

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 45 SC 45.2.7.14 P25 L32 # 1 [REDACTED]  
 Barrass, Hugh Cisco  
 Comment Type E Comment Status D bucket  
 Typo 10G instead of 100G in Table 45-191  
 SuggestedRemedy  
 Change 10G to 100G in 8 instances.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78 P37 L1 # 4 [REDACTED]  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D bucket  
 The title of clause 78 is "Energy efficient Ethernet (EEE)"  
 SuggestedRemedy  
 Add the " (EEE)" to the title of Clause 78  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 69 SC 69.1.3 P28 L51 # 2 [REDACTED]  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D  
 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:"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.2 P38 L37 # 5 [REDACTED]  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 69 SC 69.2.4 P32 L6 # 3 [REDACTED]  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D  
 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 80 SC 80.1.2 P42 L17 # 6  
 Anslow, Pete Ciena

Comment Type E Comment Status D  
 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)"

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

The resolution to #432 neatly avoids this issue by retaining a vestigial subclause.

If #432 is rejected, 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 editor recommend option a) if comment #432 is rejected.

CI 80 SC 80.1.3 P42 L43 # 7  
 Anslow, Pete Ciena

Comment Type E Comment Status D 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."

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 80 SC 80.1.4 P44 L15 # 8  
 Anslow, Pete Ciena

Comment Type E Comment Status D 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)

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 80 SC 80.1.5 P44 L27 # 9  
 Anslow, Pete Ciena

Comment Type E Comment Status D bucket  
 A Replace editing instruction does not show the replaced object in strikethrough

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:"

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 80 SC 80.1.5 P45 L8 # 10  
 Anslow, Pete Ciena

Comment Type E Comment Status D 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

Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

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Cl 81 SC 81.3a P59 L35 # 11  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D bucket  
 The formatting of the text below Figure 81-9a is not usual (the left margin is indented)  
 SuggestedRemedy  
 Correct the formatting  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

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Cl 82 SC 82.6 P72 L48 # 14  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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)"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

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Cl 82 SC 82.2.18.2.3 P69 L18 # 12  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

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Cl 82 SC 82.2.18.3.1 P71 L28 # 13  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 91 SC 91.5.2.5 P95 L12 # 15  
 Anslow, Pete Ciena

Comment Type E Comment Status D

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"

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 92 SC 92.8.3.3 P122 L43 # 16  
 Anslow, Pete Ciena

Comment Type E Comment Status D

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"

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

CI 93 SC 93.9.2 P165 L27 # 17  
 Anslow, Pete Ciena

Comment Type E Comment Status D

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

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 83C SC 83C P205 L8 # 18  
 Anslow, Pete Ciena

Comment Type E Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92A SC 92A.7 P211 L20 # 19  
 Anslow, Pete Ciena

Comment Type E Comment Status D  
 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"

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Use suggested remedy.

Cl 69 SC 69.5 P32 L47 # 20  
 Anslow, Pete Ciena

Comment Type T Comment Status D  
 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 deletion 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.1.4 P38 L5 # 21  
 Anslow, Pete Ciena

Comment Type T Comment Status D 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"

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.2 P39 L1 # 22  
 Anslow, Pete Ciena

Comment Type T Comment Status D 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"

Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.1.4 P43 L 52 # 23  
 Anslow, Pete Ciena

Comment Type T Comment Status D

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)"

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See also #343 & #449

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

Cl 81 SC 81.1.7 P55 L 39 # 24  
 Anslow, Pete Ciena

Comment Type T Comment Status D bucket

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

SuggestedRemedy

Correct the reference

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change to 22.7

Cl 83 SC 83.1.1 P83 L 32 # 25  
 Anslow, Pete Ciena

Comment Type T Comment Status D 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"

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.3.1 P99 L 32 # 26  
 Anslow, Pete Ciena

Comment Type T Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See healey\_02\_0912.pdf.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.3 P120 L32 # 27  
 Anslow, Pete Ciena

Comment Type T Comment Status D

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)"

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Resolve with comment#273

Change Table 92-5-Far-end transmit output noise (max) value:

From:  
 "2 See Equation (92-2)"  
 "1 See Equation (92-3)"

To:  
 "See Equation (92-2)"  
 "See Equation (92-3)"

From comment#273  
 $RMSldev = \sqrt{sl^2 + 1^2}$   
 $RMSshdev = \sqrt{sh^2 + 2^2}$

For the low-loss cable assembly, the maximum RMS deviation from the cable assembly is 2 mV. The measured RMS deviation from the cable assembly ICN due to the far-end transmitter output noise shall meet the values determined using Equation (92-2).  
 For the high-loss cable assembly, the maximum RMS deviation from the cable assembly is 1 mV. The measured RMS deviation from the cable assembly ICN due to the far-end transmitter output noise shall meet the values determined using Equation (92-3).

Add under equations (92-2) and (92-3).

Where  
 RMSldev is the maximum RMS deviation from the low-loss cable assembly  
 RMSshdev is the maximum RMS deviation from the high-loss cable assembly  
 sl is far-end ICN for the low-loss cable assembly.  
 Sh is far-end ICN for the high-loss cable assembly.

CI 93A SC 93A.1.6 P217 L39 # 28  
 Anslow, Pete Ciena

Comment Type T Comment Status D

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."

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 99 SC P5 L11 # 29  
 Anslow, Pete Ciena

Comment Type E Comment Status D

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

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

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

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 45 SC 45.2.7.13.1a P24 L41 # 30  
 Anslow, Pete Ciena

Comment Type E Comment Status D 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 69 SC 69.1.2 P28 L29 # 31  
 Anslow, Pete Ciena

Comment Type E Comment Status D

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 instruction to be:  
 "Change the first paragraph of 69.1.3 (now renumbered to 69.1.2) as shown:"

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

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

CI 93A SC 93A.1 P214 L3 # 32  
 Moore, Charles Avago Technologies

Comment Type E Comment Status D

All the parameters in Table 93A-1 got lost between my advanced copy and D1.1

SuggestedRemedy

Restore 2 missing columns.

Proposed Response Response Status W

PROPOSED 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.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93A SC 1 P214 L40 # 33  
 Moore, Charles Avago Technologies

Comment Type T Comment Status D  
 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 intended 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".

Proposed Response Response Status W  
 PROPOSED 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 1.6.1 P218 L30 # 34  
 Moore, Charles Avago Technologies

Comment Type T Comment Status D  
 Equation 93A-20 represents a really painful way of computing  $\sigma_m^2$ . Much simpler is

$$\sigma_m^2 = \sum_{n=0}^{N-1} (H_m(n))^2$$

*SuggestedRemedy*

Delete equation 93A-20. Insert

$$\sigma_m^2 = \sum_{n=0}^{N-1} (H_m(n))^2$$

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  $\sigma_m$

Proposed Response Response Status W  
 PROPOSED 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:

$$(\sigma_m)^2 = \sum_{n=0}^{N-1} (h_m(n))^2 * \sigma_x^2 / N$$

Note that  $\sigma_x^2$  is the signal power which is a function of the number of signal levels L. However,  $\sigma_x^2 / N$  is not a function of m so maximizing the proposed expression yields the same result. Thus there are two options.

1. Define  $(\sigma_m)^2$  correctly.
2. Use the proposed expression but do not refer to it as only proportional to the interference amplitude and not equivalent.

Note that is comment #233 is accepted, the version of this equation that corresponds to the single bit response sampled a baud intervals should be substituted in the response.

Does the Task Force have a preference? The remainder of the suggested remedy can be implemented as proposed.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl **93A** SC **P213** L**3** # **35**  
 Moore, Charles Avago Technologies

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

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."

Proposed Response Response Status **W**

PROPOSED 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 **1.3** **P215** L**46** # **36**  
 Moore, Charles Avago Technologies

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

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"

Proposed Response Response Status **W**

PROPOSED ACCEPT.

Note that comment #130 suggests to remove H<sub>t</sub>(f) and Equation 93A-6. If that comment is accepted, this becomes overtaken by events.

See also #247.

Cl **92** SC **92.11** **P145** L**12** # **37**  
 Cole, Chris Finisar

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

Add 2nd MDI specification, as justified in cole\_01\_0712 and supported in mcsorley\_01\_0712

*SuggestedRemedy*

Incorporate text as per cole\_02\_0712

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

For committee discussion, use cole\_02\_0712.pdf.

Cl **94** SC **94.3.10** **P186** L**31** # **38**  
 Lusted, Kent Intel

Comment Type **TR** Comment Status **D** TX training

PMD control function for 100GBASE-KP4 needs a baseline proposal.

*SuggestedRemedy*

See presentation to be submitted at a future date

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address this topic.

Cl **94** SC **94.2.3** **P176** L**24** # **39**  
 Lusted, Kent Intel

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

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address this comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 45 SC 45.2.1.80 P21 L1 # 40  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.1.81 P21 L1 # 41  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.1.82 P21 L1 # 42  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.1.83 P21 L1 # 43  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.1.84 P21 L1 # 44  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC Table 45-105 P21 L1 # 45  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 45 SC 45.2.3.9 P21 L1 # 46  
 Lusted, Kent Intel  
 Comment Type **TR** Comment Status **D** 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  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.

Cl 91 SC Figure 91-5 P98 L39 # 47  
 Szczepanek, Andre Inphi  
 Comment Type **ER** Comment Status **D** 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"  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.  
 See comment #48.

Cl 91 SC 91.5.2.7 P97 L33 # 48  
 Szczepanek, Andre Inphi  
 Comment Type **ER** Comment Status **D**  
 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<sup>w</sup>) where w=10 is the symbol size in bits"  
 with "GF(2<sup>10</sup>) where the symbol size is 10 bits"  
 Proposed Response Response Status **W**  
 PROPOSED 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 91.5.3.1 P99 L31 # 49  
 Szczepanek, Andre Inphi  
 Comment Type **ER** Comment Status **D**  
 "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 functionally 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 separate 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.  
 Proposed Response Response Status **W**  
 PROPOSED 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".

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.3.2 P99 L43 # 50  
 Szczepanek, Andre Inphi

Comment Type ER Comment Status D

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 carries AM\_0, lane 1 AM\_1, lane 2 AM\_2, and lane 3 AM\_3.

Proposed Response Response Status W

PROPOSED 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 91.5.3.4 P101 L17 # 51  
 Szczepanek, Andre Inphi

Comment Type ER Comment Status D bucket

Descrambling no longer forms part of the receive datapath.

SuggestedRemedy

Remove "descrambling and"

Proposed Response Response Status W

PROPOSED ACCEPT.

[Added Clause (91) to Sbcl field for consistent sorting.]

Cl 91 SC 91.5.3.5 P101 L39 # 52  
 Szczepanek, Andre Inphi

Comment Type ER Comment Status D

The function for re-insertion of the first codeword "s" nibble is unnecessarily terse and makes it difficult 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 - sc why not do it for them.

SuggestedRemedy

Replace :

d)let rx\_payloads be a vector representing 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 vector representing 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

Proposed Response Response Status W

PROPOSED 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.

If comment #52 is accepted (in principle), this response should be modified to be consistent.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.2.5 P95 L1 # 53  
 Szczepanek, Andre Inphi

Comment Type TR Comment Status D

The output of the transcoder 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

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Added Clause (91) to Sbcl field for consistent sorting.]

See healey\_02\_0912.pdf.

Cl 91 SC 91.5.2.6 P95 L40 # 54  
 Szczepanek, Andre Inphi

Comment Type TR Comment Status D bucket

The upper limit of the range of variable "j" is wrong.  
 The range of j should be 0 to 4 consistent with the 5 AMs per row shown in Figure 91-4

SuggestedRemedy

Replace " $j=0$  to 5" with " $j=0$  to 4"

Proposed Response Response Status W

PROPOSED ACCEPT.

[Added Clause (91) to Sbcl field for consistent sorting.]

See comment #472.

Cl 91 SC 91.5.3.3 P101 L6 # 55  
 Szczepanek, Andre Inphi

Comment Type TR Comment Status D

"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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[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.

See comment #443.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.2.5 P95 L15 # 56  
 Szczepanek, Andre Inphi

Comment Type ER Comment Status D

The function for omission of the first codeword "s" nibble is unnecessarily terse and makes it difficult 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>

Proposed Response Response Status W

PROPOSED 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 91.5.2.6 P95 L45 # 57  
 Szczepanek, Andre Inphi

Comment Type ER Comment Status D

This mapping process 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.

Proposed Response Response Status W

PROPOSED 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 Figure 91-4 P97 L4 # 58  
 Szczepanek, Andre Inphi

Comment Type ER Comment Status D

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 easier to understand.

Proposed Response Response Status W

PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

**Cl 91**    **SC 91.5.2.7**    **P98**    **L47**    # **59**  
 Szczepanek, Andre    Inphi

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

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 consistent with Figure 91-5.

*Proposed Response*    **Response Status W**  
 PROPOSED ACCEPT.

[Added Clause (91) to Sbc1 field for consistent sorting.]

See comment #234.

**Cl 92**    **SC 92.10.9**    **P141**    **L22**    # **60**  
 Sommers, Scott    Molex

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

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."

*Proposed Response*    **Response Status W**  
 PROPOSED ACCEPT.

Use suggested remedy.

**Cl 80**    **SC 80.3.2**    **P49**    **L28**    # **61**  
 Barrass, Hugh    Cisco

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

*Proposed Response*    **Response Status W**  
 PROPOSED ACCEPT.

**Cl 80**    **SC 80.3.3.6**    **P49**    **L53**    # **62**  
 Barrass, Hugh    Cisco

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

*Proposed Response*    **Response Status W**  
 PROPOSED ACCEPT.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.3.3.7 P49 L54 # 63  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 82 SC 82.1.5 P65 L33 # 64  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 82 SC 82.2.18.2.2 P68 L1 # 65  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 85 SC 85.13.3 P90 L13 # 66  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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"

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 83A SC 83A.3.2a P202 L28 # 67  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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"

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

**Cl 74**    **SC 74.7.4.4**                      **P37**            **L1**            # **68**  
 Barrass, Hugh                                      Cisco

**Comment Type**    **T**                      **Comment Status**    **D**                                      **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).

*Proposed Response*                      **Response Status**    **W**  
 PROPOSED ACCEPT.

**Cl 74**    **SC 74.7.4.8**                      **P37**            **L1**            # **69**  
 Barrass, Hugh                                      Cisco

**Comment Type**    **T**                      **Comment Status**    **D**                                      **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 including a down\_count divisible by 4

*Proposed Response*                      **Response Status**    **W**  
 PROPOSED ACCEPT.

**Cl 80**    **SC 80.3.1**                                      **P46**            **L44**            # **70**  
 Barrass, Hugh                                      Cisco

**Comment Type**    **T**                      **Comment Status**    **D**                                      **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 presentation. 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

*Proposed Response*                      **Response Status**    **W**  
 PROPOSED ACCEPT.

**Cl 80**    **SC 80.3.1**                                      **P46**            **L48**            # **71**  
 Barrass, Hugh                                      Cisco

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

*Proposed Response*                      **Response Status**    **W**  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.3.3.5 P47 L36 # 72  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.3.5.1 P47 L44 # 73  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D LPI Rx  
 For change of LPI Rx function  
 Change rx\_mode direction  
 SuggestedRemedy  
 Change indicate to request  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.3.5.1 P47 L47 # 74  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D LPI Rx  
 For change of LPI Rx function  
 No ALERT for rx\_mode  
 SuggestedRemedy  
 Delete ALERT.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.3.5.2 P47 L51 # 75  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D LPI Rx  
 For change of LPI Rx function  
 Change origin of rx\_mode  
 SuggestedRemedy  
 Change "received signal" to "PCS LPI receive function"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P48 L13 # 76  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P48 L21 # 77  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.3.2 P48 L28 # 78  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P48 L36 # 79  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P49 L13 # 80  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.2.2 P68 L12 # 81  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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).  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.18.2.2 P68 L30 # 82  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.3.1 P72 L5 # 83  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.3.1 P80 L # 84  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.3.1 P80 L25 # 85  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.3.1 P80 L32 # 86  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.18.3.1 P80 L16 # 87  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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

Proposed Response Response Status W  
PROPOSED ACCEPT.

Cl 83 SC 83.3 P83 L44 # 88  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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

Proposed Response Response Status W  
PROPOSED ACCEPT.

Cl 83 SC 83.3 P83 L48 # 89  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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.

Proposed Response Response Status W  
PROPOSED ACCEPT.

Cl 84 SC 84 P86 L20 # 90  
Barrass, Hugh Cisco

Comment Type T Comment Status D 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

Proposed Response Response Status W  
PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

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

Barrass, Hugh                                      Cisco

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

*Proposed Response*                      *Response Status*    **W**

PROPOSED ACCEPT.

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

Barrass, Hugh                                      Cisco

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

*Proposed Response*                      *Response Status*    **W**

PROPOSED ACCEPT.

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

Barrass, Hugh                                      Cisco

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

*Proposed Response*                      *Response Status*    **W**

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 85 SC 85.7.4 P88 L14 # 94  
 Barrass, Hugh Cisco

Comment Type T Comment Status D 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 91 SC 91.2 P92 L33 # 95  
 Barrass, Hugh Cisco

Comment Type T Comment Status D

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

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.7.13 P23 L9 # 96  
 Barrass, Hugh Cisco

Comment Type T Comment Status D 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 convince 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

Proposed Response Response Status W  
 PROPOSED ACCEPT.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 45 SC 45.2.7.13.1a P24 L41 # 97  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *EEE option*  
 If the new optional behavior is accepted there needs to be a description of the new register bit

*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.

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.7.13.1a P24 L45 # 98  
 Barrass, Hugh Cisco  
 Comment Type E Comment Status D *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.

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 91 SC 91.5.1 P94 L4 # 99  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D  
 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

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 91 SC 91.5.1 P94 L40 # 100  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D  
 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

*Proposed Response* Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Change the direction of PMA:IS\_RX\_MODE.request and add PMA:IS\_ENERGY\_DETECT.indication

Cl 92 SC 92.2 P113 L11 # 101  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D  
 For change of LPI Rx function

rx\_mode needs to change direction

*SuggestedRemedy*  
 Change:  
 IS\_RX\_MODE.indication

To:  
 IS\_RX\_MODE.request

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.2 P151 L11 # 102  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D  
 For change of LPI Rx function  
 rx\_mode needs to change direction  
 SuggestedRemedy  
 Change:  
 IS\_RX\_MODE.indication  
 To:  
 IS\_RX\_MODE.request  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 94 SC 94.3.1 P180 L2 # 104  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 94 SC 94.2 P171 L19 # 103  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 [non-controversial]  
 The primitive name is already as requested on page 171, line 19.

Cl 45 SC 45.2.7.14 P25 L29 # 105  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 69 SC 69.1.2 P28 L32 # 106  
 Barrass, Hugh Cisco  
 Comment Type E Comment Status D  
 For consistency - and also so that commenters can see what is changing - show the deleted text.  
 SuggestedRemedy  
 Show the deleted text.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment #31.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 78 SC 78.1 P37 L32 # 107  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...  
 SuggestedRemedy  
 Change "100GBASE-CR10" to "40GBASE-CR4 PHY, the 100GBASE-CR10 PHY"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.1 P37 L34 # 108  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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,"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.5 P38 L44 # 109  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...  
 SuggestedRemedy  
 Change 100 Gb/s to 40 Gb/s and 100 Gb/s  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.5 P38 L44 # 110  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D EEE option  
 If the new optional behavior is accepted then the "may" should be used.  
 SuggestedRemedy  
 Change "are supported" to "may be supported"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.5 P38 L48 # 111  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.5 P39 L31 # 112  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...  
 SuggestedRemedy  
 In Table 78-4 add two rows for 40GBASE-CR4 and 40GBASE-KR4  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 78 SC 78.5.2 P39 L46 # 113  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 78 SC 78.5.2 P39 L48 # 114  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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"

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P47 L5 # 115  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...

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

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 81 SC 81.1 P55 L28 # 116  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...

*SuggestedRemedy*  
 Change CGMII to XLGMII and CGMII

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 81 SC 81.3a.3.1 P61 L31 # 117  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...

*SuggestedRemedy*  
 Change CGMII to XLGMII and CGMII - 2 locations.

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 81 SC 81.3a.3.1 P61 L # 118  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 40G  
 Following the decision to include all 40/100 PHYs...

*SuggestedRemedy*  
 Change CAUI to XLAUI and CAUI - 2 locations.

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.2.2 P68 L15 # 119  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *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 optional normal wake mode is supported. "

*Proposed Response* Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 82 SC 82.7.6.6 P82 L6 # 120  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 82 SC 82.7.6.6 P82 L11 # 121  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *bucket*  
 The numbering of the table items is unusual.  
*SuggestedRemedy*  
 Number the items in a simple sequence, starting with LPI-01.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 83 SC 83.3 P83 L40 # 122  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 83 SC 83 P83 L51 # 123  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 83 SC 83.7.3 P85 L12 # 124  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 85 SC 85.1 P87 L33 # 125  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D *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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 85 SC 85.2 P87 L # 126  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 85 SC 85.7.2 P88 L5 # 127  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Change paragraph as suggested in #458

Cl 85 SC 85.7.6 P88 L33 # 128  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P49 L21 # 129  
 Barrass, Hugh Cisco  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 93a SC 93A.1.3 P215 L46 # 130  
 Mellitz, Richard Intel Corporation  
 Comment Type TR Comment Status D  
 The transmitter filter was intended to represent the rise and fall times of the transmitter. However values to be presented by Liav Ben-Artzi 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  
 Proposed Response Response Status W  
 PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI **93A** SC **93A.1.6.2** P**219** L**1** # **131**  
 Mellitz, Richard Intel Corporation

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

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

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

See the proposed response to comment #146 for a discussion of the use of p\_G and p\_DD to model amplitude interference due to jitter.

The balance of the response is pending the consideration of this noise source by the Task Force.

CI **93A** SC **93A.1.5** P**217** L**21** # **132**  
 Mellitz, Richard Intel Corporation

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

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 93-14

*SuggestedRemedy*

in equation 93a-14; change denominator to  
 $\max(\sigma_w^2 + A_s^2 * \sigma_G^2, NA_{rms}^2)$

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #131.

CI **93A** SC **93A.1.5** P**217** L**1** # **133**  
 Mellitz, Richard Intel Corporation

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

If the response to #233 is approved, the proposed modification would need to be applied to h(n), which is the single bit response sampled every unit interval around the sample time ts.

$$h_w(n) = h(n) - \text{sign}(h(n)) * \min(\text{abs}(h(n)), wtx)$$

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.

CI **94** SC **94.3.11.1.1** P**118** L**25** # **134**  
 Mellitz, Richard Intel Corporation

Comment Type **TR** Comment Status **D** 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 appropriate graph and equalation

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address this topic.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 94 SC 94.3.12.1.1 P194 L 53 # 135  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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 appropriate graph and equalation

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address topic.

CI 94 SC 94.4.1 P196 L 30 # 136  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 94 SC 94.4.2 P197 L 10 # 137  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 94 SC 94.4.2 P197 L 3 # 138  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D channel COM

If wtx is accepted, add entry in table 94-8

SuggestedRemedy

wtx = 0.1

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 94 SC 94.4.2 P197 L 41 # 139  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 93 SC 93.8.2.2 P162 L 47 # 140  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D

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 appropriate graph and equalation

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Assume the commenter is referring to TP5/TP5a and 93.8.2.1.]

See comment #349.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.8.1.4 P158 L21 # 141  
Mellitz, Richard Intel Corporation

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

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 appropriate graph and equalation

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Assuming the commenter is referring to TP0/TP0a and 93.8.1.1.]

See comment #166.

Cl 93 SC 93.9.1 P165 L46 # 142  
Mellitz, Richard Intel Corporation

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

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.

Proposed Response Response Status **W**

PROPOSED 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 P165 L10 # 143  
Mellitz, Richard Intel Corporation

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

Proposed Response Response Status **W**

PROPOSED ACCEPT.

[Clause from 94 to 93 and Subcl from 93.9.2 to 93.9.1.]

See comment #168 and #169.

Cl 93 SC 93.9.2 P165 L40 # 144  
Mellitz, Richard Intel Corporation

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

Exclusion region not defined. Need to be large enough to insure channels suggested work

SuggestedRemedy

Table 93-8  
set W=12

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #254.

Cl 93 SC 93.9.2 P165 L3 # 145  
Mellitz, Richard Intel Corporation

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

If wtx is accepted, add entry in table 93-8

SuggestedRemedy

wtx = 0.1

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

As pointed out by the commenter, this change is contingent on modifications to Annex 93A.

See comment #133.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.9.2 P165 L43 # 146  
 Mellitz, Richard Intel Corporation

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

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

Table 93-8  
 Change  
 Add = .025

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

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.

CI 94 SC 94.4.2 P197 L42 # 147  
 Mellitz, Richard Intel Corporation

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

Table 93-8  
 Change  
 Sigma\_g = .005  
 Add = .025

Proposed Response Response Status **W**

PROPOSED ACCEPT.

[Changed page from 196 to 197.]

CI 78 SC 78.1.4 P38 L1 # 148  
 Ran, Adeo Intel

Comment Type **E** Comment Status **D** 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".

Proposed Response Response Status **W**

PROPOSED ACCEPT.

CI 82 SC 82.2.18.2.3 P69 L18 # 149  
 Ran, Adeo Intel

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

Capitalization of hexadecimals should be consistent with previous instances.

SuggestedRemedy

Change "0x1e" to "0x1E".

Proposed Response Response Status **W**

PROPOSED ACCEPT.

CI 91 SC 91.5.2.6 P95 L50 # 150  
 Ran, Adeo Intel

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Augment Figure 91-4 to show the inclusion of the 5-bit pad.

Also clarify the assignment of pad bits.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

**Cl 91**    **SC 91.5.2.8**                      **P99**            **L13**            # 151  
 Ran, Adee                                      Intel  
**Comment Type**    **E**                      **Comment Status**    **D**                      *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)".  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED 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 91.5.3.2**                      **P99**            **L42**            # 152  
 Ran, Adee                                      Intel  
**Comment Type**    **E**                      **Comment Status**    **D**  
 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".  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment #453.

**Cl 92**    **SC 92.8.3.3**                      **P122**            **L42**            # 153  
 Ran, Adee                                      Intel  
**Comment Type**    **E**                      **Comment Status**    **D**  
 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 entirely.  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment#365.

**Cl 83**    **SC 83.1.1**                              **P83**            **L31**            # 154  
 Ran, Adee                                      Intel  
**Comment Type**    **ER**                      **Comment Status**    **D**                      *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).  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 91 SC 91.5.2.5 P95 L 20 # 155  
 Ran, Adee Intel

Comment Type ER Comment Status D

It is not absolutely clear from the text whether the XOR occurs only for the case where at least one 66-bit block is a control block, or for all cases including all-data blocks. I assume the latter 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\_xcoded<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.

Proposed Response Response Status W

PROPOSED 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.

CI 91 SC 91.5.2.6 P95 L 26 # 156  
 Ran, Adee Intel

Comment Type ER Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Figure 91-4 was intended to be the requested illustration.

See comment #150.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.3.5 P101 L25 # 157  
 Ran, Adee Intel

Comment Type ER Comment Status D

Assuming rx\_xcoded<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> and 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.

Proposed Response Response Status W

PROPOSED 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 92 SC 92.8.3.7 P128 L8 # 158  
 Ran, Adee Intel

Comment Type ER Comment Status D

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!

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change: The reference test fixture printed circuit board insertion loss is given in Equation (92-15) and shall be used.

Change: 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 of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.4 P130 L12 # 159  
 Ran, Adee Intel

Comment Type T Comment Status D

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).

Proposed Response Response Status W

PROPOSED REJECT.

Changing BER requirement is not sufficiently addressed in remedy to implement in draft. For committee discussion.resolve with comment#390.

CI 81 SC 81.3a P59 L10 # 160  
 Ran, Adee Intel

Comment Type TR Comment Status D 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

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Instead of XLGMII/CGMII, use XLGMII and CGMII

Instead of XLAUI/CAUI, use XLAUI and CAUI

CI 91 SC 91.3 P92 L44 # 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

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 91 SC 91.5.2.5 P95 L7 # 162  
Ran, Adee Intel

Comment Type TR Comment Status D

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.

Proposed Response Response Status W  
PROPOSED ACCEPT IN PRINCIPLE.

See comment #53.

CI 91 SC 91.5.2.6 P95 L40 # 163  
Ran, Adee Intel

Comment Type TR Comment Status D 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".

Proposed Response Response Status W  
PROPOSED ACCEPT.

[Comment was entered against Subcl 91.5.2.5, but is actually against 91.5.2.6.]

See comment #472.

CI 91 SC 91.5.3.5 P101 L45 # 164  
Ran, Adee Intel

Comment Type TR Comment Status D

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.

Proposed Response Response Status W  
PROPOSED 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 scramble 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.4.2 P131 L19 # 165  
 Ben-Artsi, Liav Marvell  
 Comment Type E Comment Status D  
 Applied DCD should be changed according to the new convention (even-odd jitter)  
 SuggestedRemedy  
 change DCD to even-odd jitter  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 Use suggested remedy.

CI 93 SC 93.8.1.1 P156 L51 # 166  
 Ben-Artsi, Liav Marvell  
 Comment Type T Comment Status D  
 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)  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Response pending consideration of the cited presentation.

CI 93 SC 93.8.2.2 P162 L52 # 167  
 Ben-Artsi, Liav Marvell  
 Comment Type TR Comment Status D  
 Differential return loss in equation 93-3 is TBD  
 SuggestedRemedy  
 Define return loss according to equation 93A-3 with parameters according to the presentation  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Response pending consideration of the cited presentation.

CI 93 SC 93.9 P165 L10 # 168  
 Ben-Artsi, Liav Marvell  
 Comment Type TR Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 The comment is against Table 93-8. Response is pending consideration of the cited presentation.

CI 93 SC 93.9 P165 L13 # 169  
 Ben-Artsi, Liav Marvell  
 Comment Type TR Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 The comment is against Table 93-8. Response is pending consideration of the cited presentation.

CI 93 SC 93.9 P165 L15 # 170  
 Ben-Artsi, Liav Marvell  
 Comment Type TR Comment Status D  
 Table 93-8 does not include package insertion loss model equation  
 SuggestedRemedy  
 Add package insertion loss model equation according to presentation  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Response is pending consideration of the cited presentation.  
 However, assuming the model is a function of some (small) number of parameters, the parameters and values would be included in Table 93-8 while the equations would be include in Annex 93A.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.8.1.4 P158 L37 # 171  
Ben-Artsi, Liav Marvell

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

Differential return loss in equation 93-1 is TBD

*SuggestedRemedy*

Define return loss according to equation 93A-3 with parameters according to the presentation

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Refer to cited presentation.

Note that comment #491 proposes the addition of transmitter common-mode to differential return loss requirements.

Cl 00 SC 0 P L # 172  
Anslow, Pete Ciena

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

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.

Proposed Response Response Status **W**

PROPOSED 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 80 SC 80.1.5 P45 L8 # 173  
Anslow, Pete Ciena

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

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

Proposed Response Response Status **W**

PROPOSED ACCEPT.

Cl 80 SC 80.1.4 P44 L3 # 174  
Anslow, Pete Ciena

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

Proposed Response Response Status **W**

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 80 SC 80.1.5 P45 L35 # 175  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 80 SC 80.1.5 P44 L22 # 176  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 83 SC 83.1.1 P83 L23 # 177  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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:"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 80 SC 80.4 P50 L3 # 178  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 80 SC 80.4 P50 L20 # 179  
 Anslow, Pete Ciena  
 Comment Type E Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 00 SC 0 P L # 180  
 Anslow, Pete Ciena  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.7 P54 L1 # 181  
 Anslow, Pete Ciena

Comment Type T Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.2.6 P96 L48 # 182  
 Slavick, Jeff Avago Technologies

Comment Type E Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.2.8 P99 L9 # 183  
 Slavick, Jeff Avago Technologies

Comment Type E Comment Status D 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 "descrambling and" from the last sentence in 91.5.3.4

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change to:

"Once the data has been Reed-Solomon encoded, it shall..."

Cl 82 SC 82.2.18.2.2 P68 L31 # 184  
 Slavick, Jeff Avago Technologies

Comment Type E Comment Status D LPI Rx

Text states rx\_mode is one of four values, but only 3 are listed.

SuggestedRemedy

Change the word four to three.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

#82 changes definition to only two modes.

Cl 82 SC 18.2.18.2.3 P69 L44 # 185  
 Slavick, Jeff Avago Technologies

Comment Type E Comment Status D bucket

/L/ 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/,/L/, and /E/;

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.3.3 P101 L11 # 186  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED REJECT.

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.

Therefore, the response is proposed to be REJECT pending discussion and a measurement of the consensus to add (and implicitly require) this feature.

Cl 82 SC 82.2.8a P66 L5 # 187  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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 82.2.18.2.3.1 P71 L36 # 188  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED REJECT.

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

Cl 78 SC 78.5.2 P39 L53 # 189  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED 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

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.4 P92 L53 # 190  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D  
 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

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

The proposed value of 8 pause\_quanta exceeds the informal latency target of 100 ns and should be discussed.

In addition, comment #241 requests more information on the impact of error marking on FEC latency. If error marking is made optional (similar to Clause 74), should text be added to indicate its impact?

Cl 82 SC 82.2.18.3.1 P79 L40 # 191  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D  
 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

Proposed Response Response Status W  
 PROPOSED 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 P65 L34 # 192  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D 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

Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.8a P66 L8 # 193  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D 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 14 66-bit block on each 40G PCS lane."

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 82 SC 82.2.8a P66 L14 # 194  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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 P66 L11 # 195  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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

*SuggestedRemedy*

Add a sentence 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"

Proposed Response Response Status W

PROPOSED 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, 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 insertion after one block of /LPI/ has been transmitted on PCS lane 0. The distance between the first RAM and preceding normal alignment marker shall be an integer number of 4 66-bit blocks."

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 91 SC 91 P104 L0 # 196  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See healey\_02\_0912.pdf.

CI 91 SC 91.5.2.4 P93 L46 # 197  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

Replace TBD with the BIP error counter register that already exist in MDIO.

SuggestedRemedy

Change TBD with 3.200 to 3.219

Proposed Response Response Status W

PROPOSED 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.

CI 91 SC 91.5.2.5 P95 L20 # 198  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #155.

CI 91 SC 91.5.4.2.1 P107 L3 # 199  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #209.

CI 82 SC 82.2.8a P67 L2 # 200  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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).

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.7.12 P119 L14 # 201  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED 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 82 SC 82 P80 L10 # 202  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D  
 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 to restart continuously until you begin to see data leave. So leaving the RX\_SLEEP -> RX\_SLEEP loop in place is an option.

Proposed Response Response Status W  
 PROPOSED 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 P80 L8 # 203  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D  
 Figure 82-17 LPI Receive state diagram. The transition 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

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Since rx\_align\_status takes into account the block\_lock for all PCS lanes, it is more efficient to make the transition:

align\_status \* rx\_align\_status \* R\_TYPE(rx\_coded) = LI

Cl 91 SC 91.5.4.2.3 P106 L3 # 204  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.4.3 P108 L37 # 205  
 Slavick, Jeff Avago Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED 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. 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 91.5.2.6 P113 L38 # 206  
 Zhong, Qiwen Huawei

Comment Type E Comment Status D

"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!

Proposed Response Response Status W

PROPOSED REJECT.

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, the editor is open to using a different example if there consensus is to do so.]

Cl 91 SC 91-2 P94 L # 207  
 Sela, Oren Mellanox Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 91 SC 91.5.4.2.1 P105 L 54 # 208  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D

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 state 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\_pcs1 = first\_pcs1+16 only  
If option 2 is chosen then AMP\_COMPARE should change so that - if current\_pcs1 equals first\_pcs1, amp\_match is set to true - is applicable for both EEE and normal mode

Proposed Response Response Status W  
PROPOSED 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.

The behavior of Clause 91 for the optional EEE capability is proposed to be modified per comment #243. This comment will be used to summarize all changes related to EEE (including the definition of amp\_counter).

CI 91 SC 91.5.4.2.1 P104 L # 209  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D

restart\_lock variable is not defined in the varabile section

SuggestedRemedy

add restart\_lock definition

Proposed Response Response Status W  
PROPOSED 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.

CI 91 SC 91-8 P107 L # 210  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D

The FEC synchronization state diagram doesn't take into account the fast lock needed for EEE wakeup from LPI QUIET - 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

Proposed Response Response Status W  
PROPOSED ACCEPT IN PRINCIPLE.

See comment #243.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.4.2.1 P104 L # 211  
Sela, Oren Mellanox Technologies

Comment Type E Comment Status D

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

Proposed Response Response Status W

PROPOSED 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 91-9 P108 L # 212  
Sela, Oren Mellanox Technologies

Comment Type E Comment Status D

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"

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #49.

Cl 91 SC 91.5.4.2.1 P104 L26 # 213  
Sela, Oren Mellanox Technologies

Comment Type ER Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 82 SC 82.2.8a P66 L10 # 214  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED REJECT.

The link partner uses the count down field in received RAMs to derive received\_tx\_mode

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.8a P67 L8 # 215  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D

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

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 78 SC 78.1 P37 L30 # 216  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D 40G

Need to add the 40GBASE-CR4 and 40GBASE-KR4 PHYs to the 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"

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See #107, 108

Cl 82 SC 82-16 P79 L # 217  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D 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 to be sent, this can be done by setting down\_count\_done to TRUE in the scrambler bypass state 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\_bypass\_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

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

An alternate solution to this problem is offered by comments #68, #69

*Cl* **85**      *SC* **85-1**      *P* **87**      *L* **28**      # **218**

Sela, Oren      Mellanox Technologies

*Comment Type* **T**      *Comment Status* **D**      *40G*

change "Not Applicable" to "Optional" for 40GBASE-CR4

*SuggestedRemedy*

per comment

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT.

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

Sela, Oren      Mellanox Technologies

*Comment Type* **T**      *Comment Status* **D**      *40G*

40GBASE-CR4 can also enter low power idle

*SuggestedRemedy*

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

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT.

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

Marris, Arthur      Cadence

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

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 consistency.

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT.

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

Marris, Arthur      Cadence

*Comment Type* **T**      *Comment Status* **D**      *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)"

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

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

*Cl* **91**      *SC* **91.5.2.2**      *P* **93**      *L* **27**      # **222**

Gustlin, Mark      Xilinx

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

The skew variation of 0.2ns is discussed, but it would be good to also refer to SP1 in this sentence, similar to how it is referenced in 83.5.3.3.

*SuggestedRemedy*

Per the comment.

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See healey\_02\_0912.

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

Gustlin, Mark      Xilinx

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

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.8a P66 L15 # 224  
Gustlin, Mark Xilinx

Comment Type T Comment Status D

Figure 82.9a is meant to show the blocks being transmitted from 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Normal AM left-most; 16383 blocks; then down\_count = 0; etc.

Cl 91 SC 91.5.4.2.1 P104 L46 # 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 W

PROPOSED ACCEPT IN PRINCIPLE.

Is there a presentation of the analysis to confirm the commenter's assertion?

Cl 91 SC 91.5.4.3 P107 L3 # 226  
Gustlin, Mark Xilinx

Comment Type T Comment Status D

The signal restart\_lock is not a defined variable. Add it to the list of variables.

SuggestedRemedy

Per the comment.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #209.

Cl 82 SC 82.2.8a P66 L43 # 227  
Gustlin, Mark Xilinx

Comment Type T Comment Status D 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 referencnes to table 82-3 for 40GE encoding of AMs.

SuggestedRemedy

Per the comment.

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 82 SC 82.2.8a P67 L7 # 228  
Gustlin, Mark Xilinx

Comment Type T Comment Status D

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 receiver 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.

Proposed Response Response Status W

PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl **93A** SC **P213** L **24** # **229**  
 Vareljian, Albert Independent

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

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 in the standard.

*Suggested Remedy*

See provided material for details.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Response pending Task Force discussion of cited materials.

The response to this comment potentially overtakes the remainder of the comments against this Annex.

Cl **92A** SC **92A.4** **P208** L **29** # **230**  
 Moore, Charles Avago Technologies

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

Annex 92A.4 refers to 92.8.3.4 which separately specifies the loss from TP0-TP2 and from TP3-TP5 but then talks primarily 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 unnecessary and confusing. Also the reference to the loss of a mated pair seems like a non-sequitur.

*Suggested Remedy*

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:

$$IL\_PCB(f) \leq IL\_PCBmax(f) = 0.0347 + 0.2124 \sqrt{f} + 0.4661 f \text{ (dB)}$$

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

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

(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

$$IL_{PCB}(f) \geq IL_{PCBmin}(f) = 0.184 * (0.0347 + 0.2124 \sqrt{f}) + 0.4661 f \text{ (dB)}$$

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment#486.

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**Cl 93A**      **SC 93A.1.5**      **P 216**      **L 49**      # 231

Healey, Adam      LSI Corporation

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

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.

*Suggested Remedy*

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.

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #253.

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**Cl 93A**      **SC 93A.1.5**      **P 217**      **L 6**      # 232

Healey, Adam      LSI Corporation

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

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.

*Suggested Remedy*

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  $h(ts) - |h(ts - T_b)|$  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):  $h(ts - T_b/2) = h(ts + T_b/2) - h(ts + T_b)/2$

*Proposed Response*      *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The intent of the original proposal was option #1. Update the definition of tz and ts accordingly.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93A SC 93A.1.5 P217 L8 # 233  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D

Residual inter-symbol interference should be a function of the chosen sampling phase  $t_s$ . 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  $t_s$ . 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  $t_s$  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  $t_s$  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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 91 SC 91.5.2.7 P99 L1 # 234  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D

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,  $g_i$ , in Clause 91 or in the proposed annex.

Proposed Response Response Status W  
 PROPOSED 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).

CI 93 SC 93.5 P152 L8 # 235  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D

There is no physical instantiation of the Clause 93 PMD service interface and it does not make 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 93 SC 93.4 P151 L49 # 236  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D

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).

Proposed Response Response Status W  
 PROPOSED ACCEPT.

CI 93 SC 93.8.1.5 P158 L48 # 237  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D

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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.8.3 P164 L4 # 238  
 Healey, Adam LSI Corporation  
 Comment Type T Comment Status D  
 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 specifier to that subclause.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment #488.

Cl 91 SC 91.2 P92 L21 # 239  
 Healey, Adam LSI Corporation  
 Comment Type T Comment Status D  
 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  
 Specify 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Define SIGNAL\_OK per the comment.  
 For the definition of the rx\_bit values when SIGNAL\_OK=FAIL, see healey\_02\_0912.

Cl 91 SC 91.5.2.5 P95 L12 # 240  
 Healey, Adam LSI Corporation  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 See comment #15.

Cl 91 SC 91.5.3.3 P101 L6 # 241  
 Healey, Adam LSI Corporation  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

It should be noted that deactivating error marking would have an adverse impact on MTTFFPA  
 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 P101 L18 # 242  
 Healey, Adam LSI Corporation  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Grant editorial license to craft to text to be consistent with changes to EEE functionality suggested by other comments.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.4.2.1 P104 L39 # 243  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

See healey\_02\_0912.pdf.

Cl 91 SC 91.6 P108 L52 # 244  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Refer to comment #196.

Cl 91 SC 91.4 P92 L52 # 245  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

See comment #190.

Cl 93A SC 93A.1 P213 L24 # 246  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 93A SC 93A.1.3 P215 L46 # 247  
 Healey, Adam LSI Corporation

Comment Type T Comment Status D  
 The variable  $A_t$  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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Note that comment #130 suggests to remove  $H_t(f)$  and Equation 93A-6. If that comment is accepted, this becomes overtaken by events.

See also comment #36.

## IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.8.1.1 P156 L47 # 248  
Ran, Adee Intel

Comment Type E Comment Status D

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 output waveform on another.

For symmetry, apply also for TP5a in subclause 93.8.2.1.

*Suggested Remedy*

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".

Proposed Response Response Status W

PROPOSED 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.

CI 93A SC 93A.1.6.1 P216 L17 # 249  
Ran, Adee Intel

Comment Type E Comment Status D

Convolution is also denoted by "\*" in other equations 23, 24 and 25.

*Suggested Remedy*

Either refer to all equations or just change "In equation (93A-18)" to "Where".

Proposed Response Response Status W

PROPOSED 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)."

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.1 P111 L19 # 250  
 Ran, Adee Intel

Comment Type ER Comment Status D

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 clarification 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.

*Suggested Remedy*

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

The text cited in this comment is modified by comment #489.

Cl 93 SC 93.8.1 P156 L18 # 251  
 Ran, Adee Intel

Comment Type T Comment Status D

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 increase the rise time.

*Suggested Remedy*

Remove this parameter from table 93-4 and delete clause 93.8.1.5.

Proposed Response Response Status W

PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.8.1.6 P160 L10 # 252  
 Ran, Adeo 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 W

PROPOSED ACCEPT IN PRINCIPLE.

The transmitter output waveform measurement in Clause 85 is made at the output of a host channel and test fixture with up to 6.5 dB of loss at the fundamental frequency. Compare this to the 1.6 dB loss in the test fixture defined in 93.8.1.1.

While the Np/Dp and Nw/Dw value may need adjustment, the values proposed in the Suggested Remedy may not be the correct ones.

CI 93A SC 93A.1.5 P216 L48 # 253  
 Ran, Adeo Intel

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 93 SC 93.9.1 P165 L40 # 254  
 Ran, Adeo Intel

Comment Type T Comment Status D

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, making W=16.

SuggestedRemedy

In table 93-8, change the value of W from "TBD" to 16.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TBD to be replaced with a value reflecting the consensus of the Task Force.

CI 94 SC 94.3.11 P187 L35 # 255  
 Ran, Adeo Intel

Comment Type T Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address this comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 94 SC 94.4.1 P197 L40 # 256  
Ran, Adee Intel

Comment Type T Comment Status D 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 receiver 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 93 SC 93.8.1.1 P157 L28 # 257  
Ran, Adee Intel

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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. However, given that the budget is tight, it may be worthwhile to make this distinction.

The response is pending a discussion of these trade-offs.

Cl 93 SC 93.8.2.3 P163 L23 # 258  
Ran, Adee Intel

Comment Type TR Comment Status D

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).

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Pending discussion by the Task Force.

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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI **93A** SC **93A.1.5** P**217** L**8** # **259**  
 Ran, Adee Intel

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

The exception window should start at  $t_z - T_b$  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 "[ $t_z, t_z + WT_b$ ]" to "[ $t_z - T_b, t_z + WT_b$ ]".

Apply also in 93A.1.6.3 (line 13).

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Assuming the response to comment #233 is approved, the exception window would no longer be applied to the oversampled single bit response and this comment is overtaken by events.

CI **93A** SC **93A-1.6.3** P**219** L**14** # **260**  
 Ran, Adee Intel

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

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

$$t_n = t_z + (n-4) * T_b, n = 0.. \text{floor}(3 * T_{prop} / T_b) + 8$$

and  $T_{prop}$  is the propagation delay through the channel.

Use  $h_w(n)$  for the procedure defined in 93A.1.6.1.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #233.

CI **94** SC **94.3.12.3** P**195** L**37** # **261**  
 Ran, Adee Intel

Comment Type **TR** Comment Status **D** 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).

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address this comment.

CI **92** SC **Table 92-1** P**134** L**1** # **262**  
 Lusted, Kent Intel

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

Draft 1.1 rennumbers the tables in Clause 92 but the first table in the section starts with 92-2. should be 92-1.

*SuggestedRemedy*

Fix Table numbers

Proposed Response Response Status **W**

PROPOSED REJECT.

Page 111 - Line 24 - Table 92-1-Physical Layer clauses associated with the 100GBASE-CR4 PMD.

Page 144 - Line 31 - Table 92-2



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC Table 92-2 P134 L9 # 263  
Lusted, Kent Intel

Comment Type TR Comment Status D

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 part 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 MTTFFPA.

*SuggestedRemedy*

Make FEC optional: Remove the mandatory FEC encoding and transcoding requirement from the clause and enable using 64/66 encoding.

Proposed Response Response Status W

PROPOSED 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

Therefore, the proposed response is REJECT pending discussion by the Task Force (and a motion demonstrating consensus to modify the decision).

Cl 93 SC Table 93-1 P175 L9 # 264  
Lusted, Kent Intel

Comment Type TR Comment Status D

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 part 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 MTTFFPA.

*SuggestedRemedy*

Make FEC optional: Remove the mandatory FEC encoding and transcoding requirement from the clause and enable using 64/66 encoding.

Proposed Response Response Status W

PROPOSED 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

Therefore, the proposed response is REJECT pending discussion by the Task Force (and a motion demonstrating consensus to modify the decision).

See also #263 for 100GBASE-CR4.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.7.12 P184 L3 # 265  
Lusted, Kent Intel

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #10175.

Cl 92 SC 92.7.12 P143 L22 # 266  
Lusted, Kent Intel

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comments #10175 (and #265).

Cl 45 SC Table 45-7 P21 L1 # 267  
Lusted, Kent Intel

Comment Type TR Comment Status D 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

Proposed Response Response Status W

PROPOSED 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 P21 L1 # 268  
Lusted, Kent Intel

Comment Type TR Comment Status D 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

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 45 SC Table 45-10 P21 L1 # 269  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.1.8 P21 L1 # 270  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC Table 45-15 P21 L1 # 271  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 45 SC 45.2.1.12 P21 L1 # 272  
 Lusted, Kent Intel  
 Comment Type TR Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 92 SC 92.8.3 P120 L # 273  
 DiMinico, Christopher MC Communications  
 Comment Type TR Comment Status D  
 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 diminco\_01\_0712.pdf slide 4 Equations 92-1, 92-2 and 92-3.  
 SuggestedRemedy  
 Use diminco\_01\_0712.pdf slide 4 Equations 92-1, 92-2 and 92-3 for D1.1 Equations 92-1, 92-2 and 92-3.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 Use suggested remedy.

Cl 92 SC 92.10.2 P135 L17 # 274  
 DiMinico, Christopher MC Communications  
 Comment Type TR Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI **92** SC **92.8.4.2** P**131** L**7** # **275**  
 DiMinico, Christopher MC Communications

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

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 assembly with the maximum noise (ICN) at that loss.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for Table 92-8-100GBASE-CR4 interference tolerance TBD and related parameters.

CI **92A** SC **92A.8** P**211** L**41** # **276**  
 DiMinico, Christopher MC Communications

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

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).

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for the total integrated crosstalk RMS noise voltage of the channel in Equation (92A-6).

CI **92** SC **92.8.3.7** P**128** L**12** # **277**  
 DiMinico, Christopher MC Communications

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for the test fixture reference insertion loss equation 92-15.

CI **92** SC **92.10.9.1** P**141** L**44** # **278**  
 DiMinico, Christopher MC Communications

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the 92.10.9.1 Mated test fixtures insertion loss Equations (92-34) and (92-35) and illustration in Figure 92-14.

CI **92** SC **92.10.9.2** P**142** L**35** # **279**  
 DiMinico, Christopher MC Communications

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the 92.10.9.2 Mated test fixtures return loss Equation (92-36) an illustration in Figure 92-15.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.10.9 P143 L24 # 280  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the 92.10.9.3 Mated test fixtures common-mode return loss Equation (92-TBD) an illustration in Figure 92-TBD.

Cl 92 SC 92.10.9.3 P143 L25 # 281  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the 92.10.9.3 Mated test fixtures common-mode conversion loss Equation (92-37) an illustration in Figure 92-16.

Cl 92 SC 92.10.9.4 P144 L35 # 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 W

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the Mated test fixtures integrated crosstalk noise parameter values in Table 92-12.

Cl 92 SC 92.8.3.3 P123 L17 # 283  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

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...

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for TBD parameters of pulse fit and the equalizing filter given in Table 92-6.

Cl 92 SC 92.8.3.4 P126 L21 # 284  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for equations 92-14 and figure for 92-4.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.10.7 P139 L38 # 285  
DiMinico, Christopher MC Communications

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the total integrated crosstalk RMS noise voltage Equation (92-32) and Figure 92-11.

CI 92 SC 92.8.3.2 P121 L10 # 286  
DiMinico, Christopher MC Communications

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

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  $\pm$  TBD dB at 12.8906 GHz and a "high-loss" cable assembly with insertion loss on the reference pair of TBD dB  $\pm$  TBD dB at 12.8906 GHz.

*SuggestedRemedy*

diminico\_0912.pdf provides the values for TBD's of the two reference channels.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for TBD values of the two reference channels.

CI 92 SC 92.8.4.5 P133 L30 # 287  
DiMinico, Christopher MC Communications

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

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.

Proposed Response Response Status **W**

PROPOSED ACCEPT.

Use suggested remedy.

CI 92 SC 92.10.8 P140 L34 # 288  
DiMinico, Christopher MC Communications

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

The reference test fixture printed circuit board insertion loss is given in Equation (92-33).

*SuggestedRemedy*

diminico\_0912.pdf provides Equation (9-33).

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee review of diminico\_0912.pdf for the reference test fixture printed circuit board insertion loss is given in Equation (92-33).

CI 92A SC 92A-5 P210 L34 # 289  
DiMinico, Christopher MC Communications

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

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).

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for Equation (92A-4).

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3.3 P123 L10 # 290  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

Provide values for 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  $TBD \times$  Steady state voltage.

SuggestedRemedy

Use values for these parameters in Table 93-4-Summary of transmitter characteristics at TP0a.

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

Cl 92 SC 92.8.3.3.1 P123 L54 # 291  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

the ratio  $(c(0)+c(1)-c(-1))/(c(0)+c(1)+c(-1))$  is TBD  $\pm 10\%$

SuggestedRemedy

diminico\_0912.pdf provides ratio TBD.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Changed ", " to "." in Subcl field for more consistent sorting.]

Committee review of diminico\_0912.pdf for the ratio  $(c(0)+c(1)-c(-1))/(c(0)+c(1)+c(-1))$  TBD  $\pm 10\%$ .

Cl 92 SC 92.8.3.3.2 P124 L7 # 292  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for TBD values.

Also, Table 92-5-includes values for minimum precursor fullscale range= 1.54 and minimum post cursor fullscale range= 4

These parameter values are TBD in reference 92.8.3.3.3. In 92.8.3.3.3 replace minimum precursor fullscale range TBD with 1.54 and minimum post cursor fullscale range TBD with 4.

Cl 92 SC 92.8.3.3.3 P124 L21 # 293  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for TBD values.

Cl 92 SC 92.8.3.3.4 P124 L35 # 294  
DiMinico, Christopher MC Communications

Comment Type TR Comment Status D

The value of M is TBD

SuggestedRemedy

diminico\_0912.pdf provides TBD.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for TBD value.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.4.2.4 P132 L44 # 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 **W**

PROPOSED ACCEPT IN PRINCIPLE.

Committee discussion of diminico\_0912.pdf for the rise and fall times of the pattern generator and Equation (92-17).

Cl 92A SC 92A.4 P209 L12 # 296  
 Ghiasi, Ali Broadcom

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

0.184(xyz) equation not clear

*SuggestedRemedy*

0.184x(xyz)

Proposed Response Response Status **W**

PROPOSED REJECT.

Coefficient without multiplication operator chosen as style in 802.3ba and used in 802.3bj.

Cl 92A SC 92A.4 P209 L12 # 297  
 Ghiasi, Ali Broadcom

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

Min loss equation stop at 18.75 GHz

*SuggestedRemedy*

range should be 0.01 to 18.75 GHz

Proposed Response Response Status **W**

PROPOSED REJECT.

Line 12 reads - for 0.01 GHz = f = 18.75 GHz.

Cl 89 SC 1 P30 L10 # 298  
 Ghiasi, Ali Broadcom

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

A more deatial disclaimer need to be added inclduing the fact VSR2000-3R2 does not have the same level of interoperability or BER objective

*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 **W**

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.

Cl 89 SC 5.1 P34 L33 # 299  
 Ghiasi, Ali Broadcom

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

PMD service interface TP1 and TP4 are not applicable as they are not currently defined

*SuggestedRemedy*

Remove TP1 and TP4  
 Add XLAUI interface to the PMA

Proposed Response Response Status **W**

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 89 SC 6.3 P37 L36 # 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 W

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.

Cl 89 SC 6.3 P37 L46 # 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 W

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.

Cl 89 SC 7.10 P42 L4 # 302  
Ghiasi, Ali Broadcom

Comment Type TR Comment Status D bucket

The receiver jitter tolerance 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 W

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.

Cl 89 SC 9 P4 L17 # 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 W

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.

Cl 89 SC 9 P4 L19 # 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 W

PROPOSED REJECT.

This comment appears to have been submitted in error. Clause 89 is beyond the scope of P802.3bj.

Cl 92 SC 92.7.1 P116 L53 # 305  
Ghiasi, Ali Broadcom

Comment Type TR Comment Status D

Cable output test point is TP4 and not TP3

SuggestedRemedy

Repalce TP3 with TP4 in table 92-4

Proposed Response Response Status W

PROPOSED REJECT.

Line 53 TP3 is for receiver measurements.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3 P120 L36 # 306  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 The commenter did not provide sufficient data that demonstrates that 0.28 will have severe impact on the link.

Cl 92 SC 92.8.3 P120 L36 # 307  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Why are we introducing effective random jitter instead of classical definition of the random jitter  
 SuggestedRemedy  
 Replace efective random jitter with random jitter  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 See comment#322.

Cl 92 SC 92.8.3.1 P120 L52 # 308  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Transmitter RL is TBD  
 SuggestedRemedy  
 $RL = 12 - 0.5 * f$  for 0.05 to 8 GHz  
 $= 5.67 - 9.71 * \log_{10}(f/14e9)$  8 GHz to 25.78 GHz  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment#273.

Cl 92 SC 92.8.3.4 P126 L22 # 309  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment#284.

Cl 92 SC 92.8.3.8 P129 L7 # 310  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Effective random jitter is introduced in this standard based on dual-dirc method, depending or the amount of DJ RJ can vary.  
 SuggestedRemedy  
 If the intention is to limit random noise / unbonuded 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)  
 Proposed Response Response Status W  
 PROPOSED 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 curretn method.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.4.1 P130 L33 # 311  
 Ghiasi, Ali Broadcom

Comment Type TR Comment Status D

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 equation need to be  $6.4 - 13 \cdot \log(f/13.75)$

Better definition would be  
 12 -  $0.5 \cdot f/1E9$  0.05 to 8 GHz  
 5.67 -  $9.71 \cdot \log(f/14e9)$  8 to 25.78 GHz

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change:  $12 - 1.24 \cdot \text{SQRT}(f)$   
 To:  $12 - 1.25 \cdot \text{SQRT}(f)$

Cl 92 SC 92.8.4.5 P133 L28 # 312  
 Ghiasi, Ali Broadcom

Comment Type TR Comment Status D

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 recommended that the value of AC coupling 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"

Proposed Response Response Status W

PROPOSED 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.

Cl 92 SC 92.8.4.5 P133 L29 # 313  
 Ghiasi, Ali Broadcom

Comment Type TR Comment Status D

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

Proposed Response Response Status W

PROPOSED REJECT.

The low frequency 3 dB frequency cutoff is to characterize AC coupling.

Cl 92 SC 92.10 P134 L14 # 314  
 Ghiasi, Ali Broadcom

Comment Type TR Comment Status D

It is not helpful 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"

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

In Table 92-9 change return loss cross- reference form 92.10.4 to 92.10.5.

Cl 92 SC 92.10.4 P137 L3 # 315  
 Ghiasi, Ali Broadcom

Comment Type TR Comment Status D

There is jump in the RL equation

SuggestedRemedy

Change to  $10.5 - 13 \log_{10}(f/5.5)$  from 4.1 to 25 GHz

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change  $16.2 - 2 \sqrt{f}$  0.05= $f < 4.1$   
 To  $16.5 - 2 \sqrt{f}$  0.05= $f < 4.1$   
 Change  $10.5 - 13 \log_{10}(f/5.5)$  4.1= $f = 25$   
 To  $10.8 - 13 \log_{10}(f/5.5)$  4.1= $f = 25$

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.10.8 P140 L34 # 316  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 ILcat(f) is missing  
 SuggestedRemedy  
 $IL_{cat}(f) = 1.25 * (-0.001 + 0.096 * \sqrt{f} + 0.046 * f^2)$   
 which has loss of 1.25 dB at 14 GHz  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See response comment #288.

Cl 92 SC 92.10.8 P140 L34 # 317  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 ILxyz(f) of the HCB is missing  
 SuggestedRemedy  
 Add section like 10.8 for HCB then add following  
 $IL_{cat}(f) = 1.75 * (-0.001 + 0.096 * \sqrt{f} + 0.046 * f^2)$   
 which has loss of 1.75 dB at 14 GHz  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 TP2 or TP3 test fixture insertion loss specified in 92.8.3.7 equation 92-15.  
 In Annex 92A, the insertion loss of the test fixture printed circuit board is 1.25 dB at 12.8906 GHz.  
 See comment#277 for equation 92-15.

Cl 92 SC 92.10.9.1 P141 L50 # 318  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Mated test fixture max and min loss are missing  
 SuggestedRemedy  
 $IL_{MTFmin} = (0.08 * \sqrt{f} + 0.2 * f)$  for 0.01 to 25.78 GHz  
 $IL_{MTFmax} = (-0.114 + 0.45 * \sqrt{f} + 0.21 * f)$  for 0.01 to 14 GHz  
 = 4.5 - 0.66\*f for 14 to 25.78 GHz  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Resolve with comment #278.

Cl 92 SC 92.10.9.2 P142 L34 # 319  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Mated board RL value TBD  
 SuggestedRemedy  
 Presentation will show the graph but the proposed 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Resolve with comment#279.

Cl 92 SC 92.10.9.3 P143 L35 # 320  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Conversion loss is TBD  
 SuggestedRemedy  
 $SCD_{xx} = -35 + 1.07 * f$  for 0.01 to 14 GHz  
 = -20 dB for 14 to 25.78 GHz  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Resolve with comment #281.

Cl 93 SC 93.8.1 P157 L33 # 321  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 There is insufficient proof that DJ can be removed without some penalty due to the case when DJ=0.28 and RJ effective = 0!  
 SuggestedRemedy  
 Add line with max deterministic jitter = 0.15 UI  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 [Changed Subcl from 8.1.1 to 93.8.1 for more consistent sorting (the comment is against Table 93-4).]  
 Response pending Task Force discussion.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.1.1 P157 L32 # 322  
 Ghiasi, Ali Broadcom

Comment Type **TR** Comment Status **D**  
 Why are we introducing new jitter term "Effective random jitter"

SuggestedRemedy  
 Replace effective random jitter with "random jitter"

Proposed Response Response Status **W**  
 PROPOSED 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 randomness

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 93 SC 93.8.3 P164 L4 # 323  
 Ghiasi, Ali Broadcom

Comment Type **TR** Comment Status **D**  
 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".

Proposed Response Response Status **W**  
 PROPOSED REJECT.

[Changed Subcl from 8.3 to 93.8.3 for more consistent sorting.]

In response to comments against Draft 1.0, the AC coupling capacitor has been designated to 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 94 SC 94.3.11 P187 L24 # 324  
 Ghiasi, Ali Broadcom

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

Proposed Response Response Status **W**  
 PROPOSED ACCEPT IN PRINCIPLE.

[Changed sub-clause from 3.11 to 94.3.11.]

One or more presentations are expected to address this comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92A SC 92A.4 P208 L48 # 325  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D  
 Max loss equation stop at 18.75 GHz  
 SuggestedRemedy  
 range should be 0.01 to 18.75 GHz  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 Line 48 - for 0.01 GHz = f = 18.75 GHz.

Cl 94 SC 94.3.13 P196 L23 # 326  
 Ghiasi, Ali Broadcom  
 Comment Type TR Comment Status D 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".  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 [Changed sub-clause from 3.13 to 94.3.13.]  
 In 94.3.13, AC coupling is specified as part of the channel.

Cl 78 SC 78.1.4 P38 L5 # 327  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.1.2 P42 L17 # 328  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 The TF expressed support for this approach with the intent that it should start a new tradition for projects in 802.3.

Cl 81 SC 81.1 P55 L22 # 329  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 Although the comment is correct, the consolidation of the 2 notes may be more easily achieved during the revision.

Cl 81 SC 81.1.5 P55 L28 # 330  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 40G  
 Bullet point g) does not include XLGMII  
 SuggestedRemedy  
 Change "The CGMII may" to "The XLGMII/CGMII may"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Change to "The XLGMII and CGMII may" - see comment #116

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 78 SC 78.1 P37 L30 # 331  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 40G  
 The paragraph does not mention 10BASE-Te, 40GBASE-CR4, or 40GBASE-KR4  
 SuggestedRemedy  
 Add these PHYs in their respoective positions in the paragraph  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See #107, 108

Cl 78 SC 78.5 P38 L44 # 332  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 40G  
 Is 40G excluded from Fast wake?  
 SuggestedRemedy  
 If Fast wake should be supported for EEE then add 40 Gb/s to this paragraph.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See #109

Cl 81 SC 81.3.4 P58 L33 # 333  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D  
 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."

Proposed Response Response Status W  
 PROPOSED 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.2.1 P60 L43 # 334  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 40G  
 tw\_timer only references the CAUI.  
 SuggestedRemedy  
 Add XLAUI to the definition  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Change CAUI to XLAUI and CAUI

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 81 SC 81.3a.3.1 P61 L29 # 335  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D  
 This subclause only references the CGMII and the CAUI  
 SuggestedRemedy  
 Add references to the XLGMII and the XLAUI  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Resolved by #117 & #118

Cl 82 SC 82.2.18.2.2 P68 L29 # 338  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D LPI Rx  
 There are three possible values for rx\_mode  
 SuggestedRemedy  
 Change "four values" to "three values"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Comment #82 reduces this to two values.

Cl 81 SC 81.3a-2 P61 L8 # 336  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D bucket  
 Figure 81-10a  
 There is a period after "LPI\_REQUEST=ASSERT" that should not be there  
 SuggestedRemedy  
 Remove the period  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.2.2 P68 L41 # 339  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 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"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.1.3 P63 L27 # 337  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D  
 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  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 Although the comment is correct, the consolidation of the 2 notes may be more easily achieved during the revision.

Cl 82 SC 82.2.18.2.3 P69 L27 # 340  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 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 /L/ control characters as type E."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.18.2.3 P70 L5 # 341  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.2.5 P70 L32 # 342  
 Estes, Dave UNH - IOL  
 Comment Type E Comment Status D bucket  
 All timers in this subclause 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 80 SC 80.1.4 P43 L47 # 343  
 Estes, Dave UNH - IOL  
 Comment Type T Comment Status D  
 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).

Proposed Response Response Status W  
 PROPOSED 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 multi-level (>2) pulse amplitude modulation (PAM). Some 100GBASE-R Physical Layer devices also use the transcoding and FEC of Clause 91.

Cl 78 SC 78.5.2 P39 L46 # 344  
 Estes, Dave UNH - IOL  
 Comment Type T Comment Status D 40G  
 This section should also include the XLAUI  
 SuggestedRemedy  
 Change all references of CAUI to XLAUI/CAUI  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 See #113, 114

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.2.8a P67 L7 # 345  
 Estes, Dave UNH - IOL  
 Comment Type T Comment Status D 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  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 82 SC 82.2.18.2.2 P68 L16 # 346  
 Estes, Dave UNH - IOL  
 Comment Type T Comment Status D  
 The possible values for received\_tx\_mode are not defined  
 SuggestedRemedy  
 Define the possible values for received\_tx\_mode  
 Proposed Response Response Status W  
 PROPOSED 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 78 SC 78.2 P39 L1 # 347  
 Estes, Dave UNH - IOL  
 Comment Type TR Comment Status D  
 Table 78-2 doesn't include EEE parameters for XLAUI/CAUI  
 SuggestedRemedy  
 Add XLAUI/CAUI parameters to table 78-2  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Add 1 row for XLAUI/CAUI, all parameters TBD.

Cl 78 SC 78-5 P39 L25 # 348  
 Estes, Dave UNH - IOL  
 Comment Type TR Comment Status D 40G  
 Table 78-4 does not include any LPI timing parameters for 40G  
 SuggestedRemedy  
 Add 40G timing parameters to table 78-4  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 See #112

Cl 93 SC 93.8.2.1 P162 L26 # 349  
 Ben-Artzi, Liav Marvell  
 Comment Type TR Comment Status D  
 Measuring the receiver return loss through an interconnect can obfuscate real chip return loss  
 SuggestedRemedy  
 Redefine fixture return loss according to presentation  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Response pending consideration of the cited presentation.

Cl 94 SC 94.3.11.1.1 P188 L20 # 350  
 Ben-Artzi, Liav Marvell  
 Comment Type TR Comment Status D TX test fixture  
 100GBase-KP4 test fixture definition is TBD  
 SuggestedRemedy  
 Define test fixture equations according to presentation (IL, ILD and return loss)  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 One or more presentations are expected to address topic.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

**Cl 92**    **SC 92.8.1**                      **P119**        **L 22**        # **351**  
 Kochuparambil, Beth                      Cisco Systems

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

Does low-swing differential signaling really make you immune to noise?

**SuggestedRemedy**  
 Use editorial license to avoid stating immunity.

**Proposed Response**        **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

See comment#382.

**Cl 92**    **SC 92.8.3**                      **P120**        **L 16**        # **352**  
 Kochuparambil, Beth                      Cisco Systems

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

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.

**Proposed Response**        **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

See comment #384.

**Cl 92**    **SC 92.8.3**                      **P120**        **L 29**        # **353**  
 Kochuparambil, Beth                      Cisco Systems

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

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.

**Proposed Response**        **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

Use suggested remedy.

**Cl 93**    **SC 93.8.1.1**                      **P157**        **L 26**        # **354**  
 Kochuparambil, Beth                      Cisco Systems

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

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

**Proposed Response**        **Response Status W**  
 PROPOSED REJECT.

See comment #355.

**Cl 94**    **SC 94.3.11**                      **P187**        **L 32**        # **355**  
 Kochuparambil, Beth                      Cisco Systems

**Comment Type E**        **Comment Status D**                      *TX signal*

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

**Proposed Response**        **Response Status W**  
 PROPOSED 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 92**    **SC 92.8.3.2**                      **P122**        **L 43**        # **356**  
 Kochuparambil, Beth                      Cisco Systems

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

This paragraph references 10GBASE-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.

**Proposed Response**        **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

See comment#365.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3.4 P126 L15 # 357  
Kochuparambil, Beth Cisco Systems

Comment Type E Comment Status D  
Section refers to TP0-TP2 and TP3-TP5, yet the paragraph starts with "Transmitter measurements."

SuggestedRemedy  
Change opening sentence to include the receiver accordingly.

Proposed Response Response Status W  
PROPOSED 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 92.8.3.3.2 P124 L7 # 358  
Kochuparambil, Beth Cisco Systems

Comment Type E Comment Status D  
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.

Proposed Response Response Status W  
PROPOSED REJECT.

Table 92-5 provides summary of transmitter characteristics at TP2. Subclause referenced in Table provides details of parameter usage.

Cl 94 SC 94.3.6.1 P184 L10 # 359  
Kochuparambil, Beth Cisco Systems

Comment Type E Comment Status D link diagram  
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).

Proposed Response Response Status W  
PROPOSED ACCEPT.

Cl 93 SC 93.8.1.1 P157 L8 # 360  
Kochuparambil, Beth Cisco Systems

Comment Type T Comment Status D  
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."

Proposed Response Response Status W  
PROPOSED ACCEPT IN PRINCIPLE.

For a 101010... test pattern, the amplitude will be reduced by  $10^{-(1.6/20)}$  which is approximately a factor of 0.83.

However, the response to comment #10143 changes the test pattern from 101010... pattern to a mixed frequency test pattern (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.

If the proposed response to comment #10143 is adopted, the current values will be maintained until the correction factor for PRBS9 (if any) is derived.

Cl 94 SC 94.3.11 P187 L14 # 361  
Kochuparambil, Beth Cisco Systems

Comment Type T Comment Status D 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.

Proposed Response Response Status W  
PROPOSED ACCEPT IN PRINCIPLE.

[common with 92 and 93]

See also comments 10143, 367, and 360.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.9 P164 L7 # 362  
 Kochuparambil, Beth Cisco Systems  
 Comment Type T Comment Status D  
 Channel characteristics are incomplete.  
 SuggestedRemedy  
 See kochuparambil\_01\_0912.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Response pending consideration of the cited presentation.

CI 94 SC 94.4 P196 L26 # 363  
 Kochuparambil, Beth Cisco Systems  
 Comment Type T Comment Status D channel parameters  
 Channel characteristics are incomplete.  
 SuggestedRemedy  
 See kochuparambil\_01\_0912.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 Other comments are proposing specific values for channel operating margin and related parameters.

CI 92A SC 92A.7 P211 L21 # 364  
 Dudek, Mike QLogic  
 Comment Type ER Comment Status D  
 Weird characters.  
 SuggestedRemedy  
 Change to GHz.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment#19.

CI 92 SC 92.8.3.2 P30 L43 # 365  
 Dudek, Mike QLogic  
 Comment Type T Comment Status D  
 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."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 Use suggested remedy.

CI 92 SC 92.8.3.8 P129 L13 # 366  
 Dudek, Mike QLogic  
 Comment Type T Comment Status D  
 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<sup>-5</sup> and J1 as 10<sup>-9</sup>.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Change:Measure two values J0 and J1 where BER0 is less than BER1 e.g. 10<sup>-9</sup>and 10<sup>-5</sup>. To:Measure two values; J0 with BER greater than or equal to 10<sup>-9</sup> (BER0) and J1 with BER greater than or equal to 10<sup>-5</sup> (BER1).

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 94 SC 94.3.11.3 P188 L40 # 367  
 Dudek, Mike QLogic

Comment Type T Comment Status D 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 94 SC 94.3.11.5 P189 L38 # 368  
 Dudek, Mike QLogic

Comment Type T Comment Status D 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,...."

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

A two-level PRBS9 pattern is not expected to be supported for PAM4. The transition time procedure using PRBS9 should be deleted for 100GBASE-KP4.

One or more presentations are expected to address this comment.

Cl 94 SC 94.3.11.6 P190 L5 # 369  
 Dudek, Mike QLogic

Comment Type T Comment Status D 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"

Proposed Response Response Status W  
 PROPOSED ACCEPT.

The comment may be taken over by events.

One or more presentations are expected that provide an alternative and more complete methodology.

Cl 94 SC 94.3.11.7.2 P192 L18 # 370  
 Dudek, Mike QLogic

Comment Type T Comment Status D 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."

Proposed Response Response Status W  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 94 SC 94.3.11.1 P188 L28 # 371  
 Dudek, Mike QLogic

Comment Type TR Comment Status D 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

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

One or more presentations are expected to address this topic.

Cl 94 SC 94.3.12.3 P195 L28 # 372  
 Dudek, Mike QLogic

Comment Type TR Comment Status D RX interference tolerance

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."

Proposed Response Response Status W

PROPOSED 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 93 SC 93.7.1 P154 L5 # 373  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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"

Proposed Response Response Status W

PROPOSED REJECT.

[Commenter did not specify CommentType. Set to T.]

The assumption that each lane only has one direction is not necessarily correct.

1.4.233 defines a lane to be "A bundle of signals that constitutes a logical subset of a point-to point interconnect. A lane contains enough signals to communicate a quantum of data and/or control information between the two endpoints."

The definition states communication "between" endpoints and not from one endpoint to another. If each lane constituted only one direction, should a 4-lane PHY actually be referred to as an 8-lane PHY as the PHY does support full-duplex operation?

Cl 92 SC 92.8.3.3.3 P124 L19 # 374  
 Matthew, Brown Applied Micro

Comment Type E Comment Status D

Unnecessary capital.

SuggestedRemedy

Change "minimum Steady" to "minimum steady".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.3.5 P127 L25 # 375  
Matthew, Brown Applied Micro

Comment Type E Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Use editorial license to implement suggested remedy.

CI 92 SC 92.8.4 P130 L1 # 376  
Matthew, Brown Applied Micro

Comment Type E Comment Status D

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"

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

CI 92 SC 92.10.8 P141 L8 # 377  
Matthew, Brown Applied Micro

Comment Type E Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

Note:MDI is labeled.

CI 92 SC 92.10.9.4 P144 L27 # 378  
Matthew, Brown Applied Micro

Comment Type E Comment Status D

missing word

SuggestedRemedy

Change "disturber near-end for" to "disturber near-end crosstalk for".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change "disturber near-end" to "disturber near-end crosstalk loss".

CI 92 SC 92.7.10 P156 L11 # 379  
Matthew, Brown Applied Micro

Comment Type E Comment Status D

pmd\_transmit\_fault is specified as option in the previous paragraph

SuggestedRemedy

delete " (optional)"

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

CI 94 SC 94.3.8 P186 L15 # 380  
Matthew, Brown Applied Micro

Comment Type T Comment Status D

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".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Comment was submitted against Clause 93 but is actually against Clause 94. Updated accordingly.]

See comment #421.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.7.12 P119 L6 # 381  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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 in terms of correlation is the better approach.

Cl 92 SC 92.8.1 P119 L22 # 382  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

In the last sentence... How does a "low-swing" improve "noise immunity"? The improvement in EMI is compared to what? This statement is outdated and should be removed.

SuggestedRemedy

Delete last sentence in paragraph.

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

To resolve commenter's question on meaning of text, need to add "compared to what" or delete. not sure it's of value to provide more text on the benefits of differential signaling.

Cl 92 SC 92.8.3 P120 L3 # 383  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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."

Proposed Response Response Status W

PROPOSED 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 the test fixture specified in 92.8.3.5.

Cl 92 SC 92.8.3 P120 L15 # 384  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

Table 92-5 "Common-mode voltage limits", only one limit specified.

SuggestedRemedy

On line 16, change "limits" to "(max)".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.3 P120 L19 # 385  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

Table 92-5. No reference for Common-mode AC output voltage (max., RMS).

*SuggestedRemedy*

On line 120, add reference to defining sub-clause.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Options: Add reference to 94.3.11.3 or add defining subclause in 92. For committee discussion.

CI 92 SC 92.8.3 P120 L15 # 386  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

In Table 92-5, no reference for Differential peak-to-peak output voltage (max) with Tx disable

*SuggestedRemedy*

On line 15, add reference to 92.7.7.

Proposed Response Response Status W

PROPOSED REJECT.

For committee discussion. Not really opposed to this but 92.7.7 describes the PMD lane-by-lane transmit disable function not Differential peak-to-peak output voltage (max).

CI 92 SC 92.8.3.6 P128 L1 # 387  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

92.8.3.6 is specifically return loss.

*SuggestedRemedy*

Change title of 92.8.3.6 to "Test fixture return loss".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

CI 92 SC 92.8.3.8 P128 L30 # 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 W

PROPOSED REJECT.

Of the set of test patterns defined in the PMA, a 1010... sequence is not an option. There was a similar comment about its use to measure differential output voltage (see #10143).

Also, while it trivial to do, there are number of measurements based on PRBS9 (transmitter output waveform, DDJ, etc.) so it could be advantageous to get yet another parameter out of that one measurement of PRBS9.

Finally, it says that even-odd jitter is measured from "a sequence of no fewer than 8 symbols of alternating polarity." Further, it offers that "If PRBS9 is the test pattern", you can find the reference pattern at a particular offset. This is not a requirement to use PRBS9 to measure EOJ. Use your 1010... sequence if you want (but it is not part of the "standard" test pattern set).

CI 92 SC 92.8.3.8 P128 L53 # 389  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.3.8 P129 L23 # 390  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #366.

CI 92 SC 92.8.4 P130 L3 # 391  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Remove unit interval from Table 92-7.

Please note: Not really opposed to suggested remedy but the PICS will need to reflect each parameter "shall". In 80.2ba the table was noted e.g., RS7 Meets specifications at TP3 85.8.4 Unless otherwise noted per Table 85-7.

CI 92 SC 92.8.4 P130 L12 # 392  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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 than a pair of isolated 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.

Proposed Response Response Status W

PROPOSED REJECT.

Changing BER requirement is not sufficiently addressed in remedy to implement in draft. For committee discussion.

CI 92 SC 92.8.4.2.3 P132 L8 # 393  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

Reference should be to Figure 92-7 not Figure 92-6.

SuggestedRemedy

Change "Figure 92-7" to "Figure 92-6".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.4.2.4 P132 L53 # 394  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 "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".

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

The pattern generator shall be set to match the jitter specification in Table 92-8.

CI 92 SC 92.8.4.2.5 P133 L9 # 395  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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".

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Change "test pattern 3 as defined in 86.8.2" to PRBS31.

On line 11 change "scrambled idle characters" to "scrambled idle".

CI 92 SC 92.8.4.5 P133 L30 # 396  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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".

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Use suggested remedy.

CI 92 SC 92.8.4.5 P133 L32 # 397  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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 ...".

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

It is recommended that the value of the coupling capacitors be 100 nF. The capacitor will limit the inrush currents and baseline wander.

CI 92 SC 92.10 P134 L10 # 398  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

(92A-4) is the channel insertion loss between TP0 and TP5 representative of a 0.5 m cable. Specification for IL of 0.5 m should align with cable assembly minimum IL. Add specification for cable assembly minimum IL consistent with (92A-4) in 92.10.2.  
 On line 10 in Table 92-9 add reference to 92.10.2.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.10.8 P140 L29 # 399  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

There is a reference to 92.10.9.2 return loss in 92.8.3.6 that is intended. Change text: from "the test fixture return loss is equivalent to the test fixture return loss specified in 92.8.3.6" To: "the cable assembly test fixture return loss is equivalent to the test fixture return loss in 92.8.3.6".

CI 92 SC 92.10.9.2 P142 L31 # 400  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

CI 92 SC 92.10.9.4 P145 L16 # 401  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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".

Proposed Response Response Status W

PROPOSED 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.

CI 94 SC 94.3.6.1 P184 L15 # 402  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D link diagram

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.

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 93 SC 93.7.8 P155 L51 # 403  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

Cannot have "shall" statement against another clause>

SuggestedRemedy

Restate "Local loopback is provided by the adjacent PMA..."

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 93 SC 93.8.1.1 P156 L52 # 404  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

Return loss should be greater than limit.

SuggestedRemedy

Change "shall be less than" to "shall be greater than".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change to "shall be greater than or equal to".

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.8.2.1 P162 L30 # 405  
Matthew, Brown Applied Micro

Comment Type T Comment Status D

Return loss should be greater than limit.

SuggestedRemedy

Change "shall be less than" to "shall be greater than".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change to:

"...shall be greater than or equal to..."

Cl 93 SC 93.8.1.5 P159 L5 # 406  
Matthew, Brown Applied Micro

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED REJECT.

If comment #237 is accepted, this is overtaken by events.

If comment #237 is not accepted, since other parameters are measured from a PRBS9 test pattern, a method to also verify rise and fall times using the same pattern may be useful. The standard does not require you to measure rise and fall times this way and the text allows you to do the measurement on a square wave test pattern if you wish.

Cl 93 SC 93.8.3 P164 L4 # 407  
Matthew, Brown Applied Micro

Comment Type T Comment Status D

AC coupling frequency is a channel parameter.

SuggestedRemedy

Move AC coupling frequency specification to 93.9.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #488.

Cl 94 SC 94.3.13 P196 L23 # 408  
Matthew, Brown Applied Micro

Comment Type T Comment Status D AC coupling

AC coupling frequency is a channel parameter.

SuggestedRemedy

Move AC coupling frequency specification to 94.4.

Proposed Response Response Status W

PROPOSED 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 channel. Move the entire sub-clause to 94.4.

Cl 82 SC 82.2.12 P67 L26 # 409  
Matthew, Brown Applied Micro

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

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

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.2 P113 L1 # 410  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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".

Proposed Response Response Status W  
 PROPOSED REJECT.

I agree with the comment but the paragraph provides useful information on the SIGNAL\_DETECT values which are basis for the PMD:IS\_UNITDATA\_i.indication parameters.

Cl 92 SC 92.7.1 P114 L52 # 411  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED 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 P114 L52 # 412  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED 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 P116 L29 # 413  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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)".

Proposed Response Response Status W  
 PROPOSED ACCEPT.

Use suggested remedy.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.2 P113 L1 # 414  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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".

Proposed Response Response Status W

PROPOSED REJECT.

[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.

CI 92 SC 92.7.4 P117 L18 # 415  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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".

Proposed Response Response Status W

PROPOSED REJECT.

Line 17 - 92.7.4 is the Global PMD signal detect function...First paragraph begins with "The Global PMD signal detect function shall."..  
 Commenters reference does not seem to align with text.

CI 92 SC 92.7.4 P117 L24 # 416  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 Should be more specific which state diagram is being referred to.

SuggestedRemedy

Change "training state diagram" to "training state diagram in Figure 72-5".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

CI 92 SC 92.7.9 P118 L31 # 417  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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."

Proposed Response Response Status W

PROPOSED REJECT.

See comment #419.

CI 92 SC 92.7.10 P118 L37 # 418  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D  
 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".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #421.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.7.9 P156 L3 # 419  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT.

CI 94 SC 94.3.7 P186 L9 # 420  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D 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."

Proposed Response Response Status W

PROPOSED ACCEPT.

[non-controversial]

CI 93 SC 93.7.10 P156 L8 # 421  
 Matthew, Brown Applied Micro

Comment Type T Comment Status D

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".

Proposed Response Response Status W

PROPOSED 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 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 0 to 3) is set to one..."

In 93.7.10, change the first sentence to:  
 "...but the assertion of Global\_PMD\_transmit\_disable is not considered a transmit fault."

CI 93A SC 93A.1.2 P215 L10 # 422  
 Li, Mike Altera

Comment Type TR Comment Status D

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

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Response pending Task Force discussion of cited materials.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

**Cl 69**    **SC 69.1.3**                      **P29**            **L16**            # **423**  
 Dawe, Piers                                      IPtronics

**Comment Type E**            **Comment Status D**  
 For consistency with Fig 80-1,

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

*Proposed Response*            **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

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

**Cl 73**    **SC 73.10.7**                      **P35**            **L12**            # **424**  
 Dawe, Piers                                      IPtronics

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

*Proposed Response*            **Response Status W**  
 PROPOSED ACCEPT.

**Cl 78**    **SC 78.1.4**                      **P38**            **L21**            # **425**  
 Dawe, Piers                                      IPtronics

**Comment Type E**            **Comment Status D**  
 Make the document easier to use with consistent ordering.

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

*Proposed Response*            **Response Status W**  
 PROPOSED ACCEPT.

**Cl 93**    **SC 93.1**                                      **P149**            **L7**            # **426**  
 Dawe, Piers                                      IPtronics

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

*Proposed Response*            **Response Status W**  
 PROPOSED 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 80**    **SC 80.1.5**                                      **P45**            **L47**            # **427**  
 Dawe, Piers                                      IPtronics

**Comment Type E**            **Comment Status D**  
 Make the document easier to use with consistent ordering.

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

*Proposed Response*            **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

Comment #173 justifies a different order

**Cl 92**    **SC 92.7.1**                                      **P116**            **L45**            # **428**  
 Dawe, Piers                                      IPtronics

**Comment Type E**            **Comment Status D**  
 Table layout.

*SuggestedRemedy*  
 Please make the right hand column wider, so TP4 is not on a line by itself and the table looks better.

*Proposed Response*            **Response Status W**  
 PROPOSED ACCEPT IN PRINCIPLE.

Will do if possible.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3.4 P126 L17 # 429  
 Dawe, Piers IPtronics

**Comment Type E Comment Status D**

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.

**Proposed Response Response Status W**  
 PROPOSED 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 80 SC 80.3.3.4.1 P47 L23 # 430  
 Dawe, Piers IPtronics

**Comment Type E Comment Status D** 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".

**Proposed Response Response Status W**  
 PROPOSED ACCEPT.

Cl 80 SC 80.2.3 P46 L11 # 431  
 Dawe, Piers IPtronics

**Comment Type ER Comment Status D**

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.

**Proposed Response Response Status W**  
 PROPOSED 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 80.1.2 P42 L25 # 432  
 Dawe, Piers IPtronics

**Comment Type ER Comment Status D**

Deleting the objectives doesn't avoid all work. We need to tell the reader that 40/100G is rated at 10<sup>-12</sup> 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<sup>-12</sup> 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<sup>-12</sup> at the MAC/PLS service interface.

**Proposed Response Response Status W**  
 PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3.8 P128 L30 # 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 W

PROPOSED REJECT.

Request that the e-mail in question be submitted as a contribution for review by the Task Force.

Cl 93 SC 93.8 P156 L40 # 434  
 Dawe, Piers IPtronics

Comment Type ER Comment Status D

"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.

Proposed Response Response Status W

PROPOSED 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 instances in 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."

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.4 P50 L20 # 435  
 Dawe, Piers IPtronics  
 Comment Type ER Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.

Cl 69 SC 69.1.3 P30 L45 # 436  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

During consideration of this comment, it was observed that XLAUI is not included in the list for 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-CR4, and 100GBASE-KP4 use a four lane data path."

Cl 73 SC 73.7.2 P34 L30 # 437  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D  
 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."  
 Proposed Response Response Status W  
 PROPOSED 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-Negotiation 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.

73.6.10 Transmit Switch function

The Transmit Switch function shall enable the transmit path from a single technology-dependent PHY to the MDI once a highest common denominator choice has been made and Auto-Negotiation has completed.

During Auto-Negotiation, the Transmit Switch function shall connect only the DME page generator controlled by the Transmit State Diagram 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

The Receive Switch function shall enable the receive path from the MDI to a single technology-dependent PHY once a highest common denominator choice has been made and Auto-Negotiation has completed.

[Change the last paragraph as shown below.]

During Auto-Negotiation, 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 during Auto-Negotiation when those PHYs are present.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.1.4 P43 L48 # 438  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D  
 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).  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 PAM is a defined abbreviation in Clause 1.5

Cl 92 SC 92.8.4.2.3 P132 L40 # 439  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED 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 80 SC 80.3.3.5 P47 L39 # 440  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D  
 Should this be simplified by combining IS\_RX\_MODE.indicate (should be IS\_RX\_MODE.indication) and IS\_SIGNAL.indication?  
 SuggestedRemedy  
 ?  
 Proposed Response Response Status W  
 PROPOSED REJECT.  
 The changes proposed in comment #70 redefine the operation of RX\_MODE making such a combination impossible.

Cl 80 SC 80.3.2 P49 L16 # 441  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 Note that comment #263 might make FEC optional - nullifying this comment.

Cl 81 SC 81.3a.1 P60 L2 # 442  
 Dawe, Piers IPtronics  
 Comment Type T Comment Status D bucket  
 Wrong AN clause!  
 SuggestedRemedy  
 Change 28.2.6.1.1 to the correct reference.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Change to 73.9.1.1

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.2.7 P97 L41 # 443  
 Dawe, Piers IPtronics

Comment Type T Comment Status D

As well as 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 what an implementation must do.

*Suggested Remedy*

Add text giving the error detection capability of these codes, and the expected/required error correction and detection capability of implementations.

Proposed Response Response Status W

PROPOSED 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]).

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.

Therefore, the question is whether or not decoder error detection/correction capability needs to be specified in 91.5.3.3. 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 that a codeword is uncorrectable when there are between  $t+1$  and  $2t$  symbol errors in the codeword. The ability of the decoder to detect more than  $2t$  symbols in a codeword cannot be guaranteed."

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 78 SC 78.5 P38 L44 # 444  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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 alignment 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.

*Suggested Remedy*

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 worthwhile, 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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See #96 (& many others) for resolution.

Cl 78 SC 78.5 P38 L44 # 445  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D EEE option

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

*Suggested Remedy*

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See #96 (& many others) for resolution.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3 P120 L19 # 446  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED REJECT.

Suggested remedy proposal lacking sufficient recommended changes to implement in the draft.

Cl 92 SC 92.8.3 P120 L16 # 447  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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 to 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 implementation 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

Proposed Response Response Status W

PROPOSED REJECT.

Common-mode voltage limits were incorporated in Table 92-5 after debate including increasing limit beyond 1.9 V not supported. Also, see 93-4 and 94-4. For committee discussion.

Cl 78 SC 78.5.2 P39 L53 # 448  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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))"



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 80 SC 80.1.4 P43 L49 # 449  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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 92 SC 92.8.3.8 P129 L8 # 450  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment#366.

Cl 92 SC 92.8.3.4 P126 L17 # 451  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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

Proposed Response Response Status W

PROPOSED 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 maximum insertion loss values from TP0 to TP2 or TP3 to TP5 including the test fixture are determined using Equation (92-14).

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.10.9.3 P143 L27 # 452  
 Dawe, Piers IPtronics  
 Comment Type **TR** Comment Status **D**  
 Is "common-mode conversion loss" a through loss?  
 SuggestedRemedy  
 If so, add "common-mode conversion return loss" spec.  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment #280.

Cl 91 SC 91.5.3.2 P99 L42 # 453  
 Dawe, Piers IPtronics  
 Comment Type **TR** Comment Status **D**  
 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".  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.

Cl 80 SC 80.3.2 P48 L15 # 454  
 Dawe, Piers IPtronics  
 Comment Type **TR** Comment Status **D**  
 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  
 Proposed Response Response Status **W**  
 PROPOSED REJECT.  
 Conditional covers optional or ommitted.

Cl 82 SC 82.2.8a P67 L5 # 455  
 Dawe, Piers IPtronics  
 Comment Type **TR** Comment Status **D**  
 "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.  
 Proposed Response Response Status **W**  
 PROPOSED 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."

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 82 SC 82.3.1. P72 L25 # 456  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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 85 SC 85.1 P87 L33 # 457  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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).

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

The remedy to #125 achieves the same.

Cl 85 SC 85.7.2 P88 L5 # 458  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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 85.7.4 P88 L21 # 459  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D LPI Rx

re "rx\_mode shall be set to QUIET and shall remain in that state until a signal is detected 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."  
 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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

This section is deleted and replaced by comment #94

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

**Cl 92**    **SC 92.10**                      **P134**            **L15**            # **460**  
 Dawe, Piers                                      IPtronics  
**Comment Type**    **TR**            **Comment Status**    **D**  
 Missing spec items.  
**SuggestedRemedy**  
 Add rows for common-mode return loss, mode conversion reflection loss, Integrated Common-mode Conversion Noise, ILD. Consider adding ILDrms.  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED REJECT.  
 Proposal lacking sufficient recommended changes to implement in the draft.

**Cl 85**    **SC 85.7.2**                      **P88**            **L6**            # **461**  
 Dawe, Piers                                      IPtronics  
**Comment Type**    **TR**            **Comment Status**    **D**  
 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 this 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."  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED 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**                      **P88**            **L20**            # **462**  
 Dawe, Piers                                      IPtronics  
**Comment Type**    **TR**            **Comment Status**    **D**                      **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 doesn'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.  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED ACCEPT IN PRINCIPLE.  
 This section is deleted and replaced by comment #94

**Cl 91**    **SC 91.5.2.6**                      **P95**            **L51**            # **463**  
 Cideciyan, Roy                                      IBM  
**Comment Type**    **T**            **Comment Status**    **D**  
 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  
**Proposed Response**                      **Response Status**    **W**  
 PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.2.6 P L # 464  
Cideciyan, Roy IBM

Comment Type ER Comment Status D 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".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Change heading of 91.5.2.6 to "Alignment marker mapping and insertion".

Cl 91 SC 91.5.2.7 P98 L1 # 465  
Cideciyan, Roy IBM

Comment Type ER Comment Status D bucket

Typographical error

SuggestedRemedy

Replace "polynominal" by "polynomial"

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.2.7 P98 L12 # 466  
Cideciyan, Roy IBM

Comment Type ER Comment Status D bucket

Typographical error

SuggestedRemedy

Replace "whose the coefficients" by "whose coefficients"

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.2.7 P98 L23 # 467  
Cideciyan, Roy IBM

Comment Type ER Comment Status D bucket

Missing blank

SuggestedRemedy

Insert blank between "... is transmitted last." and "The first bit ..."

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.3.3 P101 L10 # 468  
Cideciyan, Roy IBM

Comment Type ER Comment Status D 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".

Proposed Response Response Status W

PROPOSED ACCEPT.

See comment #475.

Cl 91 SC 91.5.4.2.1 P105 L3 # 469  
Cideciyan, Roy IBM

Comment Type ER Comment Status D bucket

typographical error

SuggestedRemedy

Replace "maker" by "marker"

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.1.2 P91 L29 # 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 W

PROPOSED REJECT.

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 91.5.2.5 P95 L21 # 471  
Cideciyan, Roy IBM

Comment Type TR Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #155.

Cl 91 SC 91.5.2.6 P95 L40 # 472  
Cideciyan, Roy IBM

Comment Type TR Comment Status D bucket

j should run from 0 to 4

SuggestedRemedy

Given  $i=0$ ,  $j=0$  to 4, and  $x=i+4j$ , ...

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 91 SC 91.5.2.5 P96 L47 # 473  
Cideciyan, Roy IBM

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT.

Comment is against Figure 91-3.

Cl 91 SC 91.5.2.8 P99 L9 # 474  
Cideciyan, Roy IBM

Comment Type TR Comment Status D 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, ..."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #183.

Cl 91 SC 91.5.3.3 P101 L10 # 475  
Cideciyan, Roy IBM

Comment Type TR Comment Status D

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."

Proposed Response Response Status W

PROPOSED ACCEPT.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.3.4 P101 L17 # 476  
 Cideciyan, Roy IBM  
 Comment Type **TR** Comment Status **D** bucket  
 Data is not descrambled prior to transcoding at Rx.  
 SuggestedRemedy  
 Replace "... prior to descrambling and transcoding." by "... prior to transcoding."  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.  
 See comment #51.

Cl 91 SC 91.5.3.5 P101 L25 # 477  
 Cideciyan, Roy IBM  
 Comment Type **TR** Comment Status **D** bucket  
 Notation not correct  
 SuggestedRemedy  
 Replace "rx\_rxcoded<4:0>" by "rx\_xcoded<4:0>".  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.

Cl 91 SC 91.5.3.6 P102 L9 # 478  
 Cideciyan, Roy IBM  
 Comment Type **TR** Comment Status **D** 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 ..."  
 Proposed Response Response Status **W**  
 PROPOSED 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 P102 L27 # 479  
 Cideciyan, Roy IBM  
 Comment Type **TR** Comment Status **D** bucket  
 j runs from 0 to 4  
 SuggestedRemedy  
 Given i=0 to 3, j=0 to 4, and x=i+4j, the ...  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.

Cl 91 SC 91.5.3.7 P102 L16 # 480  
 Cideciyan, Roy IBM  
 Comment Type **TR** Comment Status **D**  
 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  
 Proposed Response Response Status **W**  
 PROPOSED 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 93B SC 93B P220 L35 # 481  
 Cideciyan, Roy IBM  
 Comment Type **TR** Comment Status **D**  
 Incorrect test point in Table 93B-1  
 SuggestedRemedy  
 Replace "TP1 to TP1" by "TP0 to TP1"  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT.  
 [Note, the commenter specified this comment to be against Clause 93. It has been changed to Annex 93B.]

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl **93** SC **93.9** P**164** L**6** # **482**  
 Dawe, Piers IPtronics  
 Comment Type **E** Comment Status **D** late  
 This time, the channel is normative.  
 SuggestedRemedy  
 Change "Channel characteristics" to "Channel specifications"  
 Proposed Response Response Status **W**  
 PROPOSED REJECT.  
 See comment #434.

Cl **92A** SC **92A.4** P**208** L**41** # **483**  
 Dawe, Piers IPtronics  
 Comment Type **E** Comment Status **D** 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.  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See comment#230 for note.  
 Also, add figures illustrating the limits of equations 92A-1 and 92A-2.

Cl **92A** SC **92A.8** P**211** L**37** # **484**  
 Dawe, Piers IPtronics  
 Comment Type **E** Comment Status **D** 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.  
 Proposed Response Response Status **W**  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Change "specified using" to "derived from", twice. P118 L7, P211 L27,L31...

Cl **93** SC **93.8.2.1** P**162** L**29** # **485**  
 Dawe, Piers IPtronics  
 Comment Type **T** Comment Status **D** 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.  
 Proposed Response Response Status **W**  
 PROPOSED 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.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92A SC 92A.4 P208 L35 # 486  
 Dawe, Piers IPtronics

Comment Type T Comment Status D 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

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. Editor license to apply new definition of Ilpcbmax.

Cl 93B SC 93B P220 L10 # 487  
 Dawe, Piers IPtronics

Comment Type T Comment Status D 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 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."

Proposed Response Response Status W  
 PROPOSED 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.

[Presumably a set of TPXa test points could be defined for a compliance-board based methodology.]

Cl 93 SC 93.8.3 P163 L47 # 488  
 Dawe, Piers IPtronics

Comment Type T Comment Status D late

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 signal line."

Proposed Response Response Status W  
 PROPOSED 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).

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.1 P149 L12 # 489  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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.

The normative requirements that are beyond the scope of Clause 91 should be removed, but the information could remain as a service to the reader (being a restatement of items in Clauses 83 and 91). This could be embodied by a note to Table 93-1, associated with 83A-CAUI, RS-FEC requires a 4-lane PMA and hence CAUI is optionally instantiated between the PCS and RS-FEC.

Make comparable adjustments of Clause 92 and Clause 94.

CI 93 SC 93.8.1 P156 L44 # 490  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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.

CI 93 SC 93.8.1 P157 L17 # 491  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment #171 which addresses differential and common-mode return loss.

The addition of common-mode to differential return loss is discussed in the context of that comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.8.1.6 P160 L7 # 492  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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 91-4 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.

Cl 93 SC 93.8.1.8 P161 L38 # 493  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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 83A SC 83A.3.4.7 P203 L32 # 494  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED 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

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 91 SC 91.5.4.2.1 P104 L16 # 495  
 Dawe, Piers IPtronics

Comment Type E Comment Status D 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.

Proposed Response Response Status W

PROPOSED REJECT.

This portion of the state diagram (and corresponding variables) is similar to what is used in the PCS deskew state diagram (refer to 82-12). There is no clear incentive to deviate from this familiar form.

Cl 92 SC 92.8.4.2.4 P132 L46 # 496  
 Dawe, Piers IPtronics

Comment Type E Comment Status D late

"The rise and fall times of the pattern generator, as defined in 72.7.1.7": don't make unnecessary 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".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

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 72.7.1.7  
 Change: If the rise and fall times of the pattern generator,  
 To: If the transition times of the pattern generator,

Committee review to consider changing reference from 72.7.1.7 to 93.8.1.5.

Cl 81 SC 81.3a.2 P60 L10 # 497  
 Dawe, Piers IPtronics

Comment Type E Comment Status D late bucket

Should this be CARRIER\_SENSE.indication or PLS\_CARRIER.indication or what?

SuggestedRemedy

?

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

PLS\_CARRIER.indication(CARRIER\_STATUS)

Cl 91 SC 91.5.2.8 P99 L9 # 498  
 Dawe, Piers IPtronics

Comment Type T Comment Status D late

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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Scrambling/descrambling was removed from the RS-FEC sublayer. The paragraph must be updated to reflect this.

See comment #183.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 81 SC 81.3.4 P58 L32 # 499  
 Dawe, Piers IPtronics

Comment Type T Comment Status D 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".

Proposed Response Response Status W

PROPOSED 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 80 SC 80.2.2 P46 L1 # 10022  
 Lusted, Kent Intel

Comment Type T Comment Status D 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."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

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

Change page & line references for D1.1

Cl 94 SC 94.2.2 P146 L18 # 10048  
 Anslow, Pete Ciena

Comment Type E Comment Status D TX encoding

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

Proposed Response Response Status W

PROPOSED ACCEPT.

[non-controversial]

[Draft 1.1, 94.2.2, page 173, line 10]

Cl 94 SC 94.3.11.4 P162 L22 # 10057  
 Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.11.4, page 189, line 22]

One or more presentations are expected to address this comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.8.2.2 P137 L19 # 10061  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D

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  $\text{erfcinv}(2 * \text{minimum BER}) * \sqrt{2}$ . This could go into Annex 69A.

Proposed Response Response Status W

PROPOSED 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.

CI 94 SC 94.3.12.3 P168 L43 # 10062  
Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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  $\text{erfcinv}(2 * \text{minimum BER}) * \sqrt{2}$ . This could go into Annex 69A.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.12.3, page 195, line 51]

Similar to Clause 93 comment #10061.

In Table 94-7.

Change last row as follows:

In parameter cell replace with the following three lines:

Applied RMS broadband noise  
level  
crest factor

In the Test 1/Test 2/Units columns replace with the following three lines:

<blank>/<blank>/<blank>  
TBD/TBD/mV  
TBD/TBD/<blank>

CI 93 SC 93.8.2.1 P136 L22 # 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 W

PROPOSED ACCEPT IN PRINCIPLE.

[93.8.2.2, Page 162, Line 52 in Draft 1.1.]

Refer to comment #86.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 94 SC 94.3.12.2 P167 L52 # 10064  
 Mellitz, Richard Intel Corporation

Comment Type TR Comment Status D 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.12.2, page 195, line 8]

One or more presentations are expected to address topic.

CI 93 SC 93.8.1.3 P132 L22 # 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 W  
 PROPOSED ACCEPT IN PRINCIPLE.

[Subcl 93.1.4, Page 158, Line 37 in Draft 1.0.]

See comment #171.

CI 93 SC 93.8.2.2 P137 L3 # 10078  
 Moore, Charles Avago Technologies

Comment Type T Comment Status D  
 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Pending discussion by the Task Force and a measurement of the consensus to make the proposed change.

May be overtaken by #258.

CI 94 SC 94.2.2.4 P147 L40 # 10080  
 Moore, Charles Avago Technologies

Comment Type T Comment Status D 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<sup>1</sup> 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.

Proposed Response Response Status W  
 PROPOSED REJECT.

[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 presentation brown\_01\_0312 and brown\_01\_0512. The benefits of the termination bits have been shown to outweigh the benefit of increasing the FEC strength 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.

One or more new presentations are expected to address this comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.8.1.3 P132 L21 # 10085  
 Moore, Charles Avago Technologies

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

Tx output return loss is TBD, we need values for equations (93-1) and (93-2)

*SuggestedRemedy*

use:  
 DifferentialReturnLoss(f) =  
 $10 \times \log_{10}((0.026 + (f/32)^2) / (1 + (f/32)^2))$  dB, 0.05<f<20 (93-1)

CommonModeReturnLoss(f) =  
 6 dB, 0.05<f<20 (93-2)

f in GHz

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Subcl 93.1.4, Page 158, Line 37 in Draft 1.0.]

See comment #171.

CI 93 SC 93.8.2.1 P136 L21 # 10086  
 Moore, Charles Avago Technologies

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

Rx output return loss is TBD, we need values for equations (93-3) and (93-4)

*SuggestedRemedy*

use:  
 DifferentialReturnLoss(f) =  
 $10 \times \log_{10}((0.026 + (f/32)^2) / (1 + (f/32)^2))$  dB, 0.05<f<20 (93-3)

CommonModeReturnLoss(f) =  
 6 dB, 0.05<f<20 (93-4)

f in GHz

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

[93.8.2.2, Page 162, Line 52 in Draft 1.1.]

See comment #86.

CI 93 SC 93.8.2.2 P136 L42 # 10088  
 Moore, Charles Avago Technologies

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

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 is 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.

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

This comment may be overtaken by #258.

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 and implement the following changes.

1. Neither "Channel noise" nor "TX-RX re-reflection noise" are defined terms so delete this row from Table 93-7 as suggested.
2. Use the test channel calibration methodology from 85.8.4.2.3 in place of what is described in 69A.2.2. This may be accomplished by adding a new subclause to Annex 69A or defining an exception in 93.8.2.2 (favoring the latter).
3. The "channel insertion loss at 12.89 GHz" is not used in 85.8.4.2.3 and thus its role must be defined or the parameter should be deleted.



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.7.12 P130 L33 # 10097  
 Slavick, Jeff Avago Technologies

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

Proposed Response Response Status **W**  
 PROPOSED 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.

CI 94 SC 94.4 P169 L1 # 10105  
 Moore, Charles Avago Technologies

Comment Type **T** Comment Status **D** channel parameters  
 The specifications given are probably insufficient 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

Proposed Response Response Status **W**  
 PROPOSED 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.

CI 94 SC 94.3.1 Table 94-4 P160 L8 # 10107  
 Moore, Charles Avago Technologies

Comment Type **TR** Comment Status **D** TX signal  
 Table 94-4 contains many TBDs making it technically incomplete.

*SuggestedRemedy*  
 Use values from moore\_02a\_0312.pdf page 18.

Proposed Response Response Status **W**  
 PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.1, page 187, line 24-41]

One or more presentations are expected to address this comment.

CI 94 SC 94.3.11.4 P162 L22 # 10108  
 Moore, Charles Avago Technologies

Comment Type **TR** Comment Status **D** TX return loss  
 equation 94-3 is TBD, this is technically incomplete

*SuggestedRemedy*  
 use equation given in moore\_02a\_0312.pdf page 20

Proposed Response Response Status **W**  
 PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.11.4, page 189, line 22]

One or more presentations are expected to address this comment.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 94 SC 94.3.12.2 P167 L52 # 10109  
 Moore, Charles Avago Technologies

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

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.3.12.2, page 195, line 8]

One or more presentations are expected to address this comment.

Cl 94 SC 94.3.12.3 table 94-7 P168 L26 # 10110  
 Moore, Charles Avago Technologies

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

Proposed Response Response Status **W**

PROPOSED ACCEPT.

[Draft 1.1, 94.3.12.3, Table 94-7, page 195]

One or more presentations are expected to address this comment.

Cl 92 SC 92.8 P94 L1 # 10140  
 Dawe, Piers IPtronics

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

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.

Proposed Response Response Status **W**

PROPOSED REJECT.

Clause 92 (PMD) structure follows Clause 85 providing Tx and Rx subclauses and subclause for link segment parameters etc...Proposal insufficiently supported and lacking sufficient recommended changes to implemet in the draft.

Cl 92 SC 92.7.1 P89 L41 # 10141  
 Dawe, Piers IPtronics

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

"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.

Proposed Response Response Status **W**

PROPOSED REJECT.

92.7.1 text describes the link block diagram and supports the defined test point definitions in Table 92-4 100GBASE-CR4.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 93 SC 93.8.1.2 P131 L 50 # 10143  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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 through a lossy channel.

*SuggestedRemedy*

Use a mixed frequency pattern: PRBS31 or scrambled idle, possibly PRBS9.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

[93.8.1.2, 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 93.8.1.2 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 TBD 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 93.8.1.2:

"Differential and common-mode signal levels are measured with a PRBS9 test pattern."

Cl 93 SC 93.8.1 P131 L # 10145  
 Dawe, Piers IPtronics

Comment Type T Comment Status D

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 set all its the taps to zero when still technically transmitting.

Proposed Response Response Status W

PROPOSED 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 preferable to not impose such a constraint since these constraints, as pointed out by comment #97, can be problematic for some algorithms.

The merits of the proposed specification should be discussed by the Task Force.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 93 SC 93.8.1.2 P131 L 51 # 10146  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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.)

Proposed Response Response Status W

PROPOSED 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.

It is agreed that if such a filter were to be defined, it should be common to all measurements.

Task Force should discuss whether or not such a filter needs to be defined, and if so, if a 33 GHz Bessel-Thompson filter the correct filter.

CI 93 SC 93.8.1.5.1 P134 L 19 # 10147  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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 when the transmit equalizer coefficients have been set to the "preset" values."

Proposed Response Response Status W

PROPOSED 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  $v_f$  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  $0.8 \times v_f$  after the transmit equalizer coefficients have been set to the "preset" values."

CI 92 SC 92.8.4.5 P106 L 49 # 10153  
 Dawe, Piers IPtronics

Comment Type T Comment Status D

"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.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

See comment#396.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.3.8 P102 L33 # 10154  
 Dawe, Piers IPtronics

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

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't 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."

Proposed Response Response Status **W**

PROPOSED 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 #146.

Cl 93 SC 93.8.1.2 P132 L2 # 10155  
 Dawe, Piers IPtronics

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

Need to define the measurement filter for AC common-mode output voltage. It is convenient (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 of 33 GHz."

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #146.

Cl 92 SC 92.7.1 P90 L7 # 10161  
 Dawe, Piers IPtronics

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

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!

Proposed Response Response Status **W**

PROPOSED 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.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.7.8 P92 L16 # 10165  
 Dawe, Piers IPtronics

Comment Type TR Comment Status D

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, change 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.

Proposed Response Response Status W  
 PROPOSED 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."

CI 92 SC 92.8.3 P94 L13 # 10169  
 Dawe, Piers IPtronics

Comment Type ER Comment Status D

Trying to define the nominal unit interval is not necessary, very difficult to do precisely, and not 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.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

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.

CI 92 SC 92.8.3 P94 L1 # 10170  
 Dawe, Piers IPtronics

Comment Type ER Comment Status D

"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.

Proposed Response Response Status W  
 PROPOSED REJECT.

See comment #434.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92.8.4.5 P106 L49 # 10171  
 Dawe, Piers IPtronics

Comment Type T Comment Status D

"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".

Proposed Response Response Status W

PROPOSED ACCEPT.

Use suggested remedy.

Cl 93 SC 93.7.12 P130 L31 # 10175  
 Dawe, Piers IPtronics

Comment Type T Comment Status D

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.

Proposed Response Response Status W

PROPOSED 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, i.e. all times are multiplied by a factor of 0.4."

Make similar changes to 92.7.12.

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 92 SC 92-1 P85 L # 10187  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D  
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

Proposed Response Response Status W  
PROPOSED 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 93 SC 93-1 P123 L # 10188  
Sela, Oren Mellanox Technologies

Comment Type T Comment Status D  
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

Proposed Response Response Status W  
PROPOSED 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 93.8.1 P131 L34 # 10203  
Hidaka, Yasuo Fujitsu Laboratories of

Comment Type T Comment Status D  
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.

Proposed Response Response Status W  
PROPOSED REJECT.

[Subcl changed from 8.1 to 93.8.1 for more consistent sorting.]

Pending discussion by the Task Force and a measurement of the consensus to make the proposed change.

Cl 92 SC 92.7.1 P90 L48 # 10212  
Dudek, Mike QLogic

Comment Type T Comment Status D  
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

Proposed Response Response Status W  
PROPOSED ACCEPT.

Change Table 92-4 row 3 from "TP0 to TP1" to "TP0 to TP2" and from "TP4 to TP5" to "TP3 to TP5".



IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

CI 92 SC 92.8.4.5 P106 L49 # 10219  
 Dudek, Mike QLogic  
 Comment Type T Comment Status D  
 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 See response comment #171.

CI 94 SC 94.4.1 P169 L8 # 10233  
 Matthew, Brown Applied Micro  
 Comment Type TR Comment Status D channel parameters  
 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:  
 $a_0 + a_1 \sqrt{f} + a_2 f + a_3 f^2 + a_4 f^3$   
 Change the bottom equation in 94-17 to:  
 $a_5 + a_6 (f-2)$   
 Delete line~17 starting with "Amax".  
 Delete lines 23 to 32.  
 Add the following:  
 $a_0 = 0.8$   
 $a_1 = 1.7372e-4$   
 $a_2 = 1.1554e-9$   
 $a_3 = 2.7795e-19$   
 $a_4 = -1.0423e-29$   
 $a_5 = 33.467$   
 $a_6 = 1e-8$   
 Proposed Response Response Status W  
 PROPOSED ACCEPT.  
 [Draft 1.1, 94.4.2, page 196, line 29]

CI 94 SC 94.2.5 P150 L29 # 10234  
 Matthew, Brown Applied Micro  
 Comment Type TR Comment Status D 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.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 [Draft 1.1, 94.2.5, page 177, line 26]  
 One or more presentations are expected to address this comment.

CI 94 SC 94.2.5 P150 L29 # 10235  
 Matthew, Brown Applied Micro  
 Comment Type TR Comment Status D TX EEE encoding  
 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  
 PROPOSED REJECT.  
 This comment was WITHDRAWN by the commenter.  
 [Draft 1.1, 94.2.5, page 177, line 26]  
 [non-controversial, withdrawn]

IEEE P802.3bj D1.1 100 Gb/s Backplane and Copper Cable 2nd Task Force review comments

Cl 94 SC 94.2.4 P 50 L 24 # 10236

Matthew, Brown

Applied Micro

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

Proposed Response Response Status **W**

PROPOSED ACCEPT IN PRINCIPLE.

[Draft 1.1, 94.2.4, page 176, line 31]

Give the editor license to write the new sub-clauses as necessary.