, and 16 correspond to FEC lane 0, alignment marker payloads corresponding to PCS lanes 1, 5, 9 13, and 17 correspond to FEC lane 1, and so on see Figure 91-4).

Cl **91** *SC* **91.5.3.3** *P* **101** *L* **10** # 468

Cideciyan, Roy IBM

Comment Type **ER** *Comment Status* **A** *bucket*

64-bytes should not be one word. It is not used as an adjective in this sentence.

SuggestedRemedy

Replace "64-bytes" by "64 bytes".

Response *Response Status* **C**

ACCEPT.

See comment #475.

Cl **91** *SC* **91.5.3.3** *P* **101** *L* **10** # 475

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A** *bucket*

Suggestion to increase clarity and change from passive form to active form. Minimum frame size is 64 bytes. Minimum packet size, I believe, is 64+8=72 bytes.

SuggestedRemedy

"This will cause the PCS to discard all frames 64 bytes and larger that are fully or partially within the uncorrectable codeword."

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.3.3** *P* **101** *L* **11** # 186

Slavick, Jeff Avago Technologies

Comment Type **T** *Comment Status* **A**

Ability to bypass the FEC correction function is not defined.

SuggestedRemedy

Add the following text to 91.5.3.3
When fec_bypass_correction is set true and the incoming parity of the codeword does not match the received parity the decoder shall corrupt the codeword in the same manner as if an uncorrectable codeword was received.

Added an MDIO register bit to control fec_bypass_correction

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

While gustlin_01a_0712 discusses the possibility that an implementation may choose to disable error correction to reduce latency when the operating conditions allow it, it was not proposed that implementations are required to do so or to expose this feature via a management variable.

However, after discussion, it was decided that this feature should be an option and an ability bit will be added in addition to the proposed enable bit.

The management variables are described in healey_3bj_02_0912. Add corresponding text to 91.5.3.3 describing the option.

Cl **91** *SC* **91.5.3.3** *P* **101** *L* **6** # 55

Szczepanek, Andre — Inphi

Comment Type **TR** *Comment Status* **R**

"If the decoder determines that a codeword is uncorrectable, it shall"
What is the definition of uncorrectable ?
This is important as it has a "shall" tied to it.
Without a definition of "uncorrectable" how can we determine compliance

SuggestedRemedy

Add the following definition of an uncorrectable 802.3bj codeword.
An uncorrectable codeword is a codeword whose error locator polynomial has a degree greater than 7 (t), or where the error locator or error evaluator polynomials cannot be determined (The key equation cannot be solved).

This definition provides a definitive minimum requirement for codeword marking.

Response *Response Status* **C**

REJECT.

[Added Clause (91) to Sbcl field for consistent sorting.]

The commenter defines the term "uncorrectable codeword" while introducing three new undefined terms ("error locator polynomial", "error evaluator polynomial", and "key equation"). This is not an equitable trade.

After discussion, it was clear that there were multiple approaches to error detection that offer trade-offs between coverage or latency. This is an implementation specific issue that should not be constrained by the draft.

See comment #443.

Cl **91** *SC* **91.5.3.3** *P* **101** *L* **6** # 241

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

Clause 74 error marking is optional presumably due to its impact on latency. What is the latency impact of the error marking specified in this subclause?

If the increase is significant, consider optional error marking for Clause 91.

SuggestedRemedy

Evaluate the impact of error marking on latency and determine whether or not the feature should be optional.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make error marking optional. Modify text in 91.5.3.3 to indicate this. Add "error indication" ability and enable bits to management per healey_3bj_02_0912.

It should be noted that deactivating error marking would have an adverse impact on MTTFPA

As stated in the comment, the other consideration for error marking is any added latency which is discussed in the context of comment #190.

Cl **91** *SC* **91.5.3.4** *P* **101** *L* **17** # 476

Cideciyan, Roy — IBM

Comment Type **TR** *Comment Status* **A** *bucket*

Data is not descrambled prior to transcoding at Rx.

SuggestedRemedy

Replace "... prior to descrambling and transcoding." by "... prior to transcoding."

Response *Response Status* **C**

ACCEPT.

See comment #51.

Cl **91** *SC* **91.5.3.4** *P* **101** *L* **17** # 51

Szczepanek, Andre Inphi

Comment Type **ER** *Comment Status* **A** *bucket*

Descrambling no longer forms part of the receive datapath.

SuggestedRemedy

Remove "descrambling and"

Response *Response Status* **C**

ACCEPT.

[Added Clause (91) to Sbcl field for consistent sorting.]

Cl **91** *SC* **91.5.3.4** *P* **101** *L* **18** # 242

Healey, Adam LSI Corporation

Comment Type **T** *Comment Status* **A**

This subclause does not address the case where rapid alignment markers are being received

SuggestedRemedy

Modify the subclause to address both normal and rapid alignment markers.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Grant editorial license to craft to text to be consistent with changes to EEE functionality suggested by other comments.

See comment #243.

Cl **91** *SC* **91.5.3.5** *P* **101** *L* **25** # 477

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A** *bucket*

Notation not correct

SuggestedRemedy

Replace "rx_rxcoded<4:0>" by "rx_xcoded<4:0>".

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.3.5** *P* **101** *L* **25** # 157

Ran, Adee Intel

Comment Type **ER** *Comment Status* **A**

Assuming rx_rxcoded<4:0> in this line is a typo, then rx_xcoded<4:0> is assigned twice. This can be confusing.

It would be preferred to define another variable rx_xcoded_header and use it as in my comment on subclause 91.5.2.5.

SuggestedRemedy

Change this paragraph to:
"Set rx_xcoded_header<4:0> to the result of the bit-wise exclusive-OR of rx_xcoded<4:0> an rx_xcoded<12:8>".

Use rx_xcoded_header<0> instead of rx_xcoded<0>, and rx_xcoded_header<j+1> instead of rx_xcoded<j+1> in the following steps.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add the following sentence to the end of the first paragraph of 91.5.3.3.

"The message symbols correspond to 20 transcoded blocks rx_scrambled."

In the first paragraph of 91.5.3.5, change reference to rx_xcoded<256:0> to rx_scrambled<256:0>.

Replace the second paragraph of 91.5.2.5 with following.

"First, descramble rx_scrambled<256:0> to yield rx_xcoded<256:0> as follows.
a) Set rx_xcoded<4:0> to the result of the bit-wise exclusive-OR of the rx_scrambled<4:0> and rx_scrambled<12:8>.
b) Set rx_xcoded<256:5> to rx_scrambled<256:5>."

In Figure 91-6, replace rx_xcoded with rx_scrambled.

Cl **91** *SC* **91.5.3.5** *P* **101** *L* **39** # 52

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **R**

The function for re-insertion of the first codeword "s" nibble is unecessarily terse and makes it dificult to understand what is required. As c only has 4 possible values, why not just state all 4 possible bit muxes.
In order to understand what is going the reader will have to calculate these four bit muxes - so why not do it for them.

SuggestedRemedy

Replace :

d)let rx_payloads be a vectorrepresenting the payloads of the four 66-bit blocks. It is derived using the following expressions:
rx_payloads<(64c+3):0> = rx_xcoded<(64c+8):5>
rx_payloads<(64c+7):(64c+4)> = 0000 (an arbitrary value that is later replaced, see step j)
rx_payloads<255:(64c+8)> = rx_xcoded<256:(64c+9)>

With :
d)let rx_payloads be a vectorrepresenting the payloads of the four 66-bit blocks. It is derived using the following expressions:
if (c==0) rx_payloads <255:0> = rx_xcoded<256:9> :: 4'b000 :: rx_xcoded <8:5>
if (c==1) rx_payloads <255:0> = rx_xcoded<256:73> :: 4'b000 :: rx_xcoded <72:5>
if (c==2) rx_payloads <255:0> = rx_xcoded<256:137> :: 4'b000 :: rx_xcoded <136:5>
if (c==3) rx_payloads <255:0> = rx_xcoded<256:201> :: 4'b000 :: rx_xcoded <200:5>
where 4'b000 is an arbitrary value that will be replaced later in step j

Response *Response Status* **C**

REJECT.

[Commenter submitted this comment against Clause 00. Changed to Clause 91, Subcl 91.5.3.5, Page 101, Line 39.]

The text is correct as written. Illustrations have been added (see Figure 91-3) to help the reader understand the process.

The suggested remedy includes notation for array concatenation "::" and definition of binary vectors 4b'xxxx, that is not used elsewhere in IEEE 802.3. The existing definition does not require new array concatenation notation.

While the mathematical description is precise, it requires the user to do a number of index computations to understand the construction of the codeword. It is not clear why the calculations involving the variable c are more onerous than the others.

Cl **91** *SC* **91.5.3.5** *P* **101** *L* **45** # 164

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **R**

According to accepted change in transcoding (gustlin_02_0712) there is no additional scrambling following transcoding. Unscrambling described in step g does not seem to have a counterpart in the original 64B/66B to 256B/257B transcoding procedure in 91.5.2.5.

SuggestedRemedy

Delete steps f and g?
Make sure this clause describes exactly the inverse operation of 91.5.2.5.

Response *Response Status* **C**

REJECT.

The 64B/66B to 256B/257B transcoder (see 91.5.2.5) removes 4 scrambled bits from the input 66-bit blocks (if any of the blocks are control blocks). The 256B/257B to 64B/66B transcoder must restore these bits, scrambled in a manner consistent with the surrounding bits, to produce valid 66B blocks.

To restore the bits, the decoder must first descramble the first nibble in order to determine what the second nibble should be (step f). It must then scrambe the second nibble based on the learned scrambler state (step g).

The steps are integral to the processing defined in gustlin_02_0712 and adopted via Draft 1.0 comment #70. They will not be deleted.

Cl **91** *SC* **91.5.3.6** *P* **102** *L* **9** # 478

Cideciyan, Roy — IBM

Comment Type **TR** *Comment Status* **A** *bucket*

Encoding and scrambling is not performed at Rx.

SuggestedRemedy

Replace "Once the data is encoded and scrambled, it shall ..." by "Once the data is decoded and transcoded, it shall ..."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to:

"After the data has been transcoded, it shall be distributed to multiple PCS lanes, one 66-bit block at a time..."

Cl **91** *SC* **91.5.3.7** *P* **102** *L* **16** # 480

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A** *bucket*

There may be errors at the RS decoder output. Therefore, am_x and am_payloads in Section 91.5.2.6 does not have to be the same as am_x and am_payloads in Section 91.5.3.7

SuggestedRemedy

In Section 91.5.2.6 replace am_x and am_payloads by am_tx and am_txpayloads
In Section 91.5.3.7 replace am_x and am_payloads by am_rx and am_rxpayloads

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In 91.5.2.6, change am_x to am_tx_x and am_payloads to am_txpayloads.

In 91.5.2.6, change am_x to am_rx_x and am_payloads to am_rxpayloads.

The notation is changed from the suggested remedy to clearly separate "tx" and "rx" from the variable "x" (PCS lane number).

Cl **91** *SC* **91.5.3.7** *P* **102** *L* **27** # 479

Cideciyan, Roy IBM

Comment Type **TR** *Comment Status* **A** *bucket*

j runs from 0 to 4

SuggestedRemedy

Given i=0 to 3, j=0 to 4, and x=i+4j, the ...

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.4.2.1** *P* **104** *L* # 211

Sela, Oren Mellanox Technologies

Comment Type **E** *Comment Status* **A**

There are many variables that have the same name in CL82 and may cause unnecessary confusion.

SuggestedRemedy

Change the naming:
align_status --> RS_FEC_align_status
alignment_valid --> RS_FEC_alignment_valid
all_locked --> amps_all_locked
enable_deskew --> RS_FEC_enable_deskew

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Some variable names clash with those incorporated by reference (see 91.5.2.1 and 91.5.2.2).

Change the following variable names:
align_status to fec_align_status
alignment_valid to fec_alignment_valid
enable_deskew to fec_enable_deskew

all_locked is not a variable name in Clause 82 and does not require change.

Cl **91** *SC* **91.5.4.2.1** *P* **104** *L* # 209

Sela, Oren Mellanox Technologies

Comment Type **T** *Comment Status* **A**

restart_lock varible is not defined in the varabile section

SuggestedRemedy

add restart_lock definition

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Define restart_lock as follows (do not include text in <>):

Boolean variable that is set by the FEC alignment <see comment #49> process to reset the synchronization process on all FEC lanes. It is set to true after 3 consecutive uncorrectable codewords are received (3_BAD state) and set to false upon entry into the LOSS_OF_ALIGNMENT state.

Cl **91** SC **91.5.4.2.1** P **104** L **16** # 495

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **R** *late*

I can't see the difference between align_status (true when all lanes are synchronized and aligned) and alignment_valid. I think they can be the same.

SuggestedRemedy

Combine them into one variable, or if not, add text to explain why there are two/what the difference is.

Response *Response Status* **C**

REJECT.

This portion of the state diagram (and corresponding variables) is similar to what is used in th PCS deskew state diagram (refer to 82-12). There is no clear incentive to deviate from this familiar form.

Cl **91** SC **91.5.4.2.1** P **104** L **26** # 213

Sela, Oren — Mellanox Technologies

Comment Type **ER** *Comment Status* **A** *bucket*

typo - am_lock<x> should be amps_lock<x>

SuggestedRemedy

Change:
"A Boolean variable that is set to true when amps_lock<x> is true for all x and is set to false when am_lock<x> is false for any x.
"
To:
"A Boolean variable that is set to true when amps_lock<x> is true for all x and is set to false when amps_lock<x> is false for any x."

Response *Response Status* **C**

ACCEPT.

Cl **91** SC **91.5.4.2.1** P **104** L **39** # 243

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

How does the RS-FEC sublayer discriminate between normal operation and the optional EEE capability? The intent of this statement is to specify that the state diagram behaves one way when normal alignment markers are expected but behaves a different way when rapid alignment markers are expected.

The RS-FEC sublayer should use the EEE service interface primitives defined in 91.2 to determine if normal or rapid alignment markers are expected.

SuggestedRemedy

Tie the behavior of the state diagram to the EEE service interface primitives defined in 91.2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement changes for the optional EEE capability per healey_3bj_02_0912.

Cl **91** SC **91.5.4.2.1** P **104** L **46** # 225

Gustlin, Mark — Xilinx

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

This editor's note can be removed, Zhongfeng Wang has looked at this and the current SM is sufficiently robust for KP4 also.

SuggestedRemedy

Per the comment.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **91** SC **91.5.4.2.1** P **105** L **3** # 469

Cideciyan, Roy — IBM

Comment Type **ER** *Comment Status* **A** *bucket*

typographical error

SuggestedRemedy

Replace "maker" by "marker"

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.4.2.1** *P* **105** *L* **54** # 208

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A**

Also for the optional EEE capability, if first_amp corresponds to PCS lane 16, 17, 18, or 19, this counter counts the 4096 FEC codewords minus 256 bits to the end of the expected location of the next alignment marker payload corresponding to PCS lanes 0, 1, 2, or 3

This means that for waking in up from EEE the 4096 FEC block time is longer than the RAMs - meaning that it will also take longer for the PCS to lock

SuggestedRemedy

Option 1 -
Change amp_valid to look for lanes 0,1,2 or 3 only in FIND_1ST state for both EEE and normal mode, and to look for 16, 17,18 or 19 in COMP_2ND sate for EEE.

Option 2-
Have the same behavior for normal and EEE mode for the amp_valid and amp_counter should be 4096 FEC codewords when rx_mode = data and 8 FEC codewords when rx_mode != data.

If option 1 is chosen then the AMP_COMPARE should be changed so that for EEE amp_match should be set to true if current_pcsl = first_pcsl+16 only
If option 2 is chosen then AMP_COMPARE should change so that - if current_pcsl equals first_pcsl, amp_match is set to true - is applicable for both EEE and normal mode

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The definition of amp_counter is incorrect. During low power idle, if first_amp corresponds to PCS lanes 16, 17, 18, or 19, amp_counter should count 2 FEC codewords minus 256 bits to the end of the expected location of the next alignment marker payload corresponding to PCS lanes 0, 1, 2, or 3.

See also comment #243.

Cl **91** *SC* **91.5.4.2.1** *P* **107** *L* **3** # 199

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Figure 91-8. The variable restart_lock is not defined in the State Variables section.

SuggestedRemedy

Add a definition for restart_lock to 91.5.4.2.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #209.

Cl **91** *SC* **91.5.4.2.3** *P* **106** *L* **3** # 204

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A** *bucket*

The term first_amp is used but the variable name is first_pscl

SuggestedRemedy

Change all first_amp references to first_pscl in the amp_counter definition.

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.5.4.3** *P* **107** *L* **3** # 226

Gustlin, Mark — Xilinx

Comment Type **T** *Comment Status* **A**

The signal restart_lock is not a defined variable. Add it to the list of variables.

SuggestedRemedy

Per the comment.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #209.

Cl **91** *SC* **91.5.4.3** *P* **108** *L* **37** # 205

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A**

Figure 91-9. The transition out of TEST_CW should be gated by a new codeword being available instead of gating the exit from a cw_bad_count adjustment state being gated.

SuggestedRemedy

Change the following state transitions to be:
TEST_CW -> CW_GOOD: test_cw & !cw_bad
TEST_CW -> CW_BAD: test_cw & cw_bad
CW_GOOD -> TEST_CW: UCT
CW_BAD -> TEST_CW: cw_bad_count < 3

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Added Subcl 91.5.4.3 for consistent sorting.]

The Suggested Remedy would cause the first codeword received after ALIGN_REQUIRED to not be considered in cw_bad_count. Otherwise, there is no difference between the existing state diagram and proposed modifications.

The problem with existing state diagram is not made clear. This is the form used in clauses 49 and 82. There is no obvious advantage to the suggested remedy.

However, in the course of considering this comment, two errors were found. In Figure 91-8, test_amp should be assigned the value FALSE in the LOCK_INIT state. In Figure 91-9, test_cw should be assigned the value FALSE in the ALIGN_ACQUIRED state. Add the assignments to the corresponding state diagrams.

Cl **91** *SC* **91.6** *P* **108** *L* **52** # 244

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

The RS-FEC architecture has stabilized to the point where MDIO status and control variables can be defined.

SuggestedRemedy

Include tables defining RS-FEC status and control variables and amend Clause 45 accordingly.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Refer to comment #196.

Cl **91** *SC* **91-2** *P* **94** *L* # 207

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **R**

In the receive path should merge the alignment lock and deskew block with the Lane reorder block - all 3 action are done be acquiring FEC block lock based on the alignment markers. Also this will make is consistent with Figure 91-7

SuggestedRemedy

Create one block "alignment lock, deskew and lane reorder" to replace the 2 blocks in the receive path in figure 91-2

Response *Response Status* **C**

REJECT.

Figure 91-7 is intended to describe bit order and for that purpose there was no advantage to showing "lane reorder" as a separate block.

Figure 91-2 is partitioned to correspond with the organization of subclauses.

Lane reordering is not needed to obtain alignment lock. Lane reordering is needed to verify that valid codewords are being received after alignment lock which requires information from the Reed-Solomon decoder. Therefore, even with the proposed consolidation, the functions are still not self-contained.

For these reasons the partition will remain as is.

Cl **91** *SC* **91-8** *P* **107** *L* # 210

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **A**

The FEC synchronization state diagram doesn't take into account the fast lock needed for EEE wakeup from LPI QUITE - need to specify that amp_count should count 4096 FEC codeword when rx_mode is DATA and 8 FEC codeword when rx_mode is not DATA.

SuggestedRemedy

per comment

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #243.

Cl **91** *SC* **91-9** *P* **108** *L* # 212

Sela, Oren — Mellanox Technologies

Comment Type **E** *Comment Status* **A**

The name: "FEC deskew" is not the right name for that diagram. This diagram doesn't only enable/disable deskew but also monitors the FEC block lock

SuggestedRemedy

Change the name of the Figure to: "FEC block lock state diagram" or "FEC block lock and deskew state diagram"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #49.

Cl **91** *SC* **Figure 91-4** *P* **97** *L* **4** # 58

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **A**

This figure describes the mapping process specified on line 43 page 95, but the column heading description "Reed Solomon Symbol Index, k" does not relate to this mapping process

SuggestedRemedy

The columns should be labelled either by alignment marker column index "j" or by column (0 to 319). Better still with both as it makes the mapping easire to understand.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #150.

Figure 91-4 illustrates the am_payloads matrix and "k" does indeed relate to the mapping per page 95, lines 45 to 48.

Cl **91** *SC* **Figure 91-5** *P* **98** *L* **39** # 47

Szczepanek, Andre — Inphi

Comment Type **ER** *Comment Status* **A** *bucket*

Why do we refer to w-bit symbols rather than 10bit symbols.
The rest of this clause has been written on the basis of 10bit symbols,
So "w" is not a variable.

SuggestedRemedy

Replace "symbol delay element, holds 1 w-bit symbol"
with "symbol delay element, holds 1 10-bit symbol"

Response *Response Status* **C**

ACCEPT.

See comment #48.

Cl **92** *SC* **92.1** *P* **111** *L* **19** # 250

Ran, Adee — Intel

Comment Type **ER** *Comment Status* **A**

RS is connected to PCS through CGMII, not to RS-FEC through CAUI. "RS" is likely a typo and should read "PCS".

Figure 92-1 does not show the optional CAUI. If it was shown, the text would be clearer.

Same comment applies to 93.1 and 94.1.

Additional alarification may be required: according to clause 83.1.4 and annex 83A.1 CAUI can be implemented between two PMAs, to separate the PCS (or the optional FEC) from the PMD. With mandatory RS-FEC instead of optional FEC, CAUI can only be used to separate the RS-FEC from the PCS over 10 lanes (top CAUI at right half of figure 83-2), since output of RS-FEC encoder is 4 physical lanes, over which CAUI is not defined. Since such separation would require 10 lanes, it seems to have mainly theoretical value.

SuggestedRemedy

Change "between the RS and the RS-FEC" to "between the PCS and the RS-FEC".

Optionally, add CAUI in figure 92-1 to clarify the meaning of this sentence, or refer to annex 83C.1a.2.

Apply same changes in clauses 93.1 and 94.1, figures 93-1 and 94-1.

Consider clarifying that separating PCS and RS-FEC through CAUI requires 10 lanes.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The text cited in this comment is modified by comment #489.

Cl **92** *SC* **92.10** *P* **134** *L* **10** # 398

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

In Table 92-9, there is no sub-clause reference for "Minimum insertion loss at 12.8906 GHz". This is not defined in any of the sub-clauses.

SuggestedRemedy

Add specification for minimum IL of 4 dB in 92.10.2.
On line 10 in Table 92-9 add reference to 92.10.2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #289.

Cl **92** *SC* **92.10** *P* **134** *L* **14** # 314

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

It is not helpfull to specify just a point for RL in the table 92-9

SuggestedRemedy

Replace single point with reference to 92.10.4 and equation 92.24 and remove the "at 12.89 GHz"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

This is a summary table and not the specification. The table references the subclause which contains that equation the normatively and completely specifies the return loss limit.

However, correct the return loss cross- reference form 92.10.5 to 92.10.4 in Table 92-9.

Cl **92** *SC* **92.10** *P* **134** *L* **15** # 460

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **R**

Missing spec items.

SuggestedRemedy

Add rows for common-mode return loss, mode conversion reflection loss, Integrated Common-mode Conversion Noise, ILD. Consider adding ILDrms.

Response *Response Status* **C**

REJECT.

Proposal lacking sufficient recommended changes to implement in the draft.

Cl **92** *SC* **92.10.2** *P* **135** *L* **17** # 274

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

In Table 92-10-Maximum cable assembly insertion loss characteristics the maximum fitted insertion loss coefficients a1, a2, and a4 are TBD's...

SuggestedRemedy

Replace TBD's with a1=4.28, a2=0.326, and a4=0.0185

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.10.4** *P* **137** *L* **3** # 315

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

There is jump in the RL equation

SuggestedRemedy

Change to 10.5-13log10(f/5.5) from 4.1 to 25 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change 16.2-2sqrt(f) 0.05=f<4.1
To 16.5-2sqrt(f) 0.05=f<4.1

Change 10.59-13log10(f/5.5) 4.1=f=25
To 10.8-13log10(f/5.5) 4.1=f=25

Cl **92** *SC* **92.10.7** *P* **139** *L* **38** # 285

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

The total integrated crosstalk RMS noise voltage determined by Equation (92-32) and Figure 92-11 are TBD's.

SuggestedRemedy

diminico_0912.pdf provides the total integrated crosstalk RMS noise voltage Equation (92-32) and Figure 92-11.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #7:
Replace Equation (92-32) with the equation from diminico_3bj_01a_0912 slide 10.
Agree -- 18
Disagree -- 3

Therefore, replace Equation (92-32) with the equation from diminico_3bj_01a_0912 slide 10.

Cl **92** *SC* **92.10.8** *P* **140** *L* **29** # 399

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

There is a reference to return loss specification in 92.8.3.6 which in turn refers to 92.10.9.2. The reference should be directly to the section containing the details.

SuggestedRemedy

Change "92.8.3.6" to "92.10.9.2".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The test fixture subclauses will be consolidated under a single subclause and the references will change as a result.

Cl **92** *SC* **92.10.8** *P* **140** *L* **34** # 316

Ghiasi, Ali Broadcom

Comment Type **TR** *Comment Status* **A**

ILcat(f) is missing

SuggestedRemedy

ILcat(f) = 1.25 * (-0.001+0.096*sqrt(f)+0.046*f^2)
which has loss of 1.25 dB at 14 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response comment #288.

Cl **92** *SC* **92.10.8** *P* **140** *L* **34** # 317

Ghiasi, Ali Broadcom

Comment Type **TR** *Comment Status* **A**

ILxyz(f) of the HCB is missing

SuggestedRemedy

Add section like 10.8 for HCB then add following
ILcat(f) = 1.75 * (-0.001+0.096*sqrt(f)+0.046*f^2)
which has loss of 1.75 dB at 14 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #277.

Cl **92** *SC* **92.10.8** *P* **140** *L* **34** # 288

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

The reference test
fixture printed circuit board insertion loss is given in
Equation (92-33).

SuggestedRemedy

diminico_0912.pdf provides Equation (9-33).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Incorporate ghiasi_3bj_01a_0912, slide 7, "MCB_Loss" as the reference cable assembly test fixture insertion loss.

Frequency range is 0.01 to 18.75 GHz.

Cl **92** *SC* **92.10.8** *P* **141** *L* **8** # 377

Matthew, Brown — Applied Micro

Comment Type **E** *Comment Status* **A** *bucket*

In Figure 92-12, since the block for the cable assembly test fixture excludes the connector labels for the receptacle and plug should be included.

SuggestedRemedy

In Figure 92-12, add labels for the receptacle and plug.

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.
Note:MDI is labeled.

Cl **92** *SC* **92.10.9** *P* **141** *L* **22** # 60

Sommers, Scott — Molex

Comment Type **ER** *Comment Status* **A**

Spec references "The test fixtures of Figure 92-5 and Figure 92-12 are specified in a mated state illustrated in Figure 92-13".

Often, this clause is misinterpreted and applied as a MDI specification.

SuggestedRemedy

"The test fixtures of Figure 92-5 and Figure 92-12 are specified in a mated state, illustrated in Figure 92-13, to enable connections to measurement equipment. The requirements in this section are not MDI specifications for an implemented design."

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.10.9** *P* **143** *L* **24** # 280

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Mated test fixtures common-mode return loss specification not included in the draft.

SuggestedRemedy

Add Mated test fixtures common-mode return loss subclause 92.10.9.3 and Equation (92-xx) and illustration in Figure 92-xx. diminico_0912.pdf provides the 92.10.9.3 Mated test fixtures common-mode return loss
Equation (92-xx) an illustration in Figure 92-xx.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Specify common-mode return loss per diminico_3bj_01a_0912, slide 18.

Cl **92** *SC* **92.10.9.1** *P* **141** *L* **44** # 278

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **R**

92.10.9.1 Mated test fixtures insertion loss Equations (92-34) and (92-35 and illustration in Figure 92-14 are TBD's.

SuggestedRemedy

diminico_0912.pdf provides the 92.10.9.1 Mated test fixtures insertion loss Equations (92-34) and (92-35) and illustration in Figure 92-14.

Response *Response Status* **C**

REJECT.

Straw poll #14: Use ghiasi_3bj_01a_0912, slide 9, "SDD21_Max2dB" as the mated test fixture insertion loss limit.
Agree -- 8
Disagree -- 4

There was not sufficient consensus to adopt the proposal. The parameter will remain TBD and the work will continue on the development of an appropriate limit.

Cl **92** *SC* **92.10.9.1** *P* **141** *L* **50** # 318

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

Mated test fixture max and min loss are missing

SuggestedRemedy

ILMTFmin=(0.08*sqrt(f)+0.2*f) for 0.01 to 25.78 GHz
ILMTFmax=(-0.114 + 0.45*sqrt(f)+0.21*f) for 0.01 to 14 GH
= 4.5 - 0.66*f for 14 to 25.78 GHz

Response *Response Status* **C**

REJECT.

See #278.

Cl **92** *SC* **92.10.9.2** *P* **142** *L* **31** # 400

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

The sentence implies that I need to measure only one side of the test fixture at my disgression. I assume that the intent is to measure both and meet the specifications on both.

SuggestedRemedy

Change "either test fixture interface" to "each test fixture interface".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.10.9.2** *P* **142** *L* **34** # 319

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

Mated board RL value TBD

SuggestedRemedy

Presenttion will show the graph but the propsoed limits are
RL= 20 -f for 0.01 to 4 GHz
= 18 - 0.5* f for 4 GHz to 16 GHz
= 11.2 - 20.5*log10(f/14e9) for 16 to 25.78 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Incorporate ghiasi_3bj_01a_0912, slide 9, "MCB_HCB_RL3" as the mated test fixture return loss limit.

Frequency range is 0.01 to 18.75 GHz.

Cl **92** *SC* **92.10.9.2** *P* **142** *L* **35** # 279

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

92.10.9.2 Mated test fixtures return loss Equation (92-36) an illustration in Figure 92-15 are TBD's.

SuggestedRemedy

diminico_0912.pdf provides 92.10.9.2 Mated test fixtures return loss Equation (92-36) an illustration in Figure 92-15.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #319.

Cl **92** *SC* **92.10.9.3** *P* **143** *L* **25** # 281

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

92.10.9.3 Mated test fixtures common-mode conversion loss Equation (92-37) an illustration in Figure 92-16 are TBD's.

SuggestedRemedy

diminico_0912.pdf provides the 92.10.9.3 Mated test fixtures common-mode conversion loss Equation (92-37) an illustration in Figure 92-16.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set the mated test fixture common-mode conversion loss limit to:
30-1.143*f from 0.01 to 14 GHz
14 from 14 to 18.75 GHz

Cl **92** *SC* **92.10.9.3** *P* **143** *L* **27** # 452

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **R**

Is "common-mode conversion loss" a through loss?

SuggestedRemedy

If so, add "common-mode conversion return loss" spec.

Response *Response Status* **C**

REJECT.

The common-mode conversion loss is a through loss.

There is no proposal for a common-mode conversion return loss specification.

Cl **92** *SC* **92.10.9.3** *P* **143** *L* **35** # 320

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

Coversion loss is TBD

SuggestedRemedy

SCDxx= -35+1.07*f for 0.01 to 14 GHz
= -20 dB for 14 to 25.78 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #281.

Cl **92** *SC* **92.10.9.4** *P* **144** *L* **27** # 378

Matthew, Brown — Applied Micro

Comment Type **E** *Comment Status* **A** *bucket*

missing word

SuggestedRemedy

Change "disturber near-end for" to "disturber near-end crosstalk for".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change "disturber near-end" to "disturber near-end crosstalk loss".

Cl **92** *SC* **92.10.9.4** *P* **144** *L* **35** # 282

DiMinico, Christopher — MC Communications

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

92.10.9.4 Mated test fixtures integrated crosstalk noise parameter values in Table 92-12 are TBD's.

SuggestedRemedy

diminico_0912.pdf provides the 92.10.9.4 Mated test fixtures integrated crosstalk noise parameter values in Table 92-12.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **92** *SC* **92.10.9.4** *P* **145** *L* **16** # 401

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

The connector is specifically the 28 Gbps version. Also, the SFF document is SFF-8665.

SuggestedRemedy

Change "the quad small" to "the 28 Gbps quad small".
Change "SFF-TBD" to "SFF-8665".

Response *Response Status* **C**

ACCEPT.

The MDI connector shall be the QSFP+ 28 Gb/s 4X Pluggable (QSFP28) receptacle with the mechanical mating interface defined in SFF-8665 and illustrated in Figure 92-18.

Cl **92** *SC* **92.11** *P* **145** *L* **12** # 37

Cole, Chris Finisar

Comment Type **T** *Comment Status* **A**

Add 2nd MDI specification, as justified in cole_01_0712 and supported in mcsorley_01_0712

SuggestedRemedy

Incorporate text as per cole_02_0712

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Incorporate additional MDI style per cole_3bj_01_0912.pdf.

Cl **92** *SC* **92.2** *P* **113** *L* **1** # 410

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

This section defines service primitives. PMD:IS_UNITDATA(SIGNAL_OK) is precisely defined in 80.3.3.3.1. This section only needs to specify that SIGNAL_OK takes its value from SIGNAL_DETECT in 92.7.4.

SuggestedRemedy

Replace paragraph with "The SIGNAL_OK parameter in PMD:IS_UNITDATA(SIGNAL_OK) indicates the value of SIGNAL_DETECT specified in 92.7.4".

Response *Response Status* **C**

ACCEPT.

Verify that Clause 93 is consistent with this response.

Cl **92** *SC* **92.2** *P* **113** *L* **1** # 414

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

This section defines service primitives. PMD:IS_UNITDATA(SIGNAL_OK) is precisely defined in 80.3.3.3.1. This section only needs to specify that SIGNAL_OK takes its value from SIGNAL_DETECT in 93.7.4.

SuggestedRemedy

Replace paragraph with "The SIGNAL_OK parameter in PMD:IS_UNITDATA(SIGNAL_OK) indicates the value of SIGNAL_DETECT specified in 93.7.4".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Changed Subcl from 93.2 to 92.2].

Based on the page/line number, it is assumed that the commenter is referring to 92.7.4 in the comment and suggested remedy. However, if the commenter did indeed mean to apply this comment to Clause 93, the response comment #410 suggests any changes be consistently applied to Clauses 92 and 93.

See comment#410.

Cl **92** *SC* **92.2** *P* **113** *L* **11** # 101

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A**

For change of LPI Rx function

rx_mode needs to change direction

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.7.1** *P* **114** *L* **52** # 412

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

What is the difference between a test and measurement?

SuggestedRemedy

Change "measurements and tests" to "tests" or "measurements".

Change in various other places in Clause 92.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Delete "tests".
Change: Unless specified otherwise, all transmitter measurements and tests defined in Table 92-5 are made at TP2 utilizing the test fixture specified in
92.8.3.5
To: Unless specified otherwise, all transmitter measurements defined in Table 92-5 are made at TP2 utilizing the test fixture specified in
92.8.3.5.

Cl **92** *SC* **92.7.1** *P* **114** *L* **52** # 411

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Table 92-5 is a summary list of parameters not measurements and tests. Refer to section 92.8.3 instead.

SuggestedRemedy

Change "Table 92-5" to "92.8.3".

Make similar changes throughout Clause 92.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change "Table 92-5" to "92.8.3" page 114 L52

Please note: 92.8.3 is Transmitter characteristics and Table 92-5 is "Transmitter characteristics" at TP2 summary

---

Cl **92** *SC* **92.7.1** *P* **116** *L* **29** # 413

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

SLn<p> and SLn<n> should be SLi<p> and SLi<n>, respectively. Also, reference to lane n at end of paragraph should be lane i.

SuggestedRemedy

Replace "SLn<p> and SLn<n>" with "SLi<p> and SLi<n>".
Replace "lane n (n = 0,1,2,3)" with "lane i (i = 0,1,2,3)".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.7.1** *P* **116** *L* **45** # 428

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

Table layout.

SuggestedRemedy

Please make the right hand column wider, so TP4 is not on a line by iteslf and the table looks better.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Will do if possible.

Cl **92** *SC* **92.7.1** *P* **116** *L* **53** # 305

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R** *bucket*

Cable output test point is TP4 and not TP3

SuggestedRemedy

Repalce TP3 with TP4 in table 92-4

Response *Response Status* **C**

REJECT.

Line 53 TP3 is for receiver measurements.

Cl **92** *SC* **92.7.1** *P* **89** *L* **41** # 10141

Dawe, Piers IPtronics

Comment Type **ER** *Comment Status* **R**

"Functional specifications" are brief, high-level (logic level) specifications of what the PMD layer does. This text is going too far into the electrical detail which is better placed elsewhere e.g. at the beginning of the "Definitions of parameters and measurement methods" subclause

SuggestedRemedy

Try to move some of the material between line 41 line "A mated connector pair has been included" and p90 line 2 "Annex 92A." into the channel or "Definitions of parameters and measurement methods" subclause.

Response *Response Status* **C**

REJECT.

92.7.1 text describes the link block diagram and supports the defined test point definitions in Table 92-4 100GBASE-CR4.

Cl **92** *SC* **92.7.1** *P* **90** *L* **48** # 10212

Dudek, Mike QLogic

Comment Type **T** *Comment Status* **A** *bucket*

In table 92-4 The Test points TP0 to TP1 and TP4 to TP5 don't match the description. There are no mated connector pairs between eg TP0 and TP1

SuggestedRemedy

Change the test points on this row from TP1 to TP2 and from TP4 to TP3

Response *Response Status* **C**

ACCEPT.

Change Table 92-4 row 3 from "TP0 to TP1" to "TP0 to TP2" and from "TP4 to TP5" to "TP3 to TP5".

Cl **92** *SC* **92.7.1** *P* **90** *L* **7** # 10161

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **A** *bucket*

Figure 92-2 shows TP0 just by the PMD transmit function, TP1 just by the connector and so on. This is at odds with the text: TP1-4 are offset from the connector by the HCB or MCB trace loss, TP0 and TP5 are not offset.

SuggestedRemedy

Make the arrow for TP0 and TP5 point exactly at the end of the function, move the arrows for TP1-4 further from the connectors. Thanks!

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Figure 92-2 move TP0 and TP5 as close to end of Tx/Rx functions as possible. TP1 to TP4 includes cable assembly text fixture loss; move TP1 and TP4 further back from MDI.

Cl **92** *SC* **92.7.10** *P* **118** *L* **37** # 418

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

What is meant by "but should not include the assertion of the Global_PMD_transmit_disable function"? First, I assume must be referring to the variable, not the function. Second, I assume it must mean not to consider the variable being set as a fault.

SuggestedRemedy

Change "but should not include the assertion of the Global PMD_transmit_disable function" to "but should not consider assertion of the Global_PMD_transmit_disable variable as a transmitter fault".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #421.

Cl **92** *SC* **92.7.10** *P* **156** *L* **11** # 379

Matthew, Brown Applied Micro

Comment Type **E** *Comment Status* **A** *bucket*

pmd_transmit_fault is specified as option in the previous paragraph

SuggestedRemedy

delete " (optional)"

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.7.12** *P* **119** *L* **14** # 201

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **R**

The clause 72 PMD training sequence has a timeout value of 500ms. We're going 2.5 times faster with more loss then 802.3ap. The channel is going to be more difficult and thus will likely require more time to optimize the link.

SuggestedRemedy

Add statements changing the PMD training timeout time for clause 92, 93, and 94 to be 1.5s.

Response *Response Status* **C**

REJECT.

Given the increase in rate, training frames will also be exchanged 2.5 times more quickly, implying 2.5 times the updates within a fixed time window of approximately 500 ms.

Cl **92** *SC* **92.7.12** *P* **119** *L* **6** # 381

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

It says the seed must be different on lanes, but says nothing about the relative phase. As specified it would be okay to use "different" seeds on each lane, but such that the phase of the pattern between the lanes was close and thus would defeat the purpose of the random seed. Specify that the pattern must not be persistently close between any two lanes.

SuggestedRemedy

Append the first sentence with "and the pattern on each of the lanes shall not be persistently close in phase with any other lane".

Update 93.7.12 similarly.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The relative "phases" of the test patterns are dictated in large part by the seed values and to a smaller extent the skew between lanes.

The suggested requirement is likely to be unclear to the reader in terms of how to implement or verify. The desired effect is to minimize the correlation between the test patterns on different lanes so perhaps a specification this is terms of correlation is the better approach.

Change the second paragraph to:
"The seeds of the training pattern described in 72.6.10.2.6 should be chosen to minimize the correlation between lanes on the medium."

Update 93.7.12 similarly.

Cl **92** *SC* **92.7.12** *P* **143** *L* **22** # 266

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A**

The draft says that each lane of this PMD shall use the same control function as 10GBASE-KR. However, the baud rate is different and Clause 72.6.10 has many explicit references to 10GBASE-KR UI.

SuggestedRemedy

use the same control function logic but change to the 25Gbaud signaling rate. I'm not entirely sure how to document it. Some possible options are: Option 1: copy 72.6.10 PMD control function into draft and modify references to state 100GBASE-CR4 baud rates and UI. Option 2: bring 72.6.10 PMD control function into draft and add clarifications for 100GBASE-CR4 at each instance (so that both 10GBASE-KR and 100GBASE-KR4 are listed) Option 3: bring 72.6.10 PMD control function into draft and make generic references to new variables for each PMD type. See presentation to be submitted.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comments #10175 (and #265).

Cl **92** *SC* **92.7.4** *P* **117** *L* **18** # 415

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

PMD service layer is specified in 92.2. Specify SIGNAL_DETECT here and refer to 92.2.

SuggestedRemedy

Delete first paragraph.
Append last sentence of first paragraph with "see 92.2".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The purpose of the function is to convey the value of SIGNAL_DETECT via the service interface primitive so the text is appropriate and will be kept.

However, the cross-reference to 92.2 can be added.

Also, ensure that Clause 93 is consistent.

Cl **92** *SC* **92.7.4** *P* **117** *L* **24** # 416

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

Should be more specific which state diagram is being referred to.

SuggestedRemedy

Change "training state diagram" to "training state diagram in Figure 72-5".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.7.8** *P* **92** *L* **16** # 10165

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

This (a PMD clause) says "Local loopback mode shall be provided by the adjacent PMA (see 83.5.8) as a test function to the device." That's impossible: only the PMA clause can tell the PMA what to do.
"Device" is not a standards word (too vague).
Why is this loopback needed?

SuggestedRemedy

83.5.8, PMA local loopback mode, says "PMA local loopback shall be provided by the PMA adjacent to the PMD for 40GBASE-KR4, 40GBASECR4, and 100BASE-CR10 PMDs."
If it's really necessary, explain in the comment response, and add 100BASE-CR4 to the list in 83.5.8, and here in 92.7.8, change to "The PMA adjacent to the PMD provides PMA local loopback mode (see 83.5.8) as a test function."
Otherwise, chnage to "The PMA adjacent to the PMD may optionally provide PMA local loopback mode (see 83.5.8) as a test function."
Similarly for 93.7.8 and 94.2.9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The commenter correctly points out the normative requirement is already stated in 83.5.8. It sets the precedent that loopback is required for 40 Gb/s and 100 Gb/s copper PHYs.

Change the first sentence of 83.5.8 as follows.

"PMA local loopback shall be provided by the PMA adjacent to the PMD for 40GBASE-KR4, 40GBASE-CR4, 100GBASE-CR10, 100GBASE-KR4, and 100GBASE-CR4 PMDs."

Change the first sentence of 92.7.8 and 93.7.8 to:
"Local loopback mode is provided by the adjacent PMA (see 83.5.8) as a test function."

Cl **92** *SC* **92.7.9** *P* **118** *L* **31** # 417

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

PMD_fault must be defined whether or not MDIO is implemented.

SuggestedRemedy

Delete "If the MDIO is implemented, ".
Add a new sentence, "If the MDIO is implemented, PMD_fault shall be mapped to the fault bit as specified in 45.2.1.2.1."

Response *Response Status* **C**

ACCEPT.

See comment #419.

Cl **92** *SC* **92.8** *P* **94** *L* **1** # 10140

Dawe, Piers — IPtronics

Comment Type **ER** *Comment Status* **R**

The layout of these clauses makes them hard to use, with PMD specifications on the one hand, and measurement and definition detail on the other, muddled together.

SuggestedRemedy

Follow the usual layout of a PMD clause, with subclause for transmitter and receiver then a separate subclause: Definition of parameters and measurement methods.

Response *Response Status* **C**

REJECT.

Clause 92 (PMD) structure follows Clause 85 providing Tx and Rx subclauses and subclause for link segment parameters etc…

Cl **92** *SC* **92.8.1** *P* **119** *L* **22** # 351

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **A**

Does low-swing differential signaling really make you immune to noise?

SuggestedRemedy

Use editorial license to avoid stating immunity.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #382.

Cl **92** *SC* **92.8.1** *P* **119** *L* **22** # 382

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

In the last sentence... How does a "low-swing" improve "noise immunity"? The improvement i EMI is compared to what? This statement is outdated and should be removed.

SuggestedRemedy

Delete last sentence in paragraph.

Response *Response Status* **C**

ACCEPT.

Use suggested remendy.

Cl **92** *SC* **92.8.1.1** *P* **157** *L* **32** # 322

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

Why are we introducing new jitter term "Effectve random jitter"

SuggestedRemedy

Replace effective random jitter with "random jitter"

Response *Response Status* **C**

REJECT.

The term "effective" was added in recognition that the measurement is based on the assumption that the jitter distribution is Gaussian but in fact says nothing about its randomnes

It is not necessarily the true random jitter on the link (in much the same way 48B.1.3 refers to the deterministic jitter, derived from the same method, as "effective DJ").

Cl **92** *SC* **92.8.3** *P* **120** *L* # 273

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Resolution to D1.0 comment 273 to Populate Table 92-5 with the values in diminco_01_0712.pdf slide 4 with the following exceptions.
a) Values that are explicitly defined by other comments.
b) DC common-mode voltage (max.) is set to 1.9.

Should have indicated to use diminico_01_0712.pdf slide 4 Equations 92-1, 92-2 and 92-3.

SuggestedRemedy

Use diminico_01_0712.pdf slide 4 Equations 92-1, 92-2 and 92-3 for D1.1 Equations 92-1, 92 2 and 92-3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #13: For host return loss, use ghiasi_3bj_01a_0912, slide 9, "Host_RLprop"
Agree -- 13
Disagree -- 1

Therefore, incorporate ghiasi_3bj_01a_0912, slide 9, "Host_RLprop". In addition change receiver return loss limit Equation (92-16) to match.

Frequency range is 0.01 to 18.75 GHz.

Note that equations (92-2) and (92-3) are addressed in a different comment.

Cl **92** *SC* **92.8.3** *P* **120** *L* **15** # 386

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

In Table 92-5, no reference for Differential peak-to-peak output voltage (max) with Tx disablec

SuggestedRemedy

On line 15, add reference to 92.7.7.

Response *Response Status* **C**

ACCEPT.

Cl **92** *SC* **92.8.3** *P* **120** *L* **15** # 384

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Table 92-5 "Common-mode voltage limits", only one limit specified.

SuggestedRemedy

On line 16, change "limits" to "(max)".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.3** *P* **120** *L* **16** # 352

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **A**

The label "Common-mode voltage limits" does not well define what the value represents.

SuggestedRemedy

Change label to "Common-mode voltage (max)" for better description and achieve commonality with other table items.

Response *Response Status* **C**

ACCEPT.

See comment #384.

Cl **92** *SC* **92.8.3** *P* **120** *L* **16** # 447

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **R**

The common-mode voltage limit for a CR4 transmitter needs to be chosen appropriately. Simply copying KR4 would be capricious and irrational because the circumstances are different. There are real DC blocking capacitors in the cable so any voltage that doesn't cause them to hold too much charge or break down is OK - the receive silicon doesn't have tc work with this voltage, it chooses its own. But it makes more sense to define the range of single-ended voltages, as done in nPPI which has the same QSFP connector, and XLAUI, and a typical silicon implemementation will support two or three of these. The single-ended voltage allows for a range of bias voltages and an allowance for signal swing.
Compare Table 83A-1 and Table 86A-1.

SuggestedRemedy

Change
Common-mode voltage limits 72.7.1.4 1.9 V
to
Single ended output voltage min -0.3, max 4 V

Response *Response Status* **C**

REJECT.

Straw poll #8
Change common mode voltage to single-ended output voltage with limits of -0.3 V (min.) to 4 V (max.)
Agree -- 15
Disagree -- 5

After discussion, it was not clear there was consensus on the proposed maximum liimit. Further, it was observed that there is no definition of single-ended output voltage in 72.7.1.4 (different reference is needed).

Recount:
Agree -- 3
Disagree -- 19

Cl **92** *SC* **92.8.3** *P* **120** *L* **19** # 385

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Table 92-5. No reference for Common-mode AC output voltage (max., RMS).

SuggestedRemedy

On line 120, add reference to defining sub-clause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a subclause to Clause 92 based on 93.8.1.3 and reference the subclause from the table.

Cl **92** *SC* **92.8.3** *P* **120** *L* **19** # 446

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **R**

Need specs for common-mode output return loss and output mode conversion loss (from common to differential).

SuggestedRemedy

Add specs for common-mode output return loss and output mode conversion loss (from common to differential).
For example, use the InfiniBand FDR specs, scaled for signalling rate.

Response *Response Status* **C**

REJECT.

Suggested remedy proposal lacking sufficient recommended changes to implement in the draft.

Cl **92** *SC* **92.8.3** *P* **120** *L* **29** # 353

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **A** *bucket*

For someone looking at the document for the first time, the labels "minimum precursor/post cursor fullscale range" may be confusing since the description is of a ratio.

SuggestedRemedy

Change labels to phrasing similar to "minimum precursor ratio" with editorial license to adjust terminology in section 92.8.3.3.3

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Use suggested remedy.

Cl **92** *SC* **92.8.3** *P* **120** *L* **3** # 383

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

The sentence referring to Table 92-5 uses the "s" word. Table 92-5 is a summary table. Most of the parameters are defined normatively in respective sections. The unit interval specification is informative since it does not give any bounds. Similar sections in other clause to not make this normative referral to the summary table.

SuggestedRemedy

Change sentence to "Transmitter characteristics are summarized in Table 92-5. Measurements are at TP2 unless otherwise noted."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change:Transmitter characteristics shall meet specifications summarized in
Table 92-5 at TP2 unless otherwise
noted.
To: Transmitter characteristics are summarized in Table 92-5. Unless specified otherwise, all transmitter measurements defined in
Table 92-5 are made at TP2 utilizing shall use the test fixture specified in
92.8.3.5.

Confirm that each referenced subclause includes "shall" related to normative requirements.

Cl **92** *SC* **92.8.3** *P* **120** *L* **32** # 27

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A**

The Value column for "Far-end transmit output noise (max)" contains:
"2 Equation (92-2)"
"1Equation (92-3)"

The "2 " and "1" at the beginning seem spurious.

SuggestedRemedy

Change to:
"See Equation (92-2)"
"See Equation (92-3)"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The "2" and "1" are the specification values. The equation may be found in the referenced subclause 92.8.3.2. Remove the equation numbers/cross-references.

In 92.8.3.2, set TBD equations (92-2) and (92-3) per diminico_3bj_01a_0912 slide 4.

Cl **92** *SC* **92.8.3** *P* **120** *L* **36** # 307

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

Why are we introducing effective random jitter instead of classical definition of the random jitter

SuggestedRemedy

Replace efective random jitter with random jitter

Response *Response Status* **C**

REJECT.

See comment#322.

Cl **92** *SC* **92.8.3** *P* **120** *L* **36** # 306

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

It has not been shown thant allowing DJ to max out at 0.28 it will not have severe impact on the link

SuggestedRemedy

Add line with max deterministic jitter =0.15 UI

Response *Response Status* **C**

REJECT.

As similar concept was discussed in context of Clause 93. There was lack of consensus to implement suggested remedy. Given the relationship between Clauses 92 and 93, this response is intended to make them consistent.

See comment #321.

Cl **92** *SC* **92.8.3** *P* **94** *L* **1** # 10170

Dawe, Piers — IPtronics

Comment Type **ER** *Comment Status* **R**

"92.8.3 Transmitter characteristics" sounds like a datasheet. Please write in normative standards language!
Also follow the house style of 100GE unless improving on it.

SuggestedRemedy

Change "92.8.3 Transmitter characteristics" to "92.8.3 Transmitter electrical specifications". Similarly for receiver and the other PMD clauses.

Response *Response Status* **C**

REJECT.

See comment #434.

Cl **92** *SC* **92.8.3** *P* **94** *L* **13** # 10169

Dawe, Piers — IPtronics

Comment Type **ER** *Comment Status* **A**

Trying to define the nominal unit interval is not necessary, very difficult to do precisely, and nc usual: most PMD clauses including 93 and 94 don't.

SuggestedRemedy

Delete this row, and in Table 92-7. In 92.8.3.9 and 92.8.4.4, change "nominally" to "approximately" or delete the sentences.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #10
Delete "unit interval" row from Table 92-7.
Agree -- 7
Disagree -- 9

Therefore, the row will be kept.

Unit UI used extensively throughout clause. In addition, subclauses include percentage of UI e.g., 92.8.3.3 Transmitter output waveform .

In 92.8.3.9 change "nominally" to "approximately". In 92.8.4.4 delete nominal.

Cl **92** *SC* **92.8.3.1** *P* **120** *L* **52** # 308

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

Transmitter RL is TBD

SuggestedRemedy

RL= 12 - 0.5*f for 0.05 to 8 GHz
= 5.67 - 9.71*log10(f/14e9) 8 GHz to 25.78 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #273.

Cl **92** *SC* **92.8.3.2** *P* **121** *L* **10** # 286

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Values are provided for TBD's for two reference channels; a "low-loss" cable assembly with insertion loss on the reference pair of TBD dB ± TBD dB at 12.8906 GHz
and a "high-loss" cable assembly with insertion loss on the reference pair of
TBD dB ± TBD dB at 12.8906 GHz.

SuggestedRemedy

diminico_0912.pdf provides the values for TBD's of the two reference channels.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #5:
Replace TBDs with values proposed in diminico_3bj_01a_0912 slide 4.
Agree -- 22
Disagree -- 3

Therefore, replace TBDs with values proposed in diminico_3bj_01a_0912 slide 4.

Cl **92** *SC* **92.8.3.2** *P* **122** *L* **43** # 356

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **A** *bucket*

This paragraph references 100GBASE-KR with a section number then references 10GBASE-KR without a section. Perhaps one of these references is in error.

SuggestedRemedy

Use editorial license to correct to the intended reference.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #365.

Cl **92** *SC* **92.8.3.2** *P* **30** *L* **43** # 365

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **A**

Stating that the test methodology of 10GBASE-KR is not a good methodology for this standard is unnecessary and not helpful.

SuggestedRemedy

Delete the sentence "However, the signal path from the transmit function to TP2 introduces frequency-dependent loss and phase shift that distorts the signal and makes it difficult to accurately characterize equalizer performance at TP2 using the methodology specified for 10GBASE-KR."

Response *Response Status* **C**

ACCEPT.

This overtaken by comment #493.

Cl **92** *SC* **92.8.3.3** *P* **122** *L* **42** # 153

Ran, Adee Intel

Comment Type **E** *Comment Status* **A** *bucket*

The text in this paragraph originates from clause 85 where it explains the differences of the measurement method compared to clause 72. The recent edit changed the reference from clause 72 into clause 93.

Since clause 93 also refers to the measurement method in 85.8.3.3 (for the same reasons described here), the rest of this paragraph (starting from "However") makes little sense.

SuggestedRemedy

Either revert to the previous version (refer to 10GBASE-KR and clause 72) or delete this paragraph enitrely.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment#365.

Cl **92** *SC* **92.8.3.3** *P* **122** *L* **43** # 16

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

In "the requirements for 100GBASE-KR specified in 93.8.1.6", "100GBASE-KR" should be "100GBASE-KR4"

SuggestedRemedy

Change "100GBASE-KR" to "100GBASE-KR4"

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.3.3** *P* **123** *L* **10** # 290

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

Provide values fot TBD's. The Steady state voltage, the sum of linear fit pulse response, p(k), from step 3) divided by M from step 3), shall be greater than TBD V and less than or equal to TBD V. The peak of the linear fit pulse response from step 3) shall be greater than TBD×Steady state voltage.

SuggestedRemedy

Use values for these parameters in Table 93-4-Summary of transmitter characteristics at TP0a.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace TBDs with values proposed in diminico_3bj_01a_0912 slide 4.

Cl **92** *SC* **92.8.3.3** *P* **123** *L* **17** # 283

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

The parameters for the pulse fit and the equalizing filter given in Table 92-6 are TBD's...

SuggestedRemedy

diminico_0912.pdf provides values for TBD parameters for the pulse fit and the equalizing filter given in Table 92-6...

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace TBDs with values proposed in diminico_3bj_01a_0912 slide 4.

Cl **92** *SC* **92.8.3.3.1** *P* **123** *L* **54** # 291

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

the ratio (c(0)+c(1)-c(-1))/(c(0)+c(1)+c(-1)) is TBD ±10%

SuggestedRemedy

diminico_0912.pdf provides ratio TBD.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Changed "," to "." in Subcl field for more consistent sorting.]

Replace TBD with values per diminico_3bj_01a_0912 slide 5 (the specifications in question are erroneously associated with comment #293).

Cl **92** *SC* **92.8.3.3.2** *P* **124** *L* **7** # 292

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

The change in the normalized amplitude of coefficient c(i) corresponding to a request to "increment" that coefficient is TBD. The change in the normalized amplitude of coefficient c(i)corresponding to a request to "decrement" that coefficient is TBD.

SuggestedRemedy

diminico_0912.pdf provides TBD's.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set TBD value per diminico_3bj_01a_0912 slide 5 (note that there are two sections related to comment #292. This comment refers to the first).

Cl **92** *SC* **92.8.3.3.2** *P* **124** *L* **7** # 358

Kochuparambil, Beth Cisco Systems

Comment Type **E** *Comment Status* **R**

Step size limits are already listed in Table 92-5, numbers are not needed in two places only making the draft longer. Will Increment step size and decrement step size limitations really be different?

SuggestedRemedy

Remove first paragraph of this section (92.8.3.3.2). Use editorial license to remove duplicity between paragraph and table in similar sections.

Response *Response Status* **C**

REJECT.

Table 92-5 provides summary of transmitter characteristics at TP2. Subclause referenced in Table provides details of parameter usage.

Cl **92** *SC* **92.8.3.3.3** *P* **124** *L* **19** # 374

Matthew, Brown Applied Micro

Comment Type **E** *Comment Status* **A** *bucket*

Unecessary capital.

SuggestedRemedy

Change "minimum Steady" to "minimum steady".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.3.3.3** *P* **124** *L* **21** # 293

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

The ratio (c(0) - c(1))/(c(0) + c(1)) is TBD.
The ratio (c(0) - c(-1))/(c(0) + c(-1)) is TBD.

SuggestedRemedy

diminico_0912.pdf provides TBD's.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set TBD related to (c(0) - c(1))/(c(0) + c(1)) to 4.

Set TBD related to (c(0) - c(-1))/(c(0) + c(-1)) to 1.54.

See diminco_3bj_01a_0912 (actually listed as the response to #292).

Cl **92** *SC* **92.8.3.3.4** *P* **124** *L* **35** # 294

DiMinico, Christopher MC Communications

Comment Type **TR** *Comment Status* **A**

The value of M is TBD

SuggestedRemedy

diminico_0912.pdf provides TBD.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set TBD value per diminico_3bj_01a_0912 slide 5.

Cl **92** *SC* **92.8.3.4** *P* **126** *L* **15** # 357

Kochuparambil, Beth Cisco Systems

Comment Type **E** *Comment Status* **A** *bucket*

Section refers to TP0-TP2 and TP3-TP5, yet the paragraph starts with "Transmitter measurements."

SuggestedRemedy

Change opening sentence to include the receiver accordingly.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change: Transmitter measurements and tests defined in Table 92-5 are made at TP2 or TP3 using the test fixture of Figure 92-5, or its equivalent.

To: Transmitter and receiver measurements are made at TP2 or TP3 using the test fixture of Figure 92-5, or its equivalent .

Cl **92** *SC* **92.8.3.4** *P* **126** *L* **17** # 429

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

Format for informative NOTE
I think it's actually eq 92-14, not Annex 92A. Also, it is useful information in the longer term.

SuggestedRemedy

On its own line, beginning NOTE See style guide, or I think the one in 73.10.7 at the bottom of the page is correct.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

D1.1 contains the note in D1 changed to enduring note.

Change: Note that in Annex 92A, the insertion loss from TP0 to TP2 or from TP3 to TP5 is 10 dB at 12.8906 GHz

To: Note that the insertion loss from TP0 to TP2 or from TP3 to TP5 is 10 dB at 12.8906 GHz

Note: Note style used throughout clause

Cl **92** *SC* **92.8.3.4** *P* **126** *L* **17** # 451

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

An equation such as Eq 92-14 doesn't determine the loss between two points, it limits it. But how is it determined? If you can't measure it you can't specify it, and you can't talk about its maximum - because you can't tell if someone is exceeding that. I think this has to be a recommendation only, unless we extract the loss from the de-embedding procedure.

SuggestedRemedy

Change
The maximum insertion loss
to
The maximum recommended insertion loss

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change: The maximum insertion loss from TP0 to TP2 or TP3 to TP5 including the test fixture is determined using Equation (92-14).
To: The recommended maximum insertion loss from TP0 to TP2 or TP3 to TP5 including the test fixture is given by Equation (92-14).

Cl **92** *SC* **92.8.3.4** *P* **126** *L* **21** # 284

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Insertion loss TP0 to TP2 or TP3 to TP5 equation 92-14 and Figure 92-4 are TBD's

SuggestedRemedy

diminico_0912.pdf provides equation for 92-14 and figure for 92-4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #11: Host mated insertion loss limit, use:
ghiasi_3bj_01a_0912, slide 9, "SDD21_1289G": 16
diminico_3bj_01a_0912, slide 7: 1
Neither: 1

Therefore, incorporate ghiasi_3bj_01a_0912, slide 9, SDD21_1289G.

Cl **92** *SC* **92.8.3.4** *P* **126** *L* **22** # 309

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

Maximum insertion loss mask is TBD

SuggestedRemedy

Max insertion loss is defined as
IL(f)=-0.3144 + 1.531*f+0.085*sqrt(f)+0.0173*f^2

also graph the above for figure 92-4

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment#284.

Cl **92** *SC* **92.8.3.5** *P* **127** *L* **25** # 375

Matthew, Brown — Applied Micro

Comment Type **E** *Comment Status* **A**

The TP2/TP3 test fixture is used by both the transmitter and receiver so shouldn't be in the transmitter section. Furthermore, there are reference to the cable assembly test fixture. Also, some tests are made in conjunction with the cable assembly test fixture. It would be a lot cleaner to consolidate the tests fixtures into one sub-clause, independent of RX and TX.

SuggestedRemedy

Create a new sub-clause 92.11 and change "MDI" to 92.12. Move 92.8.3.5 and 92.10.8 to the newly created 92.11.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Use editorial license to implement suggested remedy.

Cl **92** *SC* **92.8.3.6** *P* **128** *L* **1** # 387

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

92.8.3.6 is specifically return loss.

SuggestedRemedy

Change tite of 92.8.3.6 to "Test fixture return loss".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.3.7** *P* **128** *L* **12** # 277

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

92.8.3.7 Test fixture reference insertion loss 92-15 is TBD.

SuggestedRemedy

diminico_0912.pdf provides the test fixture reference insertion loss equation 92-15.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #12: TP2/TP3 test fixture insertion loss, use:
ghiasi_3bj_01a_0912, slide 7, "HCB_Loss2dB": 16
diminico_3bj_01a_0912, slide 12: 0
Neither: 2

Therefore, incorporate ghiasi_3bj_01a_0912, slide 7, "HCB_Loss2dB".

Frequency range is 0.01 to 18.75 GHz.

Cl **92** *SC* **92.8.3.7** *P* **128** *L* **8** # 158

Ran, Adee — Intel

Comment Type **ER** *Comment Status* **A**

What is the meaning of the sentence "The reference test fixture printed circuit board insertion loss is given in Equation (92-15) and shall be used"?

The equation requires equality to TBD. One cannot manufacture or use a test fixture with exactly TBD IL (whatever TBD stands for).

Editorially this should probably be "The reference test fixture printed circuit board insertion loss given in Equation (92-15) shall be used" but it still doesn't clarify what is required.

Should the insertion loss be specified as being within a range?

SuggestedRemedy

Please clarify!

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change: The reference test fixture printed circuit board insertion loss is given in Equation (92-15) and shall be used.

To: The test fixture printed circuit board insertion loss values determined using Equation (92-3 shall be used as the reference test fixture insertion loss.

Please note following sentence in paragraph is to clarify differences between reference insertion loss and an actual test fixture:The effects of differences between the insertion loss o an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

Cl **92** *SC* **92.8.3.8** *P* **102** *L* **33** # 10154

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A**

This says "the measurement bandwidth should be at least TBD GHz". But a definition needs to be precise and not biased: we can't say whether more bandwidth is "better", or less bandwidth. We give the reader the hint in the next sentence that it may not be critical. (I don' think it makes a huge difference as long as it's a reasonable linear-phase response.)

SuggestedRemedy

Change "For DDJ measurements, the measurement bandwidth should be at least TBD GHz." to "The waveform is observed through a fourth-order Bessel-Thomson response with a bandwidth of 33 GHz."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Comment was submitted against Clause 93, Page 153, Line 48. However, it should have been against Clause 92, Page 102, line 33 and has been updated accordingly.]

See comment #10146.

Cl **92** *SC* **92.8.3.8** *P* **128** *L* **30** # 433

Dawe, Piers IPtronics

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

Several editorials, including that this section needs subheadings for each jitter type, and should reference the transmitter specs in the table not repeat them.

SuggestedRemedy

See email.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **92** *SC* **92.8.3.8** *P* **128** *L* **30** # 388

Matthew, Brown Applied Micro

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

Why do we define EO test with a complex test pattern? It is trivial to define and implement a toggling test pattern. The toggling pattern is required for measurement of output levels on a 100GBASE-KR4 PMD (93.8.1.3).

SuggestedRemedy

Replace first paragraph with "Even-odd jitter shall be measured with a toggling test pattern with a period of 2 UI."

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **92** *SC* **92.8.3.8** *P* **128** *L* **53** # 389

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

Is "The difference between TJ and DDJ shall be less than or equal to 0.28 UI regardless of the transmit equalization setting." the same as "Total jitter excluding data dependent jitter" in Table 92-5. If so, use common terms between this paragraph and Table 92-5.

SuggestedRemedy

Replace sentence as follows:
"Total jitter excluding data dependent jitter is the difference between TJ and DDJ and shall be less than or equal to 0.28 UI regardless of the transmit equalization setting."

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.3.8** *P* **129** *L* **13** # 366

Dudek, Mike QLogic

Comment Type **T** *Comment Status* **A**

Not stating what error rates are to be used for the Dual Dirac extrapolation will lead to significant variation in the measurements.

SuggestedRemedy

Define J0 as 10^-5 and J1 as 10^-9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change item a) to:
"Measure the jitter Jn which is defined to be the range of sampling times around the signal transitions for which the BER at these sampling times is BERn. Measure two values J0 and J
where BER0 is 1E-9 and BER1 is 1E-5."

Cl **92** *SC* **92.8.3.8** *P* **129** *L* **23** # 390

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

The BER reference points should be explicit specified, otherwise there is good possibility of discrepancy in measurements by different people. Specify BER0 as 1E-9 and BER1 as 1E-5.

SuggestedRemedy

Change last sentence in (a) to "Measure two values J0 and J1 at BER0 and BER1, respectively, where BER0 is near 1E-9 and BER1 is near to 1E-5."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #366.

Cl **92** *SC* **92.8.3.8** *P* **129** *L* **7** # 310

Ghiasi, Ali Broadcom

Comment Type **TR** *Comment Status* **R**

Effective random jitter is introduced in this standard based on dual-dirc method, depending or the amount of DJ RJ can varry.

SuggestedRemedy

If the intention is to limit random noise / unbonunded jitter why not just use 1 sigma RMS on squre pattern or on PN9, where the RMS noise is the average of the rising and falling edge jitter. Suggested value is 0.01 UI (RMS)

Response *Response Status* **C**

REJECT.

The Suggested Remedy would limit uncorrelated jitter but not necessarily random or unbounded jitter.

The curve fit procedure is based on the assumption that the effective RJ has a Gaussian amplitude distribution that is not bounded (at least to the bit error ratios of interest). The proposed technique does not make this distinction.

While it is understood that this methodology is not perfect, and may not give a precise measure of actual random jitter in a link, it has been used successfully for many years as a means to control jitter on high-speed serial links.

The committee should consider this, but it is suggested that it should be made part of more comprehensive jitter measurement methodology as it is not an apples-apples substitution for any one part of the current method.

Cl **92** *SC* **92.8.3.8** *P* **129** *L* **8** # 450

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A**

In the dual-Dirac model, RJrms is expected to be the slope of the tails and RJ a multiple of that. We also expect that RJ+DJ=TJ. These things are compatible with each other and this text if DJ is extrapolated from the specification BER.

SuggestedRemedy

Say that for definition purposes, BERn are either side of and close to the specification BER, but in practice values as suggested are often used.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #366.

Cl **92** *SC* **92.8.4** *P* **130** *L* **1** # 376

Matthew, Brown — Applied Micro

Comment Type **E** *Comment Status* **A** *bucket*

Common naming with other clauses. It is not necessary to specify the details of where the measurement point is within the title.

SuggestedRemedy

Change title of 92.8.4 to "Receiver characteristics"

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4** *P* **130** *L* **12** # 392

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Bit error ratio of 1E-12 as measured at the PMD is not possible when FEC is in use. Furthermore, burst errors of duration similar to a MAC frame size are no worse that a pair of isolate bit errors. Since FEC is mandatory the error rate should be specified as MAC frame error rate as measured after the FEC and PCS decoding. Change the BER requirement to a MAC frame error rate requirement.

Using MAC frames of length 800 octets, a BER of 1E-12 with isolated bit errors would result in a MAC frame error ratio of 6.4E-9.

SuggestedRemedy

Replace the BER requirement with a MAC frame error requirement.
For MAC frames of 800 octet length, frame error ratio shall be less than 6.4E-9.

Update 92.8.4.3, 93.8.2.3, and 94.3.12.3 similarly.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #258.

Cl **92** *SC* **92.8.4** *P* **130** *L* **12** # 159

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A**

Table 92-7 is titled "at TP3" which is at the cable side of the MDI connector. Electrical characteristics are suitable, but bit error ratio cannot be defined at this test point.

Also, the required BER is defined (per the project objective) "at the MAC/PLS service interface" which means after the RS-FEC sublayer. There is no need to specify and test for 1e-12 or better (92.8.4.3) anywhere else, especially at the "Electrical characteristics" section. This would be a severe over-stress.

Bit error ratio should be specified as 1e-12 and tested between two points that span the RS-FEC sublayers. The actual test should involve RS-FEC block error rate and thus performed over the full 4-lane link. It is more likely that a test procedure would require a full compliant transmitter in order to include the RS-FEC encoding; adding jitter requirements as in table 92-8 may not be feasible.

Per-lane BER can be specified in addition at the PMA with (substantially higher BER target) with jitter stress, e.g. in order to verify CDR tracking capability.

SuggestedRemedy

Remove the "Bit error ratio" parameter from this table and from table 92-8.

Remove table 92-8 and subclause 92.8.4.3.

Instead, add a BER test which includes the RS-FEC sublayer; procedure to be defined in clause 91, with setup/stress settings defined separately for clauses 92, 93, and 94. (For the current draft, placeholders/editorial comments would suffice).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #258.

Cl **92** *SC* **92.8.4** *P* **130** *L* **3** # 391

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

The sentence referring to Table 92-7 uses the "s" word. Table 92-7 is a summary table. Most of the parameters are defined normatively in respective sections. The unit interval specification is informative since it does not give any bounds. Similar sections in other clause do not make this normative referral to the summary table.

SuggestedRemedy

Change sentence to "Receiver characteristics are summarized in Table 92-7. Measurements are at TP3 unless otherwise noted."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Treat the receive characteristics in a manner similar to what is specified in Comment #383.

Label the characteristics table as a summary, and ensure each reference subclause includes the normative requirements.

Cl **92** *SC* **92.8.4.1** *P* **130** *L* **33** # 311

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

There is jump in the return loss and high freq portion can be better specified to match the response of the device when cascaded with mated board

SuggestedRemedy

To remove the jump the 10.31 to 25 GHz equtation need to be 6.4 -13 *log(f/13.75)

Better definition would be
12 - 0.5*f/1E9 0.05 to 8 GHz
5.67 - 9.71*log(f/14e9) 8 to 25.78 GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #273.

Cl **92** *SC* **92.8.4.2** *P* **131** *L* **19** # 165

Ben-Artsi, Liav — Marvell

Comment Type **E** *Comment Status* **A** *bucket*

Applied DCD should be changed according to the new convention (even-odd jitter)

SuggestedRemedy

change DCD to even-odd jitter

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4.2** *P* **131** *L* **7** # 275

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Table 92-8-100GBASE-CR4 interference tolerance parameters includes TBD parameters and TBD equation references.

SuggestedRemedy

diminico_0912.pdf provides parameters for Table 92-8-100GBASE-CR4 interference tolerance TBD and related parameters.

Per remedy D1.0 comment#275 The desired test cases are, at least:

Test 1: Test channel (host TX plus cable assembly) with the maximum insertion loss that is permitted with the maximum noise (ICN) level allowed for a channel.
Test 2: Test channel with maximum insertion loss allowed for the host TX plus cable assmebl with the maximum noise (ICN) at that loss.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #6
Replace TBD values in Table 92-8 per diminico_3bj_01a_0912 slide 6.
Agree -- 27
Disagree -- 4

Therefore, replace TBD values in Table 92-8 per diminico_3bj_01a_0912 slide 6.

Cl **92** *SC* **92.8.4.2.3** *P* **132** *L* **40** # 439

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **A**

The common mode should be terminated too. Also some terminations are not shown e.g. output on left in Figure 92-6, Interference tolerance test setup.

SuggestedRemedy

Change "terminated in 100 ohm differentially." to "terminated with 50 ohm loads.". Add missing output and terminations to figures.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In figure 92-6 add box and arrow indicating 4 Rx. The cable assembly single ended receive lanes are terminated in 50 Ohm to provide 100 Ohm differential termination.

Cl **92** *SC* **92.8.4.2.3** *P* **132** *L* **8** # 393

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

Reference should be to Figure 92-7 not Figure 92-6.

SuggestedRemedy

Change "Figure 92-7" to "Figure 92-6".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4.2.4** *P* **132** *L* **44** # 295

DiMinico, Christopher MC Communications

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

The pattern generator output amplitude is TBD.
The rise and fall times of the pattern generator, as defined in 72.7.1.7, are TBD ps. Equation (92-17) is TBD.

SuggestedRemedy

diminico_0912.pdf provides TBD's.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **92** *SC* **92.8.4.2.4** *P* **132** *L* **46** # 496

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **A** *late*

"The rise and fall times of the pattern generator, as defined in 72.7.1.7": don't make unecessary reference to 72 when there is a suitable reference in a clause in this project. On a quick review, it looks like the two definitions are equivalent, although 93.8.1.5 should have an observation bandwidth (to be discussed in a pending comment).

SuggestedRemedy

Change to "The transition times of the pattern generator with no equalization, as defined in 93.8.1.5". Also change "rise and fall times" in next sentence to "transition times".

Response *Response Status* **C**

ACCEPT.

Change: The rise and fall times of the pattern generator, as defined in 72.7.1.7
To: The transition times of the pattern generator, as defined in 93.8.1.5

Change:If the rise and fall times of the pattern generator,
To: If the transition times of the pattern generator,

Cl **92** *SC* **92.8.4.2.4** *P* **132** *L* **53** # 394

Matthew, Brown Applied Micro

Comment Type **T** *Comment Status* **A**

"meet the jitter specification" is not the goal. In fact, the jitter should be slightly worse. The idea is to be as close to the jitter specification as possible.

SuggestedRemedy

Change "meet the jitter specification" with "match the jitter specification".

Response *Response Status* **C**

ACCEPT.

The pattern generator shall be set to match the jitter specification in Table 92-8.

Cl **92** *SC* **92.8.4.2.5** *P* **133** *L* **9** # 395

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Why is the term "test pattern 3 as defined in 86.8.2", whereas "PRBS31" is used elsewhere in this context? Also, why is the scrambled idle pattern not relevant?

SuggestedRemedy

Change "test pattern 3 as defined in 86.8.2" to "either PRBS31 or scramble idle pattern".

Also, on line 11 change "scrambled idle characters" to "scrambled idle".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4.5** *P* **106** *L* **49** # 10171

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A**

"The 100GBASE-CR4 receivers are AC coupled. AC coupling shall be part of the receive function for Style-2 100GBASE-CR4 connectors. For Style-1 100GBASE-CR4 plug connectors, the receive lanes are AC coupled; the coupling capacitors shall be within the plug connectors."
But, isn't there only one connector type at present, with the AC coupling in the cable, therefore not needed in the receiver?

SuggestedRemedy

Delete the first two sentences and "Style-1".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4.5** *P* **106** *L* **49** # 10153

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A**

"The low frequency 3 dB cutoff of the AC coupling shall be less than TBD kHz." On the one hand, the signalling rate is 2.5x higher. On the other, the signal integrity challenge is much higher. Anyway, one would expect backwards compatibility of a passive cable.

SuggestedRemedy

50 kHz, or perhaps lower.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment#396.

Cl **92** *SC* **92.8.4.5** *P* **106** *L* **49** # 10219

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **A**

The Style 2 connector isn't to be used for 100G-CR4 and we haven't defined different Style connectors.

SuggestedRemedy

Delete the sentence "AC coupling shall be part of the receive function for Style-2 100GBASE-CR4 connectors." and delete "style 1" in the next sentence.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response comment #10171.

Cl **92** *SC* **92.8.4.5** *P* **133** *L* **28** # 312

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A**

The 100 nF capacitor is only required when AC coupling is part of seperable interface otherwise the receiver should just meet BER

SuggestedRemedy

Replace last para with "It is recomended that the value of AC couplng when implemented par of plug to be 100 nF but when the AC coupling is part of the receive function the receiver mus target BER"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Delete sentence in line 26 "AC coupling shall be part of the receive function for Style-2 100GBASE-CR4 connectors." Replace sentence in line 27 with..100GBASE-CR4 plug receive lanes are AC coupled; the coupling capacitors shall be within the plug connectors.

See also #10171.

Cl **92** *SC* **92.8.4.5** *P* **133** *L* **29** # 313

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

By recomending capacitor value in the case of plug and leaving it to the reciver function there is no reason to specify the 3 dB cutoff.

SuggestedRemedy

Remove 3 dB cutoff

Response *Response Status* **C**

REJECT.

AC coupling is specified to be in the plug connector and is associated with the cable assembl

The low frequency 3 dB frequency cutoff is to characterize AC coupling.

Cl **92** *SC* **92.8.4.5** *P* **133** *L* **30** # 396

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

10GBASE-KR requests a 100 nF capacitor which results in a high pass pole of around 15.9 kHz. For a similar baseline wander penalty, the cutoff can be scaled by 2.5 to around 39.8 kHz. Should be okay to specify 50 kHz as specified in 93.8.3.

SuggestedRemedy

Change "TBD kHz" to "50 kHz".

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4.5** *P* **133** *L* **30** # 287

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

The low frequency 3
dB cutoff of the AC coupling is TBD.

SuggestedRemedy

The low frequency 3
dB cutoff of the AC coupling shall be less than 50
kHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #396.

Cl **92** *SC* **92.8.4.5** *P* **133** *L* **32** # 397

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Since the HPF cutoff is specified in the previous paragraph and an explicit capacitor is not required it is not necessary or relevant to specify the capacitor value here. Also, the capacitor value does not limit the in-rush current, it limits the duration.

SuggestedRemedy

Delete the paragraph starting "It is recommended that ...".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It is recommended that the value of the coupling capacitors be 100 nF. The capacitor will limit the inrush charge and baseline wander.

Cl **92** *SC* **92-1** *P* **85** *L* # 10187

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **R**

Need to add CL72 to the table due to startup protocol and the PMD control which is referenced to CL72

SuggestedRemedy

Add to table 92-1:
72-PMD control required

Response *Response Status* **C**

REJECT.

The 10GBASE-KR PMD sublayer is not required to form a complete 100GBASE-CR4 Physical Layer. Instead, the 100GBASE-CR4 PMD sublayer incorporates a PMD control function that is functionally equivalent, but not identical, to the function described in 72.6.10.

Cl **92** *SC* **Table 92-1** *P* **134** *L* **1** # 262

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **R** *bucket*

Draft 1.1 renumbers the tables in Clause 92 but the first table in the section starts with 92-2. should be 92-1.

SuggestedRemedy

Fix Table numbers

Response *Response Status* **C**

REJECT.

Page 111 - Line 24 - Table 92-1-Physical Layer clauses associated with the 100GBASE-CR4 PMD.
Page 144 - Line 31 - Table 92-2

Cl **92** *SC* **Table 92-2** *P* **134** *L* **9** # 263

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **R**

This project's Broad Market Potential response to the 5 criteria states that "Internet, cloud, and higher performance computing applications. are driving the need for higher bandwidth blade and rack server connections." These high performance computing applications are par of the justification for the project and demand low-latency communication. The 5nsec RS-FEC and transcoding latency quoted in gustlin_01_0712 is not realizable in a IEEE 802.3 layered architecture device and was not shown to be technically feasible (unless error detection is not performed at all). Vendors implementing a MAC device connected through a 802.3 standards-compliant CAUI interface to a PHY device that has such low latency, will not be able to detect or correct errors in packets that were already transferred to the MAC. The 5nsec number assumes a vendor-specific implementation choice on how to minimize latency using non-spec compliant techniques and thus precludes the choice of using 802.3 standard PHY and MAC from the different vendors.

Furthermore, the 50nsec latency for RS-FEC detection adds a significant penalty to low-latency switching architectures that target high-performance computing. Current 10GbE/40GbE Ethernet switch systems have <300nsec switching latency and the additional 50nsec for RS-FEC detection handicaps Ethernet when compared to competing HPC interconnect technologies. The 50ns link latency translates to per hop latency of 2x50=100ns So this adds 25 to 33% additional latency penalty for low latency Ethernet switches for higher performance computing market.

64B/66B encoding is sufficient to address the higher performance market and provide adequate MTTFPA.

SuggestedRemedy

Make FEC optional: Remove the mandatory FEC encoding and transcoding requirement from the clause and enable using 64/66 encoding.

Response *Response Status* **C**

REJECT.

This topic was discussed at the July 2012 Task Force meeting and a decision was made per Motion #3.

Motion #3 (July 2012): Clause 91 FEC transmitter encoding for 100GBASE-KR4 and 100GBASE-CR4 is mandatory. M: M. Dudek, S: P. Patel, Y: 39, N: 4, A: 13

The topic was discussed by the Task Force and it was clear that there was no consensus to make this change.

Cl **92A** *SC* **92A.4** *P* **208** *L* **29** # 230

Moore, Charles
Avago Technologies

Comment Type **T** *Comment Status* **A**

Annex 92A.4 refers to 92.8.3.4 which separately specifies the loss from TP0-TP2 and from TP3-TP5 but then talks priamarily about the sum. In any one link the Tx and Rx may come from different sources, to get the sum correct each part must be specified and specifying the sum is un-necessary and confusing. Also the reference to the loss of a mated pair seems like a non-sequitur.

SuggestedRemedy

Change:

With the insertion loss TP0 to TP2 or TP3 to TP5 given in
92.8.3.4
and an assumed mated connector loss of
1.69 dB, the maximum insertion loss allocation for the transmitter and receiver differential controlled impedance printed circuit boards for each differential lane (i.e., the maximum value of the sum of the insertion losses from TP0 to the MDI host receptacle and from TP5 to the MDI host receptacle) are determined using
Equation
(92A-1)
. The maximum insertion loss allocation for the transmitter and receiver differential controlled impedance printed circuit boards is 13.62
dB at 12.9806
GHz. The maximum insertion loss for the transmitter or the receiver differential controlled impedance printed circuit board is one half of the maximum insertion loss IL_PCBmax(f)"

to:

"With the insertion loss TP0 to TP2 or TP3 to TP5 given in 92.8.3.4, the portion of the loss allowed for the loss for TP0 to the MDI host receptacle or from the MDI host receptacle to TP5 is determined using Equation (92A-1). This gives a maximum PC board loss at 12.9806 GHz of 6.81 dB."

Change the first part of Equation 92A-1 to:

IL_PCB(f) <= IL_PCBmax(f) = 0.0347 + 0.2124 sqrt(f) + 0.4661 f (dB)

Replace:

"The minimum insertion loss allocation for the transmitter and receiver differential controlled impedance printed circuit boards for each differential lane (i.e., the minimum value of the sum of the insertion losses from TP0 to MDI receptacle and TP5 to MDI receptacle) are determined using
Equation
(92A-2)
. The
minimum insertion loss for the transmitter or the receiver differential controlled impedance printed circuit board is one half of the minimum insertion loss
IL_PCBmin(f)."

With:

"The minimum loss for TP0 to the MDI host receptacle or from the MDI host receptacle to TP5 is determined using Equation (92A-2)."

Change the first part of equation 92A-2 to

IL_PCB(f) >= IL_PCBmin(f) = 0.184*(0.0347 + 0.2124 sqrt(f) + 0.4661 f) (dB)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #486.

Cl **92A** *SC* **92A.4** *P* **208** *L* **35** # 486

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **A** *late*

This can be simplified, because ILPCBmax is never used except when it is halved.

SuggestedRemedy

Redefine ILPCBmax to be half what it is. Change
is one half of the maximum insertion loss
to
is one half of the maximum insertion loss
Change
for the transmitter and receiver PCB
to
of the transmitter or receiver PCB
four times.
Take the x 0.5 out of the editor's note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace the first paragraph of 92A.4 with:
"The maximum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards is determined using Equation (92A-1). Note that the maximum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards is 6.81 dB at 12.9806 GHz. The maximum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards is consistent with the insertion loss TP0 to TP2 or TP3 to TP5 given in 92.8.3.4 and an assumed mated connector loss of 1.69 dB."

Grant editorial license to apply new definition of ILpcbmax.

Cl **92A** *SC* **92A.4** *P* **208** *L* **41** # 483

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **A** *late*

This editor's note is really useful information; by popular demand there is something similar in 86A.6 Recommended electrical channel, which also plots out the limits.

SuggestedRemedy

Please turn it into enduring regular text or informative NOTE.
Please add a figure illustrating the limits of equations 92A-1 and 92A-2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The note is not required as this information is now in the introductory paragraph. See comment #230.

Add figures illustrating the limits of equations 92A-1 and 92A-2.

Cl **92A** *SC* **92A.4** *P* **208** *L* **48** # 325

Ghiasi, Ali Broadcom

Comment Type **TR** *Comment Status* **R**

Max loss equation stop at 18.75 GHz

SuggestedRemedy

range should be 0.01 to 18.75 GHz

Response *Response Status* **C**

REJECT.

The range is 0.01 to 18.75 GHz. There was no consensus to modify the range.

Cl **92A** *SC* **92A.4** *P* **209** *L* **12** # 297

Ghiasi, Ali Broadcom

Comment Type **TR** *Comment Status* **R**

Min loss equation stop at 18.75 GHz

SuggestedRemedy

range should be 0.01 to 18.75 GHz

Response *Response Status* **C**

REJECT.

The range is 0.01 to 18.75 GHz. There was no consensus to modify the range.

Cl **92A** *SC* **92A.4** *P* **209** *L* **12** # 296

Ghiasi, Ali — Broadcom

Comment Type **ER** *Comment Status* **R**

0.184(xyz) euqation not clear

SuggestedRemedy

0.184x(xyz)

Response *Response Status* **C**

REJECT.

Coefficient without multiplication operator chosen as style in 802.3ba and used in 802.3bj.

Cl **92A** *SC* **92A.7** *P* **211** *L* **20** # 19

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

The text "from 0.05 GHz to 18.75 Gw3qw0-Hz" seems to use unusual units for the upper frequency.

SuggestedRemedy

Change to ""from 0.05 GHz to 18.75 GHz"

Response *Response Status* **C**

ACCEPT.

Use suggested remedy.

Cl **92A** *SC* **92A.7** *P* **211** *L* **21** # 364

Dudek, Mike — QLogic

Comment Type **ER** *Comment Status* **A** *bucket*

Weird characters.

SuggestedRemedy

Change to GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment#19.

Cl **92A** *SC* **92A.8** *P* **211** *L* **37** # 484

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **A** *late*

"MDNEXT_loss(f), is specified using the individual NEXT losses": wrong word. It's not specified using the individual NEXT losses, it's derived/calculated/determined from them.

SuggestedRemedy

Change "specified using" to "derived from", twice.

Response *Response Status* **C**

ACCEPT.

Change "specified using" to "derived from", twice. P118 L7, P211 L27,L31…

Cl **92A** *SC* **92A.8** *P* **211** *L* **41** # 276

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **R**

The total integrated crosstalk RMS noise voltage of the channel in Equation (92A-6) and illustration in Figure 92A-3 are TBD's.

SuggestedRemedy

diminico_0912.pdf provides the total integrated crosstalk RMS noise voltage of the channel in Equation (92A-6).

Response *Response Status* **C**

REJECT.

It is recognized that Equation (92A-6) is TBD but there is no remedy proposed (this topic is nc covered in the cited presentation, see diminico_3bj_01a_0912).

Cl **92A** *SC* **92A-5** *P* **210** *L* **34** # 289

DiMinico, Christopher — MC Communications

Comment Type **TR** *Comment Status* **A**

Equation (92A-4) for the channel insertion loss between TP0 and TP5 representative of a 0.5 m cable assembly and a maximum host channel is TBD.

SuggestedRemedy

diminico_0912.pdf provides Equation (92A-4).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add minimum cable assembly loss specification (under 92.10.2) and replace TBD*ILcamax in Equation (92A-4) with ILcamin=8 dB per diminico_3bj_01a_0912.

Cl **93** *SC* **93.1** *P* **149** *L* **12** # 489

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *late*

Out-of-scope false requirements.
As it says, this clause specifies the PMD, not the PMA or CAUI.
A CAUI above the Clause 91 PCS/FEC is quite out of sight of the PMD.
The table says that the Clause 91 PCS/FEC is required.
The only relevant thing that should be here is a reminder not to put a 10-lane PMA between this PMD and the Clause 91 PCS/FEC.
If you want something normative about PMAs, go to Clause 83.

SuggestedRemedy

Delete these three "shall"s.
Delete the third bullet, it's irrelevant.
Simplify: replace lines 11-20 with:
NOTE--While 4-lane PMA(s) may be used to connect the PMD to the RS-FEC, a 10-lane PMA should not be used below the RS-FEC.
And the same for other PMD clauses with the same issue.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In the course of reviewing this comment, it was discovered that the recommendations in dambrosia_02_0712 (adopted via Draft 1.0 comments #294 and #296) were not implemented in Draft 1.1.

Clause 83, implement slide 7 of dambrosia_02_0712.

Remove "When forming a complete…" and associated items a) through c).

Add a note to Table 93-1, add a note to "Associated clause", 83, that indicates there are limitations on the number of PMA lanes that may be used between sublayers, see <appropriate subclause reference>."

Make the same adjustments of Clause 92 and Clause 94.

Cl **93** *SC* **93.1** *P* **149** *L* **7** # 426

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **A** *bucket*

If the clause has an associated annex, that should be pointed out to the reader right at the beginning, as Clause 92 does.

SuggestedRemedy

This clause specifies the 100GBASE-KR4 PMD and baseband medium. There are two associated annexes. Annex 93A provides a method for calculating Channel Operating Margin and Annex 93B provides an electrical backplane reference model with additional test points.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add the following after the first sentence of the first paragraph of 93.1.

"There are two associated annexes. Annex 93A defines characteristics of electrical backplanes and Annex 93B extends the electrical backplane reference model with additional informative test points."

Cl **93** *SC* **93.2** *P* **151** *L* **11** # 102

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A**

For change of LPI Rx function

rx_mode needs to change direction

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.4** *P* **151** *L* **49** # 236

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

Delay constraints for the 100GBASE-KR4 PMD are TBD.

SuggestedRemedy

Consider 84.4 (40GBASE-KR4 delay constraints) and assume the PMD/AN delay is fixed in bit times (2048, 2 pause_quanta, 20.48 ns) and the medium delay is fixed in time (8 ns, 800 bit times).

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.5** *P* **152** *L* **8** # 235

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

There is no physical instantiation of the Clause 93 PMD service interface and it does not mak sense to define Skew and Skew Variation at SP2 and SP5.

The Skew and Skew Variation allowed at SP3 and SP4 can be taken from Table 80-4 and Table 80-5 respectively.

SuggestedRemedy

Strike this paragraph as well as the paragraph at starting at line 17. Populate TBD Skew and Skew variation limits from Table 80-4 and Table 80-5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #26.

Cl **93** *SC* **93.7.1** *P* **154** *L* **5** # 373

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

wording
each lane has only one direction, but each direction has four lanes

SuggestedRemedy

Change "one direction from one lane" to "one lane from one direction"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Commenter did not specify CommentType. Set to T.]

Change to:
"one direction for one lane"

Check Clauses 92 and 94 for consistency.

Cl **93** *SC* **93.7.10** *P* **156** *L* **8** # 421

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

What is meant by "but should not include the assertion of the Global_PMD_transmit_disable function"? First, I assume must be referring to the variable, not the function. Second, I assum it must mean not to consider the variable being set as a fault.

SuggestedRemedy

Change "but should not include the assertion of the Global PMD_transmit_disable function" tc "but should not consider assertion of the Global_PMD_transmit_disable variable as a transmitter fault".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The heading of 93.7.6 is "Global PMD transmit disable function" and the heading of 93.7.7 is "PMD lane-by-lane transmit disable function". It suggests the function names are a given by the heading, and the corresponding variables include the underscore.

Change the first sentence of 93.7.6 to:
"The Global PMD transmit disable function is optional."

Change the first sentence of 93.7.7 to:
"The PMD lane-by-lane transmit disable function is optional and allows the electrical transmitter in each lane..."

In 93.7.7, change item a) to:
"When a PMD_transmit_disable_i variable (where i represents the lane number in the range C to 3) is set to one..."

In 93.7.10, change the end of the second sentence to:
"...but the assertion of Global_PMD_transmit_disable is not considered a transmit fault."

Cl **93** *SC* **93.7.12** *P* **130** *L* **31** # 10175

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A**

This says "Each lane of the 100GBASE-KR4 PMD shall use the same control function as 10GBASE-KR, as defined in 72.6.10." and 72.6.10 says "The control channel is signaled using differential Manchester encoding (DME) at a signaling rate equal to one quarter of the 10GBASE-KR signaling rate. Since each DME symbol contains two DME transition positions and each transition position is four 10GBASE-KR UI, one control channel bit is transmitted every eight 10GBASE-KR UI.
Do you mean use the same training frames run 2.5 times faster (including DME 2.5 times faster) or DME at rate stated above but PRBS 2.5x faster?

SuggestedRemedy

Please make this clear.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Page 156, Line 25 in Draft 1.1.]

The timing parameters in 72.6.10 should be scaled by a factor of 0.4 for 100GBASE-KR4 to account for the reduction in the unit interval.

Add the following sentence the end of the first paragraph of 93.7.12.

"The training frame structure used by the 100GBASE-KR4 PMD control function shall be as defined in 72.6.10 with the exception that 25.78125 GBd symbols replace 10.3125 GBd symbols and 100GBASE-KR4 UI replace 10GBASE-KR UI."

Make similar changes to 92.7.12.

Cl **93** *SC* **93.7.12** *P* **130** *L* **33** # 10097

Slavick, Jeff — Avago Technologies

Comment Type **TR** *Comment Status* **R**

Clause 72 allows for multiple tap coefficient change requests to occur at the same time. The update for each tap is done independent of each other. There are variables that combine the current overall setting of the transmitter and are used by each TAP when evaluating if it's allowed to make the change. When multiple requests are made simultaneously that cause the transmitter to go beyond it's operating range, there is no clear definition of what should be done. You can for example service one or two of the requests because it doesn't cause you to go out of bounds, or you can deny all.

SuggestedRemedy

Add the following text to 93.7.12 and 92.7.12 to the end of the first paragraph.

Each lane shall only request an adjustment to one Coefficient at a time and shall wait until receiving a response for that request before sending another request.

Response *Response Status* **C**

REJECT.

[Changed Subcl from 7.12 to 93.7.12 for more consistent sorting. Page 156, Line 25 in Draft 1.1.]

It is agreed that Clause 72 is unclear on how the status report fields should be set when a parallel coefficient update results in a violation of the peak or steady state voltage constraints

That said, while Clause 72 allows parallel coefficient update requests, it does not require it.

The implication is that an adaptation algorithm that cannot deal with ambiguity in status report corresponding to constraint violations with parallel coefficient updates may send individual coefficient updates serially.

Conversely, an adaptation algorithm that is insensitive to this ambiguity may send coefficient updates in parallel if it wishes.

Therefore, the initiator of coefficient updates has the ability to choose whether to send coefficient updates serially or in parallel and therefore there is no ambiguity imposed by the standard. It is an implementation consideration.

The commenter does not provide justification constrain the implementation in the manner proposed in the suggested remedy.

Cl **93** *SC* **93.7.12** *P* **184** *L* **3** # 265

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A**

The draft says that each lane of this PMD shall use the same control function as 10GBASE-KR. However, the baud rate is different and Clause 72.6.10 has many explicit references to 10GBASE-KR UI.

SuggestedRemedy

use the same control function logic but change to the 25Gbaud signaling rate. I'm not entirely sure how to document it. Some possible options are:

Option 1: copy 72.6.10 PMD control function into draft and modify references to state 100GBASE-KR4 baud rates and UI.

Option 2: bring 72.6.10 PMD control function into draft and add clarifications for 100GBASE-KR4 at each instance (so that both 10GBASE-KR and 100GBASE-KR4 are listed)

Option 3: bring 72.6.10 PMD control function into draft and make generic references to new variables for each PMD type. See presentation to be submitted.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #10175.

Cl **93** *SC* **93.7.8** *P* **155** *L* **51** # 403

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

Cannot have "shall" statement against another clause>

SuggestedRemedy

Restate "Local loopback is provided by the adjacent PMA..."

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.7.9** *P* **156** *L* **3** # 419

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

PMD_fault must be defined whether or not MDIO is implemented.

SuggestedRemedy

Delete "If the MDIO is implemented, ".
Add a new sentence, "If the MDIO is implemented, PMD_fault shall be mapped to the fault bit as specified in 45.2.1.2.1."

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.8** *P* **156** *L* **40** # 434

Dawe, Piers — IPtronics

Comment Type **ER** *Comment Status* **R**

"93.8 100GBASE-KR4 electrical characteristics
93.8.1 Transmitter characteristics"
This sounds like a datasheet. Please write in normative standards language! Follow the house style of 100GE unless improving on it. Compare e.g.
86.7 PMD to MDI specifications for 40GBASE-SR4 or 100GBASE-SR10
86.7.1 Transmitter optical specifications
52.5 PMD to MDI optical specifications for 10GBASE-S
52.5.1 10GBASE-S transmitter optical specifications
38.3 PMD to MDI optical specifications for 1000BASE-SX
38.3.1 Transmitter optical specifications
and plenty more.

SuggestedRemedy

Change to
93.8 100GBASE-KR4 electrical specifications
93.8.1 Transmitter electrical specifications
or
93.8 100GBASE-KR4 electrical specifications
93.8.1 Transmitter specifications
Similarly for receiver and the other PMD clauses.

Response *Response Status* **C**

REJECT.

There is no basis for the assertion that a "specification" corresponds to normative standards language but a "characteristic" does not.

The word "characteristics" appears in IEEE Std 802.3-2012 numerous times. There are 133 instances in Section 6, 241 instances in Section 5, 131 instances in Section 4, 88 instrances i Section 3, and so on.

It clear that in many of these instances, the use of the word "characteristics" is in relation to normative requirements. See for example 68.9 "Characteristics of the fiber optic cabling (channel)" which states that "The fiber optic cabling shall meet the requirements of Table 68-8."

Cl **93** *SC* **93.8.1** *P* **131** *L* # 10145

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **A**

For robustness, it would help if there were something like a minimum VMA spec (say 0 to 50 mV) so that the Tx would never set the signal to invert if the Rx asked for one too many tap weight changes.

SuggestedRemedy

Consider adding a minimum VMA spec, or similar, so that Tx can never invert the signal or se all its the taps to zero when still technically transmitting.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Page 157, Line 9 in Draft 1.1].

The PMD control function gives the receiver complete control of the transmit equalizer or, stated another way, several lengths of enough rope with which to hang itself.

While the commenter points out the extreme case where receiver forces that transmitter steady state voltage to zero, or even opposite the symbol polarity, for a given channel there likely exists other settings that yield the same effect which is the inability to effectively communicate.

When this happens, the receiver is given multiple escape routes such as sending preset or initialize to the transmitter in order to return to a known state.

So, while a minimum VMA specification could eliminate one problematic case, it does not solve the problem of an errant algorithm sending the transmitter into a bad state. Given this, it may be preferrable to not impose such a constraint since these constraints, as pointed out by comment #97, can be problematic for some algorithms.

Straw Poll #2
Should a minimum VMA specification be defined?
Yes -- 8
No -- 4

Lack of consensus to make change.

Cl **93** *SC* **93.8.1** *P* **131** *L* **34** # 10203

Hidaka, Yasuo Fujitsu Laboratories of

Comment Type **T** *Comment Status* **R**

Table 93-4.
Total jitter excluding DDJ is defined as 0.28UI.
It was defined as 0.25UI excluding DDJ in clause 85.
It was defined as 0.28UI including DDJ in clause 72.
OIF define it as 0.28UI including DDJ.

We should change it to 0.25UI as it excludes DDJ.

SuggestedRemedy

Change 0.28UI with 0.25UI.

Response *Response Status* **C**

REJECT.

[Subcl changed from 8.1 to 93.8.1 for more consistent sorting.]

Lack of consensus to make the change.

Cl **93** *SC* **93.8.1** *P* **156** *L* **18** # 251

Ran, Adee
Intel

Comment Type **T** *Comment Status* **R**

Why is there a minimum requirement for transition time for a testpoint near the transmitter? What would go wrong with a faster rise time in a backplane system? Why is there no parallel requirement for the CR4 transmitter?

Values near the suggested minimum might be difficult to measure with a sampling scope - which is otherwise a good choice.

Also, this requirement may prevent some legitimate solutions for meeting the stringent return loss requirements.

The minimum-only-requirement concept seems to be taken from annex 86A which is relevant for nPPI. Perhaps it makes sense there, but this is a very different system - the trace length on backplane will incerase the rise time.

SuggestedRemedy

Remove this parameter from table 93-4 and delete clause 93.8.1.5.

Response *Response Status* **C**

REJECT.

The (near-end) crosstalk amplitude present at the receiver is related to the aggressor rise and fall times. A minimum rise time is specified as a means to limit the crosstalk amplitude (crosstalk is no less of a concern here than it has been for other standards).

This is also reflected in the COM calculation where the transmitter filter bandwidth (inversely proportional to rise time) is larger for near-end aggressors. This bandwidth should be related to this minimum rise time specification.

Cl **93** *SC* **93.8.1** *P* **156** *L* **44** # 490

Dawe, Piers
IPtronics

Comment Type **TR** *Comment Status* **R** *late*

Make the main Tx and Rx tables normative, as is normal for a PMD clause.

SuggestedRemedy

Change
Transmitter characteristics measured at TP0 are summarized in Table 93-4.
to
Transmitter characteristics shall meet specifications summarized in Table 93-4 at TP0.
Similarly for Rx, 93.8.2.

Response *Response Status* **C**

REJECT.

There is no basis for the assertion that it is normal for a PMD clause to specify such tables as normative. Please refer to Clauses 54, 70, 71, 72, 84, and 85 where this is not the case.

The tables summarize the requirements as an aid to the reader. The specific requirements, which may extend beyond numerical limits presented in the table, are detailed in the subclause references.

Cl **93** *SC* **93.8.1** *P* **157** *L* **17** # 491

Dawe, Piers
IPtronics

Comment Type **TR** *Comment Status* **A** *late*

Need specs for common-mode output return loss and output mode conversion loss (from common to differential).

SuggestedRemedy

Add specs for common-mode output return loss and output mode conversion loss (from common to differential).
For example, use the InfiniBand FDR specs, scaled for signalling rate and converted from TP2 specs to TP0 specs.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #171 addresses differential and common-mode return loss.

The bearing of output mode conversion loss on link operation is unclear. It has not been specified in earlier backplane PHY projects. The commenter is invited to submit a proposal justifying the specification of the parameter and a limit (considerations for test fixtures should be made).

Cl **93** *SC* **93.8.1** *P* **157** *L* **33** # 321

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

There is insufficent proof that DJ can be remove without some penalty due to the case when DJ =0.28 and RJ effective = 0!

SuggestedRemedy

Add line with max determinsitic jitter = 0.15 UI

Response *Response Status* **C**

REJECT.

[Changed Subcl from 8.1.1 to 93.8.1 for more consistent sorting (the comment is against Table 93-4).]

The identified problem and suggested remedy was discussed by the task force.

Straw poll #3
Do you support suggested remedy?
Yes -- 0
No -- 10

Lack of consensus to implement suggested remedy.

The commenter is invited to quantify the problem and build consensus on a detailed remedy to present to the task force.

Cl **93** *SC* **93.8.1.1** *P* **156** *L* **47** # 248

Ran, Adee — Intel

Comment Type **E** *Comment Status* **R**

It is not absolutely clear that the requirements of table 93-4 should all be met using the same test fixture. One could theoretically meet return loss requirements in one test fixture and outpu waveform on another.

For symmetry, apply also for TP5a in subclause 93.8.2.1.

SuggestedRemedy

Change the text of the first paragraph in 93.8.1.1 to read:

"Unless otherwise noted, measurements of the transmitter are made at TP0a, which is the output of a test fixture as shown in Figure 93-3; the same test point and fixture shall be used for all measurements".

Change the text of the first paragraph in 93.8.2.1 to read:

"Unless otherwise noted, measurements of the receiver are made at TP5a, which is the input to a test fixture as shown in Figure 93-6; the same test point and fixture shall be used for all measurements".

Response *Response Status* **C**

REJECT.

The phrase "the same test point" is redundant with the statement that all measurements are made at TP0a/TP5a.

Since the insertion loss of the test fixture is allowed to vary within a range, the specifications must be set in order to ensure interoperability in spite of this variability. It is not clear that interoperability would be enhanced by enforcing the same test fixture be used for all measurements.

Cl **93** *SC* **93.8.1.1** *P* **156** *L* **51** # 166

Ben-Artsi, Liav — Marvell

Comment Type **T** *Comment Status* **A**

Measuring through an interconnect as defined in 93.8.1.1 can obfuscate real chip return loss measurement.

SuggestedRemedy

Redefine fixture definition to improve the fixture quality by defining:
1. Better return loss (-15dB up to 13GHz)
2. Defining fixture ILD (|ILD|<1dB)
3. Fixture IL up to 1.6dB
It is taken into account that fixture may not be feasible in multi lane device. In this case it is required that the actual fixture be "de-embedding worthy".
In this case the real fixture will be de-embedded and the defined fixture embedded.
(Presentation to be supplied)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Use the same test fixture specifications for the transmitter and receiver for 100GBASE-KR4 and 100GBASE-KP4 (fb is set to 25.78125 GHz for both cases).

From benartsi_3bj_01_0912:
Use insertion loss limit from slide 8.
Use insertion loss deviation limit from slide 9.
Use return loss limit from slide 14.
Also specify common-mode return loss limit of 10 dB over the frequency range.

The frequency range is 0.05 to 13 GHz.

Cl **93** *SC* **93.8.1.1** *P* **156** *L* **52** # 404

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

Return loss should be greater than limit.

SuggestedRemedy

Change "shall be less than" to "shall be greater than".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to "shall be greater than or equal to".

Cl **93** *SC* **93.8.1.1** *P* **157** *L* **26** # 354

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **R** *bucket*

For someone looking at the document for the first time, the labels "minimum precursor/post cursor fullscale range" may be confusing since the description is of a ratio.

SuggestedRemedy

Change labels to phrasing similar to "minimum precursor ratio" with editorial license to adjust terminology in section 93.8.1.6.5

Response *Response Status* **C**

REJECT.

See comment #355.

Cl **93** *SC* **93.8.1.1** *P* **157** *L* **28** # 257

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **A**

Transmitter characteristics measured on TP0a need not include noise measured on the far end of any channel. The far end of a channel is TP5, or possibly TP5a. A 100GBASE-KR4 channel is not detachable, and for a 100GBASE-KR4 transmitter, the test fixture need not include a cable channel, which is only relevant for 100GBASE-CR4.

Transmitter output noise can be measured using the same method as in clause 85.8.3.2 except for the test point, which should be TP0a. Since there is no 6 dB loss as in clause 85, the limit value should be scaled from 2 mV to 4 mV.

SuggestedRemedy

Change the parameter name from "Far-end output noise" to "Output noise". Specify only at one point, TP0a.
Change value to 4 mV.

Rewrite clause 93.8.1.7 accordingly.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The near-/far-end specifications recognize that the channel will attenuate the noise (to varying degrees based on its spectral content). A near-end measurement of 4 mV may say little about what the actual noise would be at the output of a lossy channel. If it is acceptable to budget based on the near-end value, the suggested remedy would be sufficient. Given that the budget is tight, it is worthwhile to make this distinction.

Use the channels specified for the receiver tolerance test for the low-loss and high-loss channels as specified in 93.8.2.3 for Test 1 and Test 4, respectively.

Leave values as currently specified.

Cl **93** *SC* **93.8.1.1** *P* **157** *L* **8** # 360

Kochuparambil, Beth — Cisco Systems

Comment Type **T** *Comment Status* **A**

The current "differential peak-to-peak output voltage" are most appropriate for TP0, but table 93-4 represents characteristics at TP0a.

SuggestedRemedy

Change value for Transmitter disabled to 24.95mV and Transmitter enabled to 998.12mV. Editorial license should be used while adding a note to the effect of "Maximums are 30 and 1200mV at TP0, but values given assume a 1.6dB test fixture."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The response to comment #10143 changes the test pattern from 101010 to PRBS9. The longer run lengths in the proposed test pattern will be attenuated to a much lesser degree. Therefore, the specification should not be reduced to the proposed extent.

Leave the maximum transmitter enabled output level as 1200 mV.

The 30 mVpp transmitter disabled limit is based on a signal that will be broadband in nature and is not significantly affected by the test fixture. The intent of this is to minimize the signal a the far end receiver and will be subject to the higher loss of the channel for the high frequencies. Leave the transmitter disabled maximum voltage as is.

Cl **93** *SC* **93.8.1.2** *P* **131** *L* **50** # 10143

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

A pattern with a 2 UI period is not a "square wave":
52.9.1.2 Square wave pattern definition
A pattern consisting of four to eleven consecutive ones followed by an equal run of zeros may be used as a square wave.
Table 86-11-Test patterns
Square wave (8 ones, 8 zeros)
And this is a bad choice: the true peak-to-peak voltage could be significantly larger. We really want to contain the VMA or steady-state voltage because more of that passes though a lossy channel.

SuggestedRemedy

Use a mixed frequency pattern: PRBS31 or scrambled idle, possibly PRBS9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[93.8.1.3, page 158, line 11 in Draft 1.1.]

The test patterns that may be provided by the PMA are PRBS9, PRBS31, and a square wave test pattern with a period of 16 UI. It would be beneficial to base the requirements on one of these patterns or scrambled idle.

While there is no test pattern that is entirely alternating 1 and 0 symbols, this pattern can be found in either the PRBS9 or PRBS31 test pattern. PRBS9 is a convenient test pattern since it is used to test transmit equalizer compliance.

Also note that no test pattern is defined for DC or AC common-mode output voltage and DC or AC common-mode output voltage requirements should apply regardless of the transmit equalizer setting.

Change the second and third paragraph of 93.8.1.3 to:
"The peak-to-peak differential output voltage shall be less than or equal to 1200 mV regardless of the transmit equalizer setting. The peak-to-peak differential output voltage shall be less than or equal to 30 mV when the transmitter is disabled (refer to 93.7.6 and 93.7.7)."

"The DC common-mode output voltage shall be between 0 V and 1.9 V with respect to signal ground. The AC common-mode output voltage shall be less than or equal to 12 mV RMS with respect to signal ground. Common-mode output voltage requirements shall be met regardless of the transmit equalizer setting."

Add the following paragraph to end of 93.8.1.3:
"Differential and common-mode signal levels are measured with a PRBS9 test pattern."

Cl **93** *SC* **93.8.1.2** *P* **131** *L* **51** # 10146

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

At present, this and other signal parameters are specified as if observed in an infinite bandwidth. At these rates, that's just too expensive. And noisy.

SuggestedRemedy

Define output voltage, transition time, DCD, TJ, AC common-mode output voltage and more as observed through a 33 GHz fourth-order Bessel-Thomson response.
(Someone with a much faster scope can use a software filter for most parameters, which would give great accuracy.)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[93.8.1.3, Page 158, line 11 in Draft 1.1]

The lack of a recommendation on measurement bandwidth does not imply that the bandwidth is prescribed to be infinite, only that no recommendation on the bandwidth (or filter shape for that matter) is made.

For Clause 92 and 93, specifiy a fourth-order 33 GHz Bessel-Thompson filter to be used for all transmitter signal measurements and receiver stressor measurements.

For Clause 94, specifiy a fourth-order 17 GHz Bessel-Thompson filter to be used for all transmitter signal measurements and receiver stressor measurements.

Cl **93** *SC* **93.8.1.2** *P* **132** *L* **2** # 10155

Dawe, Piers — IPtronics

Comment Type **TR** *Comment Status* **A**

Need to define the measurement filter for AC common-mode output voltage. It is convenien (lower cost) if it is the same as for DDJ and so on.

SuggestedRemedy

"The signal is observed through a fourth-order Bessel-Thomson response with a bandwidth o 33 GHz."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #10146.

Cl **93** *SC* **93.8.1.3** *P* **132** *L* **21** # 10085

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **A**

Tx output return loss is TBD, we need values for equations (93-1) and (93-2)

SuggestedRemedy

use:
DifferentialReturnLoss(f) =
10 x log10((0.026 + (f/32)^2) / (1 + f/32)^2)) dB, 0.05<f<20 (93-1)

CommonModeReturnLoss(f) =
6 dB, 0.05<f<20 (93-2)

f in GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Subcl 93.1.4, Page 158, Line 37 in Draft 1.0.]

See comment #171.

Cl **93** *SC* **93.8.1.3** *P* **132** *L* **22** # 10065

Mellitz, Richard — Intel Corporation

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

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Subcl 93.1.4, Page 158, Line 37 in Draft 1.0.]

See comment #171.

Cl **93** *SC* **93.8.1.4** *P* **158** *L* **21** # 141

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A**

Good test fixtures are required to accurately represent performance at tp5 with measurement at tp5a.

SuggestedRemedy

Add
insertion loss limit of 1.4 dB to 1.6 dB at fb/2
Max ILD < +/- 0.1 dB
Max RL < -12 dB or appropiate graph and equalation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Assuming the commenter is referring to TP0/TP0a and 93.8.1.1.]

See comment #166.

Cl **93** *SC* **93.8.1.4** *P* **158** *L* **37** # 171

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A**

Differential return loss in equation 93-1 is TBD

SuggestedRemedy

Define return loss according to equation 93A-3 with parameters according to the presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Specify the return loss using the first equation from slide 11 of benartsi_3bj_02_0912. Set the parameters as follows:
GAMMA = 0.35, f1 = 2.35*25.78125 GHz.

Specify the common-mode return loss limit to be 6 dB over the frequency range.

The frequency range is 0.05 to 13 GHz.

Cl **93** *SC* **93.8.1.5** *P* **158** *L* **48** # 237

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

The editor's note implies that the transition time definition is copied from 86A.5.3.3. This seems to be an unnecessary duplication of text.

SuggestedRemedy

Incorporate the procedure in 86A.5.3.3 by reference and only include material specific to 100GBASE-KR4 in this subclause.

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.8.1.5** *P* **159** *L* **5** # 406

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **R**

It is trivial to implement the 8 ones 8 zeros patterns. Why do we specify a complex method using PRBS9?

SuggestedRemedy

Delete the paragraph describing the PRBS9 method.

Response *Response Status* **C**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **93** *SC* **93.8.1.5.1** *P* **134** *L* **19** # 10147

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A**

This isn't a test spec. No "shall be verified" or "shall be tested" allowed! All we ask is that the thing comply - it might be established by design or batch testing. The wording in 93.8.1.4 Transition time is nicer.

SuggestedRemedy

Change "The steady state voltage and linear fit pulse peak values shall be verified after the transmit equalizer coefficients have been set to the "preset" values." to "The steady state voltage and linear fit pulse peak values shall comply with the specifications in Table 93-4 whe the transmit equalizer coefficients have been set to the "preset" values."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[93.8.1.6.1, Page 160, Line 24 in Draft 1.1]

The suggested remedy adds normative requirements that are redundant with subsequent paragraphs. Replace the text of 93.8.1.6.1 with the following.

"The steady state voltage vf is defined to be the sum of the linear fit pulse p(k) divided by M (refer to 85.8.3.3 step 3). The steady state voltage shall be greater than or equal to 0.4 V and less than or equal to 0.6 V after the transmit equalizer coefficients have been set to the "preset" values.

The peak value of p(k) shall be greater than 0.8 × vf after the transmit equalizer coefficients have been set to the "preset" values."

Cl **93** *SC* **93.8.1.6** *P* **160** *L* **10** # 252

Ran, Adee Intel

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

Current values in Table 93-5 are taken from clause 85. Assuming similar test fixture limitations, and a factor of 2.5 in signaling frequency, the lengths of the channel and equalizer in UI should scale similarly.

Delays should also be scaled to prevent precursor equalization from creating energy outside the linear fit pulse.

Suggested remedy also applies to clause 92.8.3.3, table 92-6, where the values are currently TBD.

SuggestedRemedy

Change NP and NW to 20; change DP and DW to 4.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **93** *SC* **93.8.1.6** *P* **160** *L* **7** # 492

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *late*

This section references 85.8.3.3 while 92.8.3.3 has written it all out again. These new clause should either refer to each other or all refer back to 85.8.3.3, not both. As 85.8.3.3 / 92.8.3.3 are long and rambling and could use some editorial attention to make them more usable, and because it's likely that we will think of some technical improvements to 85.8.3.3, I think referring to a 25G/lane version is the way to go.

SuggestedRemedy

Here, change 85.8.3.3 to 92.8.3.3. Work on the structure of 92.8.3.3: separate out de-embedding methods, parameter definitions and transmitter model/behaviour. Use subheadings. Refer to the transmitter table rather than duplicating specs.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Both 92.8.3.3 and 93.8.1.6 should refer to 85.8.3.3 as the procedure is unaltered from its original form.

Modification of the organization of 85.8.3.3 is beyond the scope of this project.

The normative specifications are set in the corresponding subclauses. Table 93-4 is a summary intended to be a service to the reader (see comment #490).

Note that the response to this comment required changes to Clause 92.

Straw poll #4
Organize 92.8.3.3 consistent with 93.8.1.6.
Yes -- 6
No -- 0

Organize Clause 92.8.3.3 consistent with 93.8.1.6.

Cl **93** *SC* **93.8.1.8** *P* **161** *L* **38** # 493

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *late*

Use clearer standards-like language.
Parameter definitions should reference the transmitter specs in the table not repeat them.

SuggestedRemedy

Change
Even-odd jitter is characterized using the procedure defined in 92.8.3.8. Even-odd jitter shall be less than or equal to 0.035 UI regardless of the transmit equalization setting.
to
Even-odd jitter is defined by the procedure in 92.8.3.8. Even-odd jitter shall be less than or equal to the limit given in Table 93-4 / the appropriate transmitter table regardless of the transmit equalization setting.
and so on.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

For brevity, delete "characterized using the procedure" i.e. "Even-odd jitter is defined in..."

Regarding whether the table or text should be normative, refer to #490.

Cl **93** *SC* **93.8.2.1** *P* **136** *L* **21** # 10086

Moore, Charles Avago Technologies

Comment Type **TR** *Comment Status* **A**

Rx output return loss is TBD, we need values for equations (93-3) and (93-4)

SuggestedRemedy

use:
DifferentialReturnLoss(f) =
10 x log10((0.026 + (f/32)^2) / (1 + (f/32)^2)) dB, 0.05<f<20 (93-3)

CommonModeReturnLoss(f) =
6 dB, 0.05<f<20 (93-4)

f in GHz

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[93.8.2.2, Page 162, Line 52 in Draft 1.1.]

See comment #167.

Cl **93** *SC* **93.8.2.1** *P* **136** *L* **22** # 10063

Mellitz, Richard — Intel Corporation

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

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **93** *SC* **93.8.2.1** *P* **162** *L* **26** # 349

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A**

Measuring the receiver return loss through an interconnectcan obfuscate real chip return loss

SuggestedRemedy

Redefine fixture return loss according to presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #166.

Cl **93** *SC* **93.8.2.1** *P* **162** *L* **29** # 485

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **R** *late*

The transmitter test fixture and receiver test fixture are not separate items, because an IC's receiver has to be tested with its outputs running, and they have to be terminated. Crosstalk in the test fixture should be controlled, and we probably need a spec for it.
This is the kind of reason why a "Definitions of electrical parameters and measurement methods" would be a good idea, so this stuff can be grouped together conveniently.

SuggestedRemedy

Combine the sections for transmitter test fixture and receiver test fixture.

Response *Response Status* **C**

REJECT.

The transmitter and receiver test fixtures are separate items as they are not required to be identical (and often will not be in practical test fixture implementations).

The comment on crosstalk applies equally to the transmitter (FEXT) and receiver (NEXT) although the coupling mechanisms are different. While the commenter hints at requirements in this area, no specific recommendations are made.

Cl **93** *SC* **93.8.2.1** *P* **162** *L* **30** # 405

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

Return loss should be greater than limit.

SuggestedRemedy

Change "shall be less than" to "shall be greater than".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to:
"...shall be greater than or equal to..."

Cl **93** *SC* **93.8.2.2** *P* **136** *L* **42** # 10088

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **A**

Receiver used in clause 93 is a package PHY, where clause 85 receiver is defined at a bulkhead connector. Using procedure defined in 85.8.4.2 in not appropriate, use annex 69A instead.

SuggestedRemedy

change:
"Receiver interference tolerance is characterized using the procedure defined in 85.8.4.2"
to:
"Receiver interference tolerance is characterized using the procedure defined in Annex 69A."
Change Annex 69A.2.2 to allow definition of channel loss either in terms of
~mTC and bTC or a0, a1, a2, and a4.
Delete reference to channel noise which is not defined.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The parameters listed in the table are not an exact fit to the test procedure described in either Annex 69A or 85.8.4.2. However, Annex 69A appears to be the closer fit.

Change the reference to Annex 69A as proposed in the suggested remedy.

Add an Editor's note to suggest channel-fit methodology based on OIF-CEI-3.0 section 12.2.

Cl **93** *SC* **93.8.2.2** *P* **137** *L* **19** # 10061

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **R**

Since FEC changes the minimum BER applied broad band noise should be constrained with an appropriate crest factor

SuggestedRemedy

Add entry in table after Applied RMS noise for "Applied Crest factor" are the like. Suggested value for is erfcinv(2*minimum BER)*sqrt(2). This could go into Annex 69A.

Response *Response Status* **C**

REJECT.

The response to this comment assumes that the basis of the interference tolerance test is changed to Annex 69A (see comment #88).

The crest factor of the broadband noise is specified in 69A.2.3 to be no less than 5.

The commenter does not make it clear why the existing crest factor specification is inappropriate.

Cl **93** *SC* **93.8.2.2** *P* **137** *L* **3** # 10078

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A**

table 93-7 is technically imcomplete: full of TBD's

SuggestedRemedy

replace TBD's with values from moore_02A_0312.pdf page 30. If we wish to use a_n values in the same way as 92.10.2 the numbers from moore_02A_0312.pdf page 30 which are expressed in Napier and Hz will have to be converted to dB and GHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Adopt the values in

moore_02a_0312 page 30:
highlighted in green except BER and dibit gain
Change DCD to EOJ.

Moore_3bj_01_0912 page 4
use the "recommended spec" values for broad band noise

Cl **93** *SC* **93.8.2.2** *P* **162** *L* **47** # 140

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A**

Good test fixtures are required to accurately represent performance at tp0 with measurement at tp0a.

SuggestedRemedy

Add
insertion loss limit of 1.4 dB to 1.6 dB at fb/2
Max ILD < +/- 0.1 dB
Max RL < -12 dB or appropiate graph and equalation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Assume the commenter is referring to TP5/TP5a and 93.8.2.1.]

See comment #166.

Cl **93** *SC* **93.8.2.2** *P* **162** *L* **52** # 167

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A**

Differential return loss in equation 93-3 is TBD

SuggestedRemedy

Define return loss according to equation 93A-3 with parameters according to the presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Specify the return loss using the first equation from slide 11 of benartsi_3bj_02_0912.

Set the parameters as follows:
GAMMA = 0.35, f1 = 2.35*25.78125 GHz.

Also specify the common-mode return loss limit to be 6 dB over the frequency range.

The frequency range is 0.05 to 13 GHz.

Cl **93** *SC* **93.8.2.3** *P* **163** *L* **23** # 258

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **A**

The required BER is defined (per the project objective) "at the MAC/PLS service interface" which means after the RS-FEC sublayer. There is no need to specify and test for 1e-12 or better anywhere else, especially at the "Electrical characteristics" section. This would be a severe over-stress.

Bit error ratio should be specified as 1e-12 and tested between two points that span the RS-FEC sublayers. The actual test should involve RS-FEC block error rate and thus performed over the full 4-lane link. It is more likely that a test procedure would require a full compliant transmitter in order to include the RS-FEC encoding; adding jitter requirements as in table 93-7 may not be feasible.

Per-lane BER can be specified in addition at the PMA with BER target of e.g. 2e-5 (as in tests 3 and 4) with jitter stress, e.g. in order to verify CDR tracking capability.

SuggestedRemedy

Remove columns for tests 1 and 2 from the table.

Add a BER test which includes the RS-FEC sublayer; procedure to be defined in clause 91, with setup/stress settings defined separately for clauses 92, 93, and 94. (For the current draft placeholders/editorial comments would suffice).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It should be noted that there is value in providing specifications that can be applied to the subsystems that may be brought together to form a complete PHY. It is expected that a suitable pre-correction BER limit can be derived for the purpose of PMA/PMD testing. While the proposal may be suitable for verifying the BER objective will be met at the MAC/PLS, it should not be the sole means for verifying compliance of the PMD.

Add the following to 93.1 (similarly for Clause 92 and Clause 94):

"Differential signals received at the MDI from a transmitter that meets the requirements of <reference> and have passed through the channel specified in <reference> are received with a BER less than 1E-5.

For a complete Physical Layer, this specification is considered to be satisfied by a frame error ratio less than 1.7E-10 for 64 octet frames with minimum IPG."

Editor to add the appropriate cross-references (per Clause).

Cl **93** *SC* **93.8.3** *P* **163** *L* **47** # 488

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **A** *bucket*

This says that specifications are defined as if the DC-blocking capacitor is implemented between TP0 and TP5. That's in the channel, not the receiver.

SuggestedRemedy

Move the subclause to within 93.9 Channel characteristics. Similarly for 92.8.4.5, to within 92.10 Cable assembly characteristics. In 92.8.4.5, change "The 100GBASE-CR4 receivers are AC coupled." to e.g. "The cable assembly contains AC coupling capacitors on all 16 signa line."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Move 93.8.3 to a subclause under 93.9.

However, the proposed change to 92.8.4.5 does not appear to be an improvement over the current text when considered in the context of the complete paragraph.

However, as it is not a receiver specification, it should be moved to 92.10 as suggested (or perhaps 92.11 would be better).

Cl **93** *SC* **93.8.3** *P* **164** *L* **4** # 238

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A** *bucket*

The specification of the AC coupling 3 dB cutoff frequency is a channel specification and should moved to 93.9 Channel characteristics.

SuggestedRemedy

Add a subclause 93.9 on the topic of AC coupling and move the cutoff frequency specificatior to that subclause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #488.

Cl **93** *SC* **93.8.3** *P* **164** *L* **4** # 407

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

AC coupling frequency is a channel parameter.

SuggestedRemedy

Move AC coupling frequency specification to 93.9.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #488.

Cl **93** *SC* **93.8.3** *P* **164** *L* **4** # 323

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **R**

Why do we specify hard limit for the AC coupling to be 50 KHz? AC coupling cut off frequency is function of the receiver. Why is it for 10.125 Gbd the cutoff freq was 100 KHz but for 25.78 GBd the AC coupling 3 dB is getting smaller instead of larger!

SuggestedRemedy

Replace " Low frequency 3 dB cutoff of the AC coupling shall be less than 50 KHz" with "Low frequency 3 dB cutoff of the AC coupling is implementation dependent the 3 dB cutoff should be low enough so the baseline wander does not induce BER penalty".

Response *Response Status* **C**

REJECT.

In response to comments against Draft 1.0, the AC coupling capacitor has been designated tc be part of the channel. Per comment #488, this specification will be moved under 93.9 (Channel characteristics). The value of 50 kHz was taken from a comparable specification on 40GBASE-CR4, 100GBASE-CR10, and 100GBASE-CR4 cable assemblies.

10GBASE-KR (and 40GBASE-KR4) recommend that the maximum value of the AC-coupling capacitors be limited to 100 nF. Assuming 50 Ohm source and load impedances, the cut-off frequency would be about 15.9 kHz. Accounting for the 2.5X increase in signaling rate, a comparable value would be about 40 kHz. In fact the AC coupling 3 dB is getting larger as requested.

While the actual AC-coupling structure is implementation dependent, the cut-off frequency must be specified in order to be able to predict the amount of a baseline wander the receiver will need to tolerate in a link.

Cl **93** SC **93.9** P **164** L **6** # 482

Dawe, Piers — IPtronics

Comment Type **E** *Comment Status* **R** *late*

This time, the channel is normative.

SuggestedRemedy

Change "Channel characteristics" to "Channel specifications"

Response *Response Status* **C**

REJECT.

See comment #434.

Cl **93** SC **93.9** P **164** L **7** # 362

Kochuparambil, Beth — Cisco Systems

Comment Type **T** *Comment Status* **A**

Channel characteristics are incomplete.

SuggestedRemedy

See kochuparambil_01_0912.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add informative return loss limit from slide 3 of kochuparambil_3bj_01_0912 with fmin=50 MHz.

Cl **93** SC **93.9** P **165** L **10** # 168

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A**

Transmitter reflection coefficients are missing

SuggestedRemedy

Suggest using: Gamma = 0.28 ; F = 0.77Fb Or Gamma = 0.315 ; F = 0.8Fb
Will supply a presentation and final recommendation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment is against Table 93-8.

See comment #143.

Cl **93** SC **93.9** P **165** L **13** # 169

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A**

Receiver reflection coefficients are missing

SuggestedRemedy

Suggest using Gamma = 0.28 ; F = 0.77Fb Or Gamma = 0.315 ; F = 0.8Fb
Will supply a presentation and final recommendation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The comment is against Table 93-8.

See comment #143.

Cl **93** SC **93.9** P **165** L **15** # 170

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A**

Table 93-8 does not include package insertion loss model equation

SuggestedRemedy

Add package insertion loss model equation according to presentation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #422. The package filter is defined in Annex 93A and used for both 100GBASE-KR4 and 100GBASE-KP4. There are no parameters to add to Table 93-8.

Cl **93** *SC* **93.9.1** *P* **165** *L* **40** # 254

Ran, Adee Intel

Comment Type **T** *Comment Status* **A**

Most of the presentations that demonstrated technical feasibility of NRZ over sample backplane channels were assuming 14 DFE taps or more. (ref: meghelli_01a_0911, healey_01_0911.xls, Joy et al. #20.3 at ISSCC 2011, ran_01_0112). This is a logical choice for an assumed minimum capability.

For a receiver with no DFE, the ISI effects starts 1 UI after the sampling point. Therefore, with 14 DFE taps, the exception window should be 1+14=15 UI after the sampling point, makeing W=16.

SuggestedRemedy

In table 93-8, change the value of W from "TBD" to 16.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set W to 14.

Cl **93** *SC* **93.9.1** *P* **165** *L* **46** # 142

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A**

COM criteria needs a value. If zero, adjustment can be made to COM0

SuggestedRemedy

Change TBD to zero
Table 93-8
COM_0 = 3 dB which approximates the SNR impact to be budgeted to the Rx chip.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Change Subcl to 93.9.1.]

See comment #246. Specify that COM shall be greater than equal to 3 dB. Delete COM0 from Table 93-8.

Cl **93** *SC* **93.9.2** *P* **165** *L* **10** # 143

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A** *channel COM*

Tx and Rx package must be defined

SuggestedRemedy

In Table 93-8, change
gamma_1=gamma_2=0.28
f1=f2=0.77*fb.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Clause from 94 to 93 and Subcl from 93.9.2 to 93.9.1.]

Change Equation (93A-3) and Equation (93A-4) per benartsi_3bj_02_0912.

In Table 93-8, assign parameters GAMMA_1=GAMMA_2 and f_1=f_2 per slide 16 benartsi_3bj_02_0912.

See comment #168 and #169.

Cl **93** *SC* **93.9.2** *P* **165** *L* **27** # 17

Anslow, Pete Ciena

Comment Type **E** *Comment Status* **A** *bucket*

In Table 93-8, the "Transmitter equalizer, pre-cursor coefficient" and "Transmitter equalizer, post-cursor coefficient", Maximum values are given as "0.00"
As stated in 1.2.6, the trailing zeros have no significance, so this should be shown as simply "0"

SuggestedRemedy

Change "0.00" to "0" in two places in Table 93-8
Make the same change in two places in Table 94-8

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.9.2** *P* **165** *L* **3** # 145

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A**

If wtx is accepted, add entry in table 93-8

SuggestedRemedy

wtx = 0.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set the value of wtx (or whatever it is named) to 1.0 in Table 93-8.

See comment #133.

Cl **93** *SC* **93.9.2** *P* **165** *L* **40** # 144

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A**

Exclusion region not defined. Need to be large enough to insure channels suggested work

SuggestedRemedy

Table 93-8
set W=12

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #254.

Cl **93** *SC* **93.9.2** *P* **165** *L* **43** # 146

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **R**

Sigma_G and A_dd are indented to be a bound or an estimate for the impact of jitter on COM. Low jitter will be required for 25Gb/s to operate. A_dd would suggest and amount of deterministic jitter that might inhibit operation.

SuggestedRemedy

Tablle 93-8
Change
Add = .025

Response *Response Status* **C**

REJECT.

The commenter states that the intent of the normalized RMS Gaussian noise (sigma_G) and peak dual-Dirac noise (A_dd) parameters is to estimate the impact of jitter.

However, to the first order, the relationship between phase noise and amplitude noise is the slope of the signal around the sampling times. A fixed constant scaled by the signal amplitude is a crude estimate of the impairment.

It is suggested that the phase-to-amplitude noise model be refined and new parameter selected in the context of the improved model.

Also, the values of A_dd and sigma_G should be set to the corresponding transmitter output jitter limits.

No change at this time.

Cl **93** *SC* **93-1** *P* **123** *L* # 10188

Sela, Oren — Mellanox Technologies

Comment Type **T** *Comment Status* **R**

Need to add CL72 to table 93-1 due to startup protocol and reference to PMD control

SuggestedRemedy

Add to table 93-1:
72 - PMD control required

Response *Response Status* **C**

REJECT.

[Comment is against Table 93-1, Page 149, Line 23 in Draft 1.1.]

The 10GBASE-KR PMD sublayer is not required to form a complete 100GBASE-KR4 Physical Layer. Instead, the 100GBASE-KR4 PMD sublayer incorporates a PMD control function that is functionally equivalent, but not identical, to the function described in 72.6.10.

Cl **93** SC **Table 93-1** P **175** L **9** # 264

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **R**

This project's Broad Market Potential response to the 5 criteria states that "Internet, cloud, and higher performance computing applications. are driving the need for higher bandwidth blade and rack server connections." These high performance computing applications are par of the justification for the project and demand low-latency communication. The 5nsec RS-FEC and transcoding latency quoted in gustlin_01_0712 is not realizable in a IEEE 802.3 layered architecture device and was not shown to be technically feasible (unless error detection is not performed at all). Vendors implementing a MAC device connected through a 802.3 standards-compliant CAUI interface to a PHY device that has such low latency, will not be able to detect or correct errors in packets that were already transferred to the MAC. The 5nsec number assumes a vendor-specific implementation choice on how to minimize latency using non-spec compliant techniques and thus precludes the choice of using 802.3 standard PHY and MAC from the different vendors.

Furthermore, the 50nsec latency for RS-FEC detection adds a significant penalty to low-latency switching architectures that target high-performance computing. Current 10GbE/40GbE Ethernet switch systems have <300nsec switching latency and the additional 50nsec for RS-FEC detection handicaps Ethernet when compared to competing HPC interconnect technologies. The 50ns link latency translates to per hop latency of 2x50=100ns So this adds 25 to 33% additional latency penalty for low latency Ethernet switches for higher performance computing market.

64B/66B encoding is sufficient to address the higher performance market and provide adequate MTTFPA.

SuggestedRemedy

Make FEC optional: Remove the mandatory FEC encoding and transcoding requirement from the clause and enable using 64/66 encoding.

Response *Response Status* **C**

REJECT.

This topic was discussed at the July 2012 Task Force meeting and a decision was made per Motion #3.

Motion #3 (July 2012): Clause 91 FEC transmitter encoding for 100GBASE-KR4 and 100GBASE-CR4 is mandatory. M: M. Dudek, S: P. Patel, Y: 39, N: 4, A: 13

See comment #263.

Cl **93A** SC P **213** L **24** # 229

Vareljian, Albert — Independent

Comment Type **TR** *Comment Status* **R**

To guarantee technically objective and repeatable results for the channel figure of merit compute "COM" based on Salz SNR bound framework instead. The Salz SNR methodology is fundamental for the baseband modulation type systems, including PAM2 and PAM4 used ir the standard.

SuggestedRemedy

See provided material for details.

Response *Response Status* **C**

REJECT.

Task Force reviewed vareljian_3bj_01_0912.

An informal poll of the Task Force indicated no one wished to show support to make this change.

Cl **93A** SC P **213** L **3** # 35

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A**

Annex 93A is described as normative but contains no "shall" statement or equivalent.

SuggestedRemedy

End the first paragraph in 93A.1 with:

"COM shall have a non-negative value."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The premise of comment #246 is that it is simpler to specify that COM be greater than or equal to some limit plus COM0, or equivalently, some larger limit. This specification would be stated in the corresponding PMD clause.

Add the appropriate normative requirement for Annex 93A, that is, COM shall be computed using the procedure described therein.

Cl **93A** *SC* **1** *P* **214** *L* **40** # 33

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A** *bucket*

In Table 93A-1 the parameter "W" is called "Victim single bit response exception window". Later in sub-clause 93A1.5, item d) "the exception window [is] defined as [t_z, t_z+WT_b]". I think that the terms "Victim single bit response exception window" and "the exception window are intedned to mean the same thing but they do not.

SuggestedRemedy

In table 93A-1, call W "Width of single bit response exception window".
In 93A.1.5 item d) and in equation 93A-12, replace "WT_b" with "W".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The units of W are defined to be UI in Table 93A-1. The multiplication of W by Tb in 93A.1.5 item d) converts normalized time (UI) to absolute time (s).

However, it more precise to call W the "victim single bit response exception window length" as the window itself is relative to the chosen sampling phase ts.

Change the Parameter name in Table 93A-1 to ".exception window length".

Cl **93A** *SC* **1.3** *P* **215** *L* **46** # 36

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **A**

The parameter "At" is used in equation 93A-6 but not defined anywhere in sub-clause 93A.1.3

"At" is defined in sub-clause 93A.1.4 and re-used equation 93A-10. Assuming that this is the same parameter it will result in amplitude squared being used where amplitude is appropriate

SuggestedRemedy

In equation 93A-6, replace "At" with "1"

Response *Response Status* **C**

ACCEPT.

See also #247.

Cl **93A** *SC* **1.6.1** *P* **218** *L* **30** # 34

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A**

Equation 93A-20 represents a really painful way of computing sigma^2_m. Much simpler is

sigma^2_m = sum(n=0->N-1) (H_m(n)^2)

SuggestedRemedy

Delete equation 93A-20. Insert

sigma^2_m = sum(n=0->N-1) (H_m(n)^2)

prior to equation 93A-17. Move verbage associated with equation 93A-20 having to do with selecting value of m giving maximum sigma_m up to the new equation. Add statement that equation 93A-17, 93A-18, and 93A-19 need only be applied for the value of m giving maximum sigma_m

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The proposed equation is proportional, but not equivalent to, the variance of the interference amplitude for phase index m. The equivalent expression is:

(sigma_m)^2 = sum(n=0 to N-1)(h_m(n)^2)*sigma_x^2/N

Note that sigma_x^2 is the signal power which is a function of the number of signal levels L.

Also, as comment #233 was accepted, the equation should use the single bit response at sampled at baud intervals.

Cl **93A** *SC* **93A.1** *P* **213** *L* **24** # 246

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

Equation 93A-1 implies that COM+COM0=20*log(As/An) and it is simpler to define a lower bound on the quantity (COM+COM0), which may still be called COM.

SuggestedRemedy

Delete COM0 term.

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1** *P* **214** *L* **3** # 32

Moore, Charles — Avago Technologies

Comment Type **E** *Comment Status* **R** *bucket*

All the parameters in Table 93A-1 got lost between my advanced copy and D1.1

SuggestedRemedy

Restore 2 missing columns.

Response *Response Status* **C**

REJECT.

They are not lost. 93A.1 states that "The values assigned to these parameters are defined by the Physical Layer specification that invokes the method."

The "missing" columns are included in the corresponding PMD clause (see 93.9.1 and 94.4.1). Table 93A-1 is essentially a table of nomenclature.

Cl **93A** *SC* **93A.1.2** *P* **215** *L* **10** # 422

Li, Mike — Altera

Comment Type **TR** *Comment Status* **A**

The model and equations for package return-loss and insertion-loss were left out in mellitz_01_0712.pdf

SuggestedRemedy

A presentation will be provided to fill-in the missing information

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Include TX/RX "package" filters in the voltage transfer function for victim and crosstalk responses. Use benartsi_3bj_02_0912 slide 7 (coefficients on slide 8, Lpkg is 7070 microns, GAMMA_tl=0.056).

Cl **93a** *SC* **93A.1.3** *P* **215** *L* **46** # 130

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **R**

The transmitter filter was intended to represent the rise and fall times of the transmitter. However values to be presented by Liav Ben-Artsi tend to limit rise time significantly by application of equation 93A-3 and 93A-5. Use of both rise time filter and Gamma seems to double count risetime filtering.

SuggestedRemedy

remove equation 93A-6
change line 38ff to
The voltage transfer function for each signal path h_21^(k)(f)(see 93A.1.2) is multiplied by H_r(f) to yield H_tf^k(f).

ref: Table 93A-1-Summary of parameters
remove f_v, f_f, and f_n
Remove respective entries in table 93-8 and 94-8

Response *Response Status* **C**

REJECT.

The parameters GAMMA1 and GAMMA2, included by Equation (93A-5), have no discernable impact on the transmitter rise and fall times. Therefore, there is no double-counting.

Cl **93A** *SC* **93A.1.3** *P* **215** *L* **46** # 247

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

The variable At is included in Equation (93A-10) and should not be in the numerator of Equation (93A-6).

SuggestedRemedy

Change the numerator of Equation (93A-6) to 1.

Response *Response Status* **C**

ACCEPT.

See also comment #36.

Cl **93A** *SC* **93A.1.5** *P* **216** *L* **48** # 253

Ran, Adee Intel

Comment Type **T** *Comment Status* **A**

Based on consensus building and having to alternative procedures, the presented procedure should be accepted into the draft.

Same comment applies to clause 93A.1.6.3 (combination of interference and noise distributions).

SuggestedRemedy

Remove editor's notes in both clauses.

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.5** *P* **216** *L* **49** # 231

Healey, Adam LSI Corporation

Comment Type **T** *Comment Status* **A**

Editor's note implies that the procedure is only an example. It appears to be a suitable procedure for 100GBASE-KR4.

There is similar editor's note in 93A.1.6.3.

SuggestedRemedy

Remove the editor's notes. If 100GBASE-KP4 requires a different procedure, then include this procedure as a subclause for 100GBASE-KR4 and define the procedure for 100GBASE-KP4 in a separate subclause.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #253.

Cl **93A** *SC* **93A.1.5** *P* **217** *L* **1** # 133

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A**

There is need to limit channels that might promote error propagation. In equation 93a-12 line 14, a region is define between t_z and t_z+WT_b
Limit the maximum of h_(0)(t) between t_z + 2*UI to t_z+WT_b will limit error propagation and frame errors.

SuggestedRemedy

Add parameter something like "maximum exclusion region excursion" as "wtx" table 93a-1 add entry to list on page 217 somewhere after line 4 indicating that only the FOM are considered when the amplitude, normalized to signal amplitude, anywhere between "_z + 2*UI to t_z+WT_b" does not exceed wtx.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The proposed modification is to be applied to h(n), which is the single bit response sampled every unit interval around the sample time ts.

h_w(n) = h(n)-sign(h(n))*min(abs(h(n)), wtx)

For n is the index to the first W post-cursor samples h_w(n) = h(n) otherwise).

This would like the magnitude of the corrections to wtx or whatever the parameter name should be.

Cl **93A** *SC* **93A.1.5** *P* **217** *L* **21** # 132

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A**

If "Voltage threshold sensitivity" is adopted, use that value to limit the "procedure that is used to determine the values of these variables that will be used to calculate COM." in equation 93a 14

SuggestedRemedy

in equation 93a-14; change denominator to
max(sigma_w^2+A_s^2*sigma_G^2,NA_rms^2)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add NA_rms^2 (or whatever it ends up being named) to the existing terms in the denominator of Equation (93A-14).

See comment #131.

Cl **93A** *SC* **93A.1.5** *P* **217** *L* **6** # 232

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

In item b), the "zero crossing" of the rising edge of the single bit response does not appear to be a stable reference point unless sufficient pre-shoot is added, via c(-1), to cause an explicit zero crossing.

Ambiguity in the tz value may disqualify otherwise valid solutions for small c(-1) magnitudes.

SuggestedRemedy

Define tz in a manner that is robust for all values of c(-1), c(1), and gDC. Some examples are given.

1. Define tz to be the time where the single bit response crosses a positive, but non-zero, threshold. If there are multiple such crossings, the latest crossing time that precedes the peak of the single bit response is selected.

2. Define ts to be the time that maximizes the quantity h(ts)-|h(ts-Tb)| and no independent definition of tz is needed.

3. Define ts to be the value that satisfies the equation (again tz does not need to be defined): h(ts-Tb/2)=h(ts+Tb/2)-h(ts+Tb)/2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The intent of the original proposal was option #1. Update the definition of tz and ts accordingly

Define tz to be the time where the single bit response crosses a positive threshold equal to 1% of its peak amplitude. If there are multiple such crossings, the latest crossing time that precedes the peak of the single bit response is selected.

Cl **93A** *SC* **93A.1.5** *P* **217** *L* **8** # 259

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **A**

The exception window should start at tz-Tb to preclude the pre-cursor equalization (which create a pre-shoot of the single bit response) from counting as ISI. After canceling the first precursor, the uncanceled ISI should be measured from the second precursor and back.

SuggestedRemedy

Change "[tz, tz+WTb]" to "[tz-Tb, tz+WTb]".

Apply also in 93A.1.6.3 (line 13).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Overtaken by events. The exception window will no longer be applied to the oversampled single bit response (see comment #233).

Cl **93A** *SC* **93A.1.5** *P* **217** *L* **8** # 233

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **A**

Residual inter-symbol interference should be a function of the chosen sampling phase ts. Instead, the parameter optimization procedure defined in 93A.1.5 considers the error across all sampling phases and the interference amplitude distribution computed per 93A.1.6.3 takes a worst-case phase independent of ts. This also implies the value used to optimize c(-1), c(1) and gDC is not the same value that is used to noise amplitude and consequently the COM value.

Instead, the single bit response should be sampled at baud intervals around ts and the RMS value computed based on those sampled values. The interference distribution should also be computed from the sampled values. In this scenario, the exception window W would be used to force the first W sampled values after ts to be zero. This is more in-line with the operation of a decision feedback equalizer.

SuggestedRemedy

Modify the treatment of inter-symbol interference per the comment.

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.6** *P* **217** *L* **39** # 28

Anslow, Pete — Ciena

Comment Type **T** *Comment Status* **A** *bucket*

This says "where SER0 is the target uncorrected symbol error rate."
However, 802.3 is consistent (16 instances) in its use of the term "symbol error ratio" rather than "symbol error rate"

SuggestedRemedy

Change to "where SER0 is the target uncorrected symbol error ratio."

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.6.1** *P* **216** *L* **17** # 249

Ran, Adee — Intel

Comment Type **E** *Comment Status* **A** *bucket*

Convolution is also denoted by "*" in other equations 23, 24 and 25.

SuggestedRemedy

Either refer to all equations or just change "In equation (93A-18)" to "Where".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The "*" notation is used in 93A.1.6.1, 93A.1.6.2, and 93A.1.6.3. Therefore, it would be better to define this notation in 93A.1.6.

Add the following paragraph to the end of 93A.1.6 and move Equation (93A-19) accordingly.

"In this Annex, "*" denotes convolution which is defined by Equation (93A-XX)."

Cl **93A** *SC* **93A.1.6.2** *P* **219** *L* **1** # 131

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A**

Voltage threshold sensitivity is missing from equation 93A-23
The p_g and p_dd are proportional to signal amplitude and represent a tie into the jitter specifications.

SuggestedRemedy

Change 93a-32
to p_n(y)= p_g(y)* p_dd(y)* p_vs(y)
add
equation like 93a-21
p_vs(y)=1/(NA_rms*sqrt(2*pi))*exp(-1/2*(y/NA_rms)^2))
Add entry in table 93-8 and table 94-8 NA_rms=.001

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See the proposed response to comment #146 for a discussion of the use of p_G and p_DD tc model amplitude interference due to jitter.

However, rather than add this value as another Gaussian distribution (requiring another convolution), add the variance to sigma_G^2 and compute the Gaussian distribution based or the result.

Cl **93A** *SC* **93A-1.6.3** *P* **219** *L* **14** # 260

Ran, Adee — Intel

Comment Type **TR** *Comment Status* **A**

The procedure defined in 93A.1.6.1 needs a sampled version h_w(n) instead of h_w(t).

SuggestedRemedy

Define h_w(n) as h_w(t_n), where

t_n= t_z+(n-4)*T_b, n=0..floor(3*T_prop/T_b)+8

and T_prop is the propagation delay through the channel.

Use h_w(n) for the procedure defined in 93A.1.6.1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #233.

Cl **93B** *SC* **93B** *P* **220** *L* **10** # 487

Dawe, Piers — IPtronics

Comment Type **T** *Comment Status* **R** *late*

This diagram is a useful foundation for future developments, but we don't know if people will use a compliance board methodology round these connectors, or not, or both ways.

SuggestedRemedy

Add "This annex does not determine whether the test points TP1, TP2, TP3 and TP4 are are precisely at the interface between the connector and the printed circuit board, or are offset by a defined electrical path in a compliance board methodology."

Response *Response Status* **C**

REJECT.

This diagram was based on goergen_02a_0712 which was explicit about the position of the test points. As a result, Table 93B-1 explicitly defines the position of the various test points (connector/board interface) and therefore the proposed text is in conflict with the table.

Cl **93B** *SC* **93B** *P* **220** *L* **35** # 481

Cideciyan, Roy — IBM

Comment Type **TR** *Comment Status* **A** *bucket*

Incorrect test point in Table 93B-1

SuggestedRemedy

Replace "TP1 to TP1" by "TP0 to TP1"

Response *Response Status* **C**

ACCEPT.

[Note, the commenter specified this comment to be against Clause 93. It has been changed to Annex 93B.]

Cl **94** *SC* **94.2** *P* **171** *L* **19** # 103

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *PMA service layer*

For change of LPI Rx function

rx_mode needs to change direction

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[non-controversial]

The primitive name is already as requested on page 171, line 19.

Cl **94** *SC* **94.2.2** *P* **146** *L* **18** # 10048

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

In Clause 94 there are several arrays of objects denoted by single letters. A useful feature of these arrays is to choose a letter that makes it easy to remember which array is which.
In draft D1.0:
T() for Termination blocks
G() for Grey-coded symbols
P() for Precoded symbols
are all easy to remember.

C() for FEC frame bits
F() for overhead frame bits
Q() for PAM4 symbols
are not very memorable - F() in particular would much more naturally stand for FEC frame bits
For the overhead frame, O would be a possibility, but this could be confused with a zero.

SuggestedRemedy

Change the letters to:
F() for FEC frame bits
V() for oVerhead frame bits
M() for PAM4 symbols

Response *Response Status* **C**

ACCEPT.

[non-controversial]

[Draft 1.1, 94.2.2, page 173, line 10]

Cl **94** *SC* **94.2.2.4** *P* **147** *L* **40** # 10080

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A** *TX encoding*

Termination bits complicate the coding and add 2.2% overhead. It is not clear that we receive real benefit in return. If a ML receiver is used it will allow us to correct a single bit error in a 4 bit block. Such errors are not likely to be what gets past FEC. Most likely multibit errors, which the termination block is less likely to correct, will be what cause FEC failures. Also if the receiver does not use ML, there is no value to the termination bits.

SuggestedRemedy

Remove termination bits and either use the reduced overhead to strengthen FEC or reduce line rate.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.2.2.4, page 174, line 40]

The termination bits have been included in this draft as a result of the consensus presentatior brown_01_0312 and brown_01_0512. The benefits of the termination bits have been shown to outweigh the benefit of increasing the FEC stength or reducing the line rate in dabiri_01_0911, parthasarthy_01_0911, and dabiri_01_1111. The utility of termination bits is not limited to MLSD as explained in brown_01_0312 and dabiri_01b_0112. The termination bits enable a wide range of efficient implementations of enhanced performance receivers.

However, in the course of consideration of this comment, it was observed that a change in the encoding would enable a more diverse set of receiver architectures. Change encoding per brown_3bj_03_0912.

Cl **94** *SC* **94.2.3** *P* **176** *L* **24** # 39

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *TX EEE encoding*

100GBASE-KP4 needs a ALERT signal

SuggestedRemedy

Use variation of proposed 100GBASE-KP4 training frame as the ALERT signal.

See presentation to be submitted in the future.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #10234.

Cl **94** *SC* **94.2.4** *P* **50** *L* **24** # 10236

Matthew, Brown — Applied Micro

Comment Type **TR** *Comment Status* **R** *RX decoding*

Detailed descriptions of the PMA decoding process are required.

SuggestedRemedy

Write a de-coding section to complement sections 94.2.2.1 to 94.2.2.8.

Response *Response Status* **C**

REJECT.

[Draft 1.1, 94.2.4, page 176, line 31]

Lack of detailed proposal. Commenter is invited to provide a future detailed proposal for evaluation.

Cl **94** *SC* **94.2.5** *P* **150** *L* **29** # 10234

Matthew, Brown — Applied Micro

Comment Type **TR** *Comment Status* **A** *TX EEE encoding*

For EEE operation, a signal structure and framing mechanism for allowing the receiver to quickly lock to the PMA frame signal.

SuggestedRemedy

A proposal will be provided at the July meeting.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.2.5, page 177, line 26]

Adopt the ALERT signalling proposed in brown_3bj_01_0912.

Cl **94** *SC* **94.2.5** *P* **150** *L* **29** # 10235

Matthew, Brown — Applied Micro

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

For EEE operation, a signal structure and framing mechanism for allowing the PMA/PMD to remain operational during the fast wake.

SuggestedRemedy

A proposal will be provided at the July meeting.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

[Draft 1.1, 94.2.5, page 177, line 26]

Cl **94** *SC* **94.3.1** *P* **180** *L* **2** # 104

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *PMD service layer*

For change of LPI Rx function

rx_mode needs to change direction

SuggestedRemedy

Change:

IS_RX_MODE.indication

To:

IS_RX_MODE.request

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.1 Table 94-4** *P* **160** *L* **8** # 10107

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **A** *TX signal*

Table 94-4 contains many TBDs making it technically incomplete.

SuggestedRemedy

Use values from moore_02a_0312.pdf page 18.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.1, page 187, line 24-41]

Update the Table with the instructions below.

Transmitted waveform

PAM4 DAC linearity:
delete, see comment 255

max normalized error(linear fit):
use 0.025 for Normalized RMS linear fit error (max.)

abs coefficient step size
use 0.0083 for Normalized coefficient step size (min.)
use 0.05 for Normalized coefficient step size (max.)

minimum precursor fullscale range
use 1.54 for Pre-cursor full-scale range (min.)

minimum post cursor fullscale range
use 4 for Post-cursor full-scale range (min.)

Far-end transmit output noise (max)
Low insertion loss channel -- 2/3 mV
High insertion loss channel -- 1/3 mV

Max output jitter (peak-to-peak)
Random jitter -- overtaken by Comment 255
Duty Cycle Distortion -- overtaken by Comment 255
Total jitter excluding data dependent jitter -- overtaken

Cl **94** *SC* **94.3.10** *P* **186** *L* **31** # 38

Lusted, Kent — Intel

Comment Type **TR** *Comment Status* **A** *TX training*

PMD control function for 100GBASE-KP4 needs a baseline proposal.

SuggestedRemedy

See presentation to be submitted at a future date

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Incorporate the training frame as proposed in lusted_3bj_03a_0912 and lusted_3bj_01_0912.

Cl **94** *SC* **94.3.11** *P* **187** *L* **14** # 361

Kochuparambil, Beth — Cisco Systems

Comment Type **T** *Comment Status* **A** *TX signal*

The current "differential peak-to-peak output voltage" are most appropriate for TP0, but table 94-4 represents characteristics at TP0a.

SuggestedRemedy

Change value for Transmitter disabled to TBD and Transmitter enabled to TBD. Editorial license should be used while adding a note to the effect of "Maximums are 30 and 1200mV at TP0, but values given assume a TBDdB test fixture." Fill in TBD if test fixture max loss is known.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The 1200 mV value is appropriate for TP0. Based on the characteristics of the test fixture (maximum 1.6 dB IL at ~13 GHz, ILD peak of 0.1 dB) the difference in measurement between TP0 and TP0a of the square wave output will be approximately 90 mV (assuming 0.7 dB loss at Nyquist).

Change the square wave output limit from 1200 mVppd to 1110 mVppd.

The 30 mVpp limit is based on a signal that will be broadband in nature and is not significantly affected by the test fixture (see above). The intent of this is to minimize the signal at the far end receiver and will be subject to the higher loss of the channel for the high frequencies. Leave the transmitter disabled maximum voltage as is.

[common with 92 and 93]

See also comments 10143, 367, and 360.

Cl **94** *SC* **94.3.11** *P* **187** *L* **24** # 324

Ghiasi, Ali — Broadcom

Comment Type **TR** *Comment Status* **A** *TX return loss*

Differential and common mode RL TBD

SuggestedRemedy

Please use the same limits as in table 93-4 (equation 93-1 and 93-2)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Changed sub-clause from 3.11 to 94.3.11.]

See comment #10108.

Cl **94** *SC* **94.3.11** *P* **187** *L* **32** # 355

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **R** *bucket*

For someone looking at the document for the first time, the labels "minimum precursor/post cursor fullscale range" may be confusing since the description is of a ratio.

SuggestedRemedy

Change labels to phrasing similar to "minimum precursor ratio" with editorial license to adjust terminology in section 94.3.11.7.5

Response *Response Status* **C**

REJECT.

The pre-cursor and post-cursor taps are adjustable from zero to some "full-scale" value. The parameter referred to by the commenter is specifically for the full-scale setting and is a minimum value for that full-scale setting. The terminology in Table 94-4 accurately describes the parameter.

Cl **94** *SC* **94.3.11** *P* **187** *L* **35** # 255

Ran, Adee — Intel

Comment Type **T** *Comment Status* **A** *TX signal*

Transmitter output jitter and noise should be replaced by requirements suitable for PAM4. A proposed procedure and new parameter definitions are described in an accompanying presentation.

SuggestedRemedy

Delete the last two rows of table 94-4.
Add new rows instead for the parameters which appear in the accompanying presentation.

Replace clauses 94.3.11.8 and 94.3.11.9 with text which specifies the procedures described in the accompanying presentation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Remove 94.3.11.6 (Transmitter linearity).

Incorporate ran_3bj_01_0912 to define the following parameters using the proposed values (despite that they are marked TBD) except where the comparable COM parameters are exceeded (use the smaller of the two):
CRJrms (labeled RJrms in the presentation)
CDJ (labeled DCJ in the presentation) including EOJ
EOJ
SNDRtx

The methodology and test parameters to be incorporated as defined in ran_3bj_01_0912.

Cl **94** *SC* **94.3.11.1** *P* **188** *L* **28** # 371

Dudek, Mike — QLogic

Comment Type **TR** *Comment Status* **A** *TX test fixture*

The loss of the test fixture is also important

SuggestedRemedy

Add a section "94.3.11.1.1 Test fixture insertion loss.

The differential loss of the test fixture at the Nyquist rate shall be between TBD dB and TBD dB".

Make the same changes in section 94.3.12.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #135.

Cl **94** *SC* **94.3.11.1.1** *P* **118** *L* **25** # 134

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A** *TX test fixture*

Good test fixtures are required to accurately represent performance at tp0 with measurement at tp0a.

SuggestedRemedy

Add
insertion loss limit of 1.4 dB to 1.6 dB at fb/2
Max ILD < +/- 0.1 dB
Max RL < -12 dB or appropiate graph and equalation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #135.

Cl **94** *SC* **94.3.11.1.1** *P* **188** *L* **20** # 350

Ben-Artsi, Liav — Marvell

Comment Type **TR** *Comment Status* **A** *TX test fixture*

100GBase-KP4 test fixture definition is TBD

SuggestedRemedy

Define test fixture equations according to presentation (IL, ILD and return loss)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #135.

Cl **94** *SC* **94.3.11.3** *P* **188** *L* **40** # 367

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **A** *TX signal*

The picture in Figure 94-6 only has 2 levels not 4. It is not obvious which levels are being referred to in the diagram.

SuggestedRemedy

Change "For a square wave test pattern with a 2 UI period, the peak-to-peak differential output voltage shall be less than or equal to 1200 mV regardless of the transmit equalizer setting." to

"For a square wave test pattern transitioning from the +1 to -1 levels with a 2 UI period, the peak-to-peak differential output voltage shall be less than or equal to 1200 mV regardless of the transmit equalizer setting.

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.11.4** *P* **162** *L* **22** # 10057

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A** *TX return loss*

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.11.4, page 189, line 22]

See comment #10108.

Cl **94** *SC* **94.3.11.4** *P* **162** *L* **22** # 10108

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **A** *TX return loss*

equation 94-3 is TBD, this is technically incomplete

SuggestedRemedy

use equation given in moore_02a_0312.pdf page 20

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.11.4, page 189, line 22]

Specify the return loss using the first equation from slide 11 of benartsi_3bj_02_0912. Set the parameters as follows:
GAMMA = 0.35, f1 = 2.35*25.78125 GHz.

Also specify the common-mode return loss limit to be 6 dB over the frequency range.

The frequency range is 0.05 to 10 GHz.

Cl **94** *SC* **94.3.11.5** *P* **189** *L* **38** # 368

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **A** *TX signal*

This transition time procedure is only really valid for two level signals.

SuggestedRemedy

Change "If the test pattern is PRBS9, the transitions within sequences of five zeros and four ones, and nine ones and five zeros, respectively,..." to

"If the test pattern is PRBS9 transitioning between +1 and -1 levels, the transitions within sequences of five zeros and four ones, and nine ones and five zeros, respectively,...."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

A two-level PRBS9 pattern is not expected to be supported for PAM4.

Add editor's note: A suitable pattern, methodology, and values for transition time is needed.

Cl **94** *SC* **94.3.11.6** *P* **190** *L* **5** # 369

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **A** *TX signal*

The sentence is unclear (and gramatically wrong)

SuggestedRemedy

Change "The normalized distortion factor for of the four levels shall be less than 0.06" to "The normalized distortion factor for each of the four levels shall be less than 0.06"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Overtaken by events. See comment #255.

Cl **94** *SC* **94.3.11.7.2** *P* **192** *L* **18** # 370

Dudek, Mike — QLogic

Comment Type **T** *Comment Status* **A** *TX signal*

This test procedure is not appropriate for a PAM4 signal. There are no instructions as to how to apply the PRBS9 signal to this multi-level specification. The specification should include th exercising of all the levels.

SuggestedRemedy

Add an Editors note box.

"This procedure needs to be amended to be appropriate for a PAM4 signal including the definition of a suitable test pattern (other than PRBS9) that exercises all the levels of the PAM4 signal."

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.12.1.1** *P* **194** *L* **53** # 135

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A** *TX test fixture*

Good test fixtures are required to accurately represent performance at tp5 with measurement at tp5a

SuggestedRemedy

Add
insertion loss limit of 1.4 dB to 1.6 dB at fb/2
Max ILD < +/- 0.1 dB
Max RL < -12 dB or appropiate graph and equalation

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Use the same test fixture specifications for the transmitter and receiver for 100GBASE-KR4 and 100GBASE-KP4 (fb is set to 25.78125 GHz for both cases).

From benartsi_3bj_01_0912:
Use insertion loss limit from slide 8.
Use insertion loss deviation limit from slide 9.
Use return loss limit from slide 14.
Also specify common-mode return loss limit of 10 dB over the frequency range.

The frequency range is 0.05 to 10 GHz.

Cl **94** *SC* **94.3.12.2** *P* **167** *L* **52** # 10064

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A** *RX return loss*

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.12.2, page 195, line 8]

See comment #10109.

Cl **94** *SC* **94.3.12.2** *P* **167** *L* **52** # 10109

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **A** *RX return loss*

Equation 94-14 is TBD, that is technically incomplete.

SuggestedRemedy

Use equation from moore_02a_0312.pdf page 20. Page 20 gives it a Tx differential return loss but the same equation can be used for Rx

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.12.2, page 195, line 8]

Specify the return loss using the first equation from slide 11 of benartsi_3bj_02_0912. Set the parameters as follows:
GAMMA = 0.35, f1 = 2.35*25.78125 GHz.

Specify the common-mode return loss limit to be 6 dB over the frequency range.

The frequency range is 0.05 to 10 GHz.

Cl **94** *SC* **94.3.12.3** *P* **168** *L* **43** # 10062

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **R** *RX interference tolerance*

Since FEC changes the minimum BER applied broad band noise should be constrained with an appropriate crest factor

SuggestedRemedy

Add entry in table after Applied RMS noise for "Applied Crest factor" are the like. Suggested value for is erfcinv(2*minimum BER)*sqrt(2). This could go into Annex 69A.

Response *Response Status* **C**

REJECT.

[Draft 1.1, 94.3.12.3, page 195, line 51]

See comment #10061.

Cl **94** *SC* **94.3.12.3** *P* **195** *L* **28** # 372

Dudek, Mike QLogic

Comment Type **TR** *Comment Status* **A** *bucket*

FEC is always used for PAM4 and there are only 2 tests.

SuggestedRemedy

Change "FEC is not included for tests 1 and 2. FEC is included for tests 3 and 4." to "FEC is included for both tests 1 and 2."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

FEC is mandatory for 100GBASE-KP4.

Delete "FEC is not included for tests 1 and 2. FEC is included for tests 3 and 4."

Cl **94** *SC* **94.3.12.3** *P* **195** *L* **37** # 261

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A** *RX performance metric*

The required BER is defined (per the project objective) "at the MAC/PLS service interface" which means after the RS-FEC sublayer. There is no need to specify and test for 1e-12 or better anywhere else, especially at the "Electrical characteristics" section. This would be a severe over-stress.

Bit error ratio should be specified as 1e-12 and tested between two points that span the RS-FEC sublayers. The actual test should involve RS-FEC block error rate and thus performed over the full 4-lane link. It is more likely that a test procedure would require a full compliant transmitter in order to include the RS-FEC encoding; adding jitter requirements as in table 94-7 may not be feasible.

Per-lane BER can be specified in addition at the PMA with BER target of e.g. 3e-4 (as in the first row of table 94-7) with jitter stress, e.g. in order to verify CDR tracking capability.

SuggestedRemedy

Remove the second row from table 94-7.

Add a BER test which includes the RS-FEC sublayer; procedure to be defined in clause 91, with setup/stress settings defined separately for clauses 92, 93, and 94. (For the current draft placeholders/editorial comments would suffice).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #258.

Cl **94** *SC* **94.3.12.3 table 94-7** *P* **168** *L* **26** # 10110

Moore, Charles Avago Technologies

Comment Type **TR** *Comment Status* **R** *RX interference tolerance*

Technically incomplete: most values are TBD.

SuggestedRemedy

use values from moore_02a_0312.pdf page 31, using the valuse listed under "Test 3" for test 1 and values given for "Test 4" for test 2.

Response *Response Status* **C**

REJECT.

[Draft 1.1, 94.3.12.3, Table 94-7, page 195]

Lack of consensus to make proposed change.

Given the adoption of COM and the revised transmitter test procedures it is desirable for the parameters in Table 94-7 and their values to be reevaluated.

Cl **94** *SC* **94.3.13** *P* **196** *L* **23** # 326

Ghiasi, Ali Broadcom

Comment Type **TR** *Comment Status* **R** *AC coupling*

Why do we specify hard limit for the AC coupling to be 50 KHz? AC coupling cut off frequency is function of the receiver. Why is it for 10.125 Gbd the cutoff freq was 100 KHz but for 25.78 GBd the AC coupling 3 dB is getting smaller instead of larger!

SuggestedRemedy

Replace " Low frequency 3 dB cutoff of the AC coupling shall be less than 50 KHz" with "Low frequency 3 dB cutoff of the AC coupling is implementation dependent the 3 dB cutoff should be low enough so the baseline wander does not induce BER penalty".

Response *Response Status* **C**

REJECT.

[Changed sub-clause from 3.13 to 94.3.13.]

In 94.3.13, AC coupling is specified as part of the channel and is not part of the receiver. In addition, the recommended maximum value of the AC coupling capacitor for 10GBASE-KR was 100 nF, implying a cut-off frequency of 15.9 kHz, not 100 kHz.

As AC coupling is part of the channel, as specification of the cut-off frequency is needed so that receivers can anticipate the degree of baseline wander that will be present in the link.

See also comment #408 which moves this text to the channel specification subclause.

Cl **94** *SC* **94.3.13** *P* **196** *L* **23** # 408

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

AC coupling frequency is a channel parameter.

SuggestedRemedy

Move AC coupling frequency specification to 94.4.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[common with 92 and 93]

See also comments 488 and 407.

The whole sub-clause refers to the AC coupling of the chanel. Move the entire sub-clause to 94.4.

Cl **94** *SC* **94.3.6.1** *P* **184** *L* **10** # 359

Kochuparambil, Beth — Cisco Systems

Comment Type **E** *Comment Status* **A** *bucket*

Link diagrams should be consistent amongst clauses 93 and 94.

SuggestedRemedy

Change figures 94-4 (pg 184), 94-5 (pg 188), and 94-9 (pg 194) to match the style of clause 93 (ex: figures 93-2 and 93-3).

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.6.1** *P* **184** *L* **15** # 402

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *bucket*

In Figure 94-4, replace with updated figure from Figure 93-2 showing physical components of link.

SuggestedRemedy

Replace Figure 94-4 with Figure 93-2.

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.7** *P* **186** *L* **9** # 420

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A** *PMD variables*

PMD_fault must be defined whether or not MDIO is implemented.

SuggestedRemedy

Delete "If the MDIO is implemented, ".
Add a new sentence, "If the MDIO is implemented, PMD_fault shall be mapped to the fault bit as specified in 45.2.1.2.1."

Response *Response Status* **C**

ACCEPT.

[non-controversial]

Cl **94** *SC* **94.3.8** *P* **186** *L* **15** # 380

Matthew, Brown — Applied Micro

Comment Type **T** *Comment Status* **A**

What is meant by "but should not include the assertion of the Global_PMD_transmit_disable function"? First, I assume must be referring to the variable, not the function. Second, I assume it must mean not to consider the variable being set as a fault.

SuggestedRemedy

Change "but should not include the assertion of the Global PMD_transmit_disable function" to "but should not consider assertion of the Global_PMD_transmit_disable variable as a transmitter fault".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Comment was submitted against Clause 93 but is actually against Clause 94. Updated accordingly.]

See comment #421.

Cl **94** *SC* **94.4** *P* **169** *L* **1** # 10105

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A** *channel parameters*

The specifications given are probably insuficient to give high confidence that a cahnnel will be usable.

SuggestedRemedy

use method defined is presentation which will be made at July meeting. Or use method defined in moore_01_0311.pdf and moore_01_0312.pdf

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.4, page 196, line 26]

In Draft 1.1, the channel is specified the channel operating margin (COM) specified in 94.4.1.

In addition, an informative return loss limit was added per comment #363.

Cl **94** *SC* **94.4** *P* **196** *L* **26** # 363

Kochuparambil, Beth — Cisco Systems

Comment Type **T** *Comment Status* **A** *channel parameters*

Channel characteristics are incomplete.

SuggestedRemedy

See kochuparambil_01_0912.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add informative return loss limit from slide 3 of kochuparambil_3bj_01_0912 with fmin=50 MHz.

Cl **94** *SC* **94.4.1** *P* **169** *L* **8** # 10233

Matthew, Brown — Applied Micro

Comment Type **TR** *Comment Status* **A** *bucket*

Equation 94-17 which is inherited from Clause 69 is based upon a second equation 94-18 which is no longer required separately for this Clause. Consolidate to a single equation set.

SuggestedRemedy

Change the top equation in 94-17 to:
a0+a1*sqrt(f)+a2*f+a3*f^2+a4*f^3

Change the bottom equation in 94-17 to:
a5+a6*(f-f2);

Delete line~17 starting with "Amax".

Delete lines 23 to 32.

Add the following:
a0 = 0.8
a1 = 1.7372e-4
a2 = 1.1554e-9
a3 = 2.7795e-19
a4 = -1.0423e-29
a5 = 33.467
a6 = 1e-8

Response *Response Status* **C**

ACCEPT.

[Draft 1.1, 94.4.2, page 196, line 29]

Cl **94** *SC* **94.4.1** *P* **196** *L* **30** # 136

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **A** *channel COM*

COM criteria needs a value. If zero, adjustment can be made to COM0

SuggestedRemedy

Change TBD to zero
Table 94-8
COM_0 = 3 dB which approximates the SNR impact to be budgeted to the Rx chip.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Specify that COM shall be greater than equal to 3 dB. Delete COM0 from Table 94-8.

Cl **94** *SC* **94.4.1** *P* **197** *L* **40** # 256

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *channel COM*

Based on preliminary analysis in ran_01_0712, assuming equalization of up to 16 UI after the cursor is about enough to get good equalization for ISI-limited channels. Length lower than 16 degraded results, while higher lengths provided diminishing returns.

This capability is considered feasible by the consensus group which examined several receiv architectures.

The exclusion window length W should accordingly be set to 16+2=18.

SuggestedRemedy

Change the value of W in table 94-8 from "TBD" to 18.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #139.

Cl **94** *SC* **94.4.2** *P* **197** *L* **10** # 137

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A** *channel COM*

Tx and Rx package must be defined

SuggestedRemedy

In Table 94-8, change
gamma_1=gamma_2=0.28
f1=f2=0.77*fb

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Table 94-8, assign parameters GAMMA_1=GAMMA_2=0.315 and f_1=f_2=0.8*25.78125 GHz.

Cl **94** *SC* **94.4.2** *P* **197** *L* **3** # 138

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A** *channel COM*

If wtx is accepted, add entry in table 94-8

SuggestedRemedy

wtx = 0.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Set the value of wtx (or whatever it is named) to 0.2 in Table 94-8.

See comment #133.

Cl **94** *SC* **94.4.2** *P* **197** *L* **41** # 139

Mellitz, Richard Intel Corporation

Comment Type **TR** *Comment Status* **A** *channel COM*

table 94-8
Exclusion region not defined. Needs to be large enough to insure channels suggested for PAM4 work

SuggestedRemedy

Table 94-8
set W=16

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.4.2** *P* **197** *L* **42** # 147

Mellitz, Richard — Intel Corporation

Comment Type **TR** *Comment Status* **R** *channel COM*

Sigma_G and A_dd are indented to be a bound or an estimate for the impact of jitter on COM. Low jitter will be required for 25Gb/s to operate. The specified sigma_G and A_dd would suggest and amount jitter that might inhibit operation for PAM4.

SuggestedRemedy

Tablle 93-8
Change
Sigma_g = .005
Add = .025

Response *Response Status* **C**

REJECT.

[Changed page from 196 to 197.]

See comment #146.

Cl **99** *SC* *P* **5** *L* **11** # 29

Anslow, Pete — Ciena

Comment Type **E** *Comment Status* **A** *bucket*

It is usual for amendments to 802.3 to include a short summary of their content immediately after the text that describes the sections of IEEE Std 802.3.
This is missing from this draft.
For example IEEE Std 802.3ap-2007 contained:
IEEE Std 802.3ap-2007
This amendment includes changes to IEEE Std 802.3-2005 and adds Clause 69 through Clause 74 and Annex 69A, Annex 69B, Annex 73A and Annex 74A. This amendment adds new Physical Layers that support the exchange of IEEE Std 802.3 format frames over electrical backplanes at 1 Gb/s and 10 Gb/s.

This paragraph will then also appear in the frontmatter of other amendments being developed such as 802.3bk

SuggestedRemedy

Add a paragraph describing 802.3bj

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The frontmatter will be updated under the guidance of the Working Group chair.