Cl **45** *SC* **45.2.1.92b** *P* **37** *L* **48** # 1

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *align status*

There is a need for an align status bit in the Tx direction (so that it can validate 45.2.1.92j RS-FEC PCS lane 0 mapping register - Register 1.250).

SuggestedRemedy

Add Register bit 15, PCS_align_status

Definition:

When read as a one, bit 1.201.15 indicates that the RS-FEC described in Clause 91 has locked and aligned all transmit PCS lanes. When read as a zero, bit 1.201.15 indicates that the RS-FEC has not locked and aligned all transmit PCS lanes.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.92j** *P* **40** *L* **53** # 2

Barrass, Hugh Cisco

Comment Type **T** *Comment Status* **A** *align status*

Assuming that an align status bit is defined for all PCS lanes, this subclause needs to be changed to reflect that.

SuggestedRemedy

Change:

The contents of the Lane 0 mapping register is valid when the transmit PCS lane alignment status bit (register 1.201.15) is set to one and is invalid otherwise (see 45.2.1.92b).

Response *Response Status* **C**

ACCEPT.

Cl **91** *SC* **91.6** *P* **155** *L* **27** # 3

Barrass, Hugh Cisco

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

The FEC align status bit is missing

SuggestedRemedy

Add a row for FEC align status:

FEC align status | FEC lane mapping register | 1.206.15 | FEC_align_status

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a row for FEC lane alignment status:

FEC lane alignment status | FEC lane mapping register | 1.206.15 | fec_align_status

Cl **91** *SC* **91.6** *P* **155** *L* **33** # 4

Barrass, Hugh Cisco

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

There needs to be a PCS lane alignment status bit - also missing in Clause 45

SuggestedRemedy

Add a row for PCS align status:

PCS align status | RS-FEC status register | 1.201.15 | PCS_align_status

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add a row for PCS lane alignment status:

PCS lane alignment status | RS-FEC-status register | 1.201.15 | align_status

Cl **99** *SC* *P* **1** *L* **36** # 5

Bob Grow RMG Consulting

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

Needs copyright year

SuggestedRemedy

201X -> 2013

Response *Response Status* **C**

ACCEPT.

Cl **99** *SC* *P* **4** *L* **30** # 6

Bob Grow RMG Consulting

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

The front matter should include a mention of IEEE Std 802.3.1.

SuggestedRemedy

A companion document IEEE Std 802.3.1 describes Ethernet management information base (MIB) modules for use with the Simple Network Management Protocol (SNMP). IEEE Std 802.3.1 is updated to add management capability for enhancements to IEEE Std 802.3 after approval of the enhancements.

Response *Response Status* **C**

ACCEPT.

Cl **30** *SC* **30.3.2.1.3** *P* **23** *L* **46** # 7

Bob Grow RMG Consulting

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

Formatting does not match 802.3-2012.

SuggestedRemedy

Match formatting (More white space on left, no visible tab between the PCS type listed).

Same problem p.34, l.2

Response *Response Status* **C**

REJECT.

The paragraph format will ensure that there is no mismatch when amendments are rolled into the next revision.

The format used in this amendment is better as it wastes less space and results in more readable output.

Cl **30** *SC* **30.5.1.1.2** *P* **24** *L* **11** # 8

Bob Grow RMG Consulting

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

Formatting problem here (and in 802.3-2012). It appears in the 2012 merge some insertions have the enumeration outdented as is the case for each enumeration here.

SuggestedRemedy

Remove outdents per 802.3-2008 enumerations.

Response *Response Status* **C**

REJECT.

The format used in this amendment is better as it wastes less space and results in more readable output.

Cl **45** *SC* **45.2.1.92j** *P* **41** *L* **5** # 9

Bob Grow RMG Consulting

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

We have not done a good job on Reserved bits/registers. This draft includes two of the four Descriptions we have in 802.3-2012. These two reflect the two different perspectives: the implementation of the bits/registers and management (perhaps remotely) looking at the bits/registers.

For the implementation, ?Value always 0, writes ignored is acceptable?. The ?Ignore on read? is the management perspective. We are specifying the implementation (per the PICS), so the former Description should be used.

(Per the PICS, an implementation is to return a 0 (better then always 0) and not be affected by (ignore) a write. What we do not state is that management should ignore reserved bits on read and write reserved bits as 0.)

SuggestedRemedy

Replace multiple occurrences of ?Ignore on read? with ?Value always 0, writes ignored?.

Response *Response Status* **C**

ACCEPT.

P.41, l.5 is the only instance where new text is inserted.

The following instances represent changes to the base standard:

p.30, l.46
p.41, l.5
p.43, l.13, l.24
p.46, l.13, l.24
p.46, l.16
p.47, l.3, l.37
p.48, l.39
p.49, l.7, l.41

Cl **78** *SC* **78.1.3.3.1** *P* **62** *L* **17** # 10

Bob Grow RMG Consulting

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

Warning is inappropriate: From the IEEE Standards Style Manual, 17.4: ?Warnings call attention to the use of materials, processes, methods, procedures, or limits that have to be followed precisely to avoid injury or death.? I don?t think this even raises to the level of a Caution: ?Cautions call attention to methods and procedures that have to be followed to avoid damage to equipment.

SuggestedRemedy

Convert to a NOTE.

Response *Response Status* **W**

REJECT.

This warning necessarily follows the same format as 82.2.3.3. If it is unacceptable in this instance then it must be changed in both locations.

Cl **78** *SC* **78.2** *P* **63** *L* **23** # 11

Bob Grow RMG Consulting

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

Editing instruction could be improved. (Inserted rows include 40 Gb/s.

SuggestedRemedy

Change table title and column heading and insert the following rows at the bottom of Table 78-2.

Response *Response Status* **C**

ACCEPT.

Also #55

Cl **00** *SC* *P* *L* # 12

Bob Grow RMG Consulting

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

Use of acronyms not in 1.5. FW is broadly used in this document, though primarily as part of variable names it is also used as an acronym. DLL is also used in variable names and in clause 30 and 78 text. TLV is in the definitions in 802.3-2012, but it isn?t listed in the acronyms.

SuggestedRemedy

Add to 1.5:
DLL data link layer
FW fast wake
TLV type, length, value

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

TLV is included in the abbrevations list in 802.3-2012.

The abbreviation FW is used in only a few places and should be changed to "fast wake". An abbrevation definition is not required for portions of variable names.

In 1.5, add instructions to add abbreviations as follows:
"DLL data link layer"

Elsewhere in draft, change all instances of "FW" to "fast wake".

Cl **79** *SC* **79.3.6.3** *P* **73** *L* **8** # 13

Bob Grow RMG Consulting

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

I think the title is referring to the echo of two fields within the TLV value, so proper field names should be used. Not sure if it should be Echo of Transmit FW and Receive FW or per Table 79-9 Echo Transmit FW and Echo Receive FW?

SuggestedRemedy

I believe it should be: Echo of Transmit FW and Receive FW

Response *Response Status* **C**

ACCEPT.

Cl **79** *SC* **79.4.2** *P* **73** *L* **36** # 14

Bob Grow RMG Consulting

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

SuggestedRemedy

EEE FW (delete the extra FW).

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.5** *P* **78** *L* **26** # 15

Bob Grow RMG Consulting

Comment Type **TR** *Comment Status* **A** *PHY types*

Their isn?t a 40 Gb/s MAC or a 100 Gb/s MAC, there is only one MAC with various operating speeds. One also for example can?t mix 40 Gb/s operation with a 100GBASE PHY as the second sentence arguably (though not logically) allows. This is also rather late in the clause to define 40 Gb/s and 100 Gb/s Ethernet. (Should have caught this on p802.3ba -- so a service to humanity.

SuggestedRemedy

Delete the second sentence. And replace 80.1.1 first paragraph with:

This clause describes the general requirements for 40 Gigabit and 100 Gigabit Ethernet. 40 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of 40 Gb/s, connected through the 40 Gb/s Media Independent Interface to a 40 Gb/s Physical Layer implementation. 100 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of 100 Gb/s, connected through the 100 Gb/s Media Independent Interface to a 100 Gb/s Physical Layer implementation.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

The suggested remedy is not technically correct in its use of "MII." It's easier to preserve the existing style:

This clause describes the general requirements for 40 Gigabit and 100 Gigabit Ethernet. 40 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of 40 Gb/s, coupled with any IEEE 802.3 40GBASE Physical Layer implementation. 100 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of 100 Gb/s, coupled with any IEEE 802.3 100GBASE Physical Layer implementation.

Cl **30** *SC* **30.5.1.1.2** *P* **24** *L* **14** # 16

Hajduczenia, Marek ZTE Corporation

Comment Type **E** *Comment Status* **A** *PHY order*

There are three new added copper PHY types, i.e., 100GBASE-KP4, 100GBASE-KR4, and 100GBASE-CR4. Now they are defined in order of Clause 94, 93, and 92.

SuggestedRemedy

Change the order of PHY names to follow Clause order, i.e. 100GBASE-CR4, 100GBASE-KR4, and 100GBASE-KP4. Once done, the order will correspond closely to the order of PHY types included in 30.6.1.1.5
Similar change would be suggested in Table 73-4 to keep it consistent with teh listing of individual PHYs and order of their Clauses. Similar change in the listing order in 73.10.7.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the order in this clause as suggested.

Table 73-4 (and 73.10.7) is in the reverse order to Table 73-5 for all of the PHY types, so it should stay the way that it is in the current draft.

Cl **45** *SC* **45.2.1.12** *P* **34** *L* **5** # 17

Hajduczenia, Marek ZTE Corporation

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

"Insert the following rows into Table 45-15in place of the row currently reserved:"
Original Table 45-15 in 802.3-2012 contains two rows with reserved values. Please indicate clearly which one of these is being replaced.

SuggestedRemedy

Suggest to change the editing instruction to read: "Insert the following rows into Table 45-15 in place of the reserved row for bits 1.13.14:12:"

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.80** *P* **34** *L* **47** # 18

Hajduczenia, Marek ZTE Corporation

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

Missing comma before the newly added 'or'

SuggestedRemedy

Is "in Clause 72, Clause 84, Clause 85, Clause 92, Clause 93 or Clause 94." and should be "in Clause 72, Clause 84, Clause 85, Clause 92, Clause 93, or Clause 94."
Similar issue in newly added text in 45.2.1.81, 45.2.1.82, 45.2.1.83, and 45.2.1.84.

Response *Response Status* **C**

ACCEPT.

Although there was no "Oxford comma" in the base standard in these instances, adding it appears to be in ln ewith the style elsewhere.

Cl **45** *SC* **45.2.1.92a.2** *P* **37** *L* **34** # 19

Hajduczenia, Marek ZTE Corporation

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

"When written as a one, this bit enables bypass of the error indication. When written as zero, errors are indicated to the PCS through the sync bits." - we typically speak of setting a bit to one/zero
There are also inconsistencies with the use of "a" before the bit value (zero/one).

SuggestedRemedy

Change the text to read:
"When set to a one, this bit enables bypass of the error indication. When set to a zero, errors are indicated to the PCS through the sync bits."

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.92b** *P* **37** *L* **50** # 20

Hajduczenia, Marek ZTE Corporation

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

Inconsistent terminology in Table 45-72d. If for bit 1.201.1 we describe the value of 1 as "FEC decoder has ability to bypass error indication", it is only expected that for the value of 0 the description will read "FEC decoder does not have the ability to bypass error indication" Simialr issue for bit 1.201.2

SuggestedRemedy

Change description for bit 1.201.1 to read:
1 = FEC decoder has the ability to bypass error indication
0 = FEC decoder does not have the ability to bypass error indication
Change description for bit 1.202.2 to read:
1 = FEC decoder has the ability to bypass error correction
0 = FEC decoder does not have the ability to bypass error correction

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.3.9** *P* **43** *L* **3** # 21

Hajduczenia, Marek ZTE Corporation

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

Editorial instruction is unclear as to what happens with bits 3.20.6 through 3.20.1, which are not shown right now in thsi table

SuggestedRemedy

Either explicitly show bits 3.20.6 through 3.20.1 as not changed from base standard, or modify the editorial instructions to indicate clearly what is being done, i.e.:
- replacing the reserved row for bits 3.20.15:7 as shown in the table
- replace the reserver row for bit 3.20.0 as shwon in the table

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change editorial instruction:

Change title of Table 45- 105, replace the reserved row for bits 3.20.15:7 as shown, and replace the reserved row for bit 3.20.0 as shown:

Cl **45** *SC* **45.2.3.9.a** *P* **43** *L* **40** # 22

Hajduczenia, Marek ZTE Corporation

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

"If the device only supports fast wake for LPI operation as defined in 78.5, this bit shall be set to one. If the device supports both fast wake and deep sleep for LPI operation, this bit shall be set to zero."
In other subclauses describing the setting for bits, you use "a one" and "a zero" It should be consistent in here as well

SuggestedRemedy

Either insert article "a" every time you call "one" or "zero" in this set of registers, ot remove them elsewhere where they are already used in this draft. Right now it is very inconsistent and highly arbitrary (at least that is the way it seems).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change all instances in these registers to "a one" or "a zero"

Cl **69** *SC* **69.1.3** *P* **53** *L* **42** # 23

Hajduczenia, Marek ZTE Corporation

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

Item g) is a new text, added under this project and should be marked accordingly.

SuggestedRemedy

Underline the content of item g). The new text in item f) should also be marked with underline.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response for comment #43.

Cl **69** *SC* **69.2.4** *P* **54** *L* **22** # 24

Hajduczenia, Marek ZTE Corporation

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

Editorial instructions associated with Table 69-1 could be clearer - it takes a while to realize what the actual change was.

SuggestedRemedy

Change the editorial instruction in line 22 to read as follows: "Replace Table 69-1 (moving 40GBASE-KR4 to Table 69-1a) and insert Table 69-1a as shown:"

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.2** *P* **63** *L* **30** # 25

Hajduczenia, Marek ZTE Corporation

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

Table 78-2 does not show with underline rows which were inserted.

SuggestedRemedy

Mark the rows in Table 78-2 which were inserted in this amendment.

Response *Response Status* **C**

ACCEPT.

Cl **79** *SC* **79.3.6.1** *P* **72** *L* **50** # 26

Hajduczenia, Marek ZTE Corporation

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

The use of the word "will" should be limited only to the statements of the fact.

Excerpt from the Style Manual: "NOTE-The use of the word mustis deprecated and shall not be used when stating mandatory requirements; must is used only to describe unavoidable situations. The use of the word will is deprecated and shall not be used when stating mandatory requirements; will is only used in statements of fact."

SuggestedRemedy

Suggest to change the sentences written in future simple into present simple tense and avoid discussion on whether they are indieed statements of a fact (or not) altogether.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change "will" to "intends to"

Cl **79** *SC* **79.3.6.3** *P* **73** *L* **11** # 27

Hajduczenia, Marek ZTE Corporation

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

Missing comma after "When a local link partner receives its echoed values from the remote link partner"
Similarly, missing comma on page 73, line 25, after "The cross-references between the EEE TLV, the EEE FW TLV" (serial comma)
Similarly, missing comma on page 80, line 5, after "The terms 40GBASE-R, and100GBASE-R" (serial comma)
Similarly, missing comma on page 80, line 35, after "The 40GBASE-R, and100GBASE-R" (serial comma)

SuggestedRemedy

Insert missing comma

Response *Response Status* **C**

ACCEPT.

Cl **81** *SC* **81.1.7** *P* **91** *L* **26** # 28

Hajduczenia, Marek ZTE Corporation

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

Missing space after "to the XLGMII/CGMII." and before the newly inserted text.

SuggestedRemedy

Insert the missing space

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.6** *P* **32** *L* **1** # 29

Hajduczenia, Marek ZTE Corporation

Comment Type **T** *Comment Status* **R** *802.3bk*

P802.3bk introduced new register settings as well, namely:
0 1 1 1 1 1 = 10/1GBASE-PRX-U4
0 1 1 1 1 0 = 10GBASE-PR-U4
0 1 1 1 0 1 = 10/1GBASE-PRX-D4
0 1 1 1 0 0 = 10GBASE-PR-D4
and the reserved range
0 1 1 1 x x = reserved
is now gone.

SuggestedRemedy

No action is needed in the draft, just making sure that thsi range is not used in 802.3bj for any purpose.

Response *Response Status* **C**

REJECT.

These bits remain reserved in this amendment, however they will have to be updated when (if) 802.3bk is published.

Cl **45** *SC* **45.2.1.92a** *P* **37** *L* **19** # 30

Hajduczenia, Marek ZTE Corporation

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

I think it would be better if we explictly said what is being detected and corrected. I assume it is errors we are really referencing.

SuggestedRemedy

Modify description for register 1.200.0 as follows:

1 = FEC decoder performs error detection without error correction
0 = FEC decoder performs error detection and error correction

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.92a.1** *P* **37** *L* **26** # 31

Hajduczenia, Marek ZTE Corporation

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

"When this variable is set to one ..." - but it is a bit in the register we are talkign about.

SuggestedRemedy

Make sure descriptions of all modified registers use the same terminology i.e., "When this bit is set to one/zero ... "
Changes are needed in (at least) 45.2.1.92a.1, 45.2.1.92b.1, 45.2.1.92b.2

Response *Response Status* **C**

ACCEPT.

Change p.37, l.26, l.27
p.38, l.7, l.8
p.38, l.14, l.15

No other instances found.

Cl **45** *SC* **45.2.3.9.b** *P* **43** *L* **47** # 32

Hajduczenia, Marek ZTE Corporation

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

Is there any way for 100GBASE-CR4 and 100GBASE-KR4 not support EEE? Similar question for 100GBASE-KP4, 100GBASE-CR10, 40GBASE-CR4, and 40GBASE-KR4, where you only describe the value of "1" (supported). However, the associated table Table 45-105 provides also indication that the given bit may be set to "0", which is not covered in the text.

SuggestedRemedy

Add description of the value "0" for all subclauses associated with Table 45-105

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Note that this format is used in the base standard, making this change will create an inconsistency.

In each instance, add "Otherwise this bit shall be set to zero."

Cl **80** *SC* **80.1.3** *P* **76** *L* **35** # 33

Hajduczenia, Marek — ZTE Corporation

Comment Type **T** *Comment Status* **R** *PHY types*

Not sure why the text "in Clause 84 for 40GBASE-KR4" was struck, given that MDI for 40GBASE-LR4 is still specified in Clause 84. Figure 84-1 was not modified and MDI is still within the scope of Clause 84.

SuggestedRemedy

Revert the text or clearly explain in editorial note why it is removed.

Response *Response Status* **C**

REJECT.

There is no electrical or mechanical specification of the MDI for backplane Physical Layers, so 40GBASE-KR4 should not be in this bullet.

An extra bullet has been added (bullet j, Draft 1.1 Comment 436) to help the reader understand this - see also comment #152.

Cl **00** *SC* **0** *P* *L* # 34

Anslow, Pete — Ciena

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

Despite comment 39 against D1.3, not all insert editing instructions say where the insertion should be made.

SuggestedRemedy

Page 60, line 6 change "Insert item LE8a" to "Insert item LE8a after item LE8"
Page 70, line 32 change "Insert 78.5.2" to "Insert 78.5.2 after 78.5.1"
Page 72, line 7 change "Insert a row and change the reserved row of Table 79-1 as shown:" to "Change the reserved row of Table 79-1 and insert a new row above it as shown:"
Page 97, line 7 change "Insert the following row into table 81.4.2.3:" to "Insert the following row at the end of the table in 81.4.2.3:"
Page 118, line 4 change "Insert the following row into table 82.7.3:" to "Insert the following row at the end of the table in 82.7.3:"
Page 121, line 19 change "Insert rows to Table 83-2 ..." to "Insert rows at the end of Table 83-2 ..."
Page 121, line 33 change "Insert rows to Table 83-3 ..." to "Insert rows at the end of Table 83-3 ..."
Page 122, line 4 change "...and insert the LPI row into table 82.7.3:" to "...and insert the *LPI row at the end of the table in 83.7.3:" (note the correction to the subclause number)
Page 123, line 7 change "Insert a row in Table 84-1 for EEE:" to "Insert a row at the end of Table 84-1 for EEE:"
Page 126, line 5 change "Insert the following row into table 84.11.3:" to "Insert the following row at the end of the table in 84.11.3:
Page 126, line 20 change "Insert the following rows into table 84.11.4.1:" to "Insert the following rows at the end of the table in 84.11.4.1:"
Page 126, line 36 change "Insert the following rows into table 84.11.4.3:" to "Insert the following rows at the end of the table in 84.11.4.3:"
Page 127, line 7 change "Insert a row in Table 85-1 for EEE:" to "Insert a row at the end of Table 85-1 for EEE:"
Page 129, line 6 change "Insert the following row in Table 85-5 in 85.8.3:" to "Insert the following row immediately above the row for Amplitude peak-to-peak (max) in Table 85-5:"
Page 130, line 5 change "Insert the following row into table 85.13.3:" to "Insert the following row at the end of the table in 85.13.3:"
Page 130, line 19 change "Insert the following rows into table 85.13.4.1:" to "Insert the following rows at the end of the table in 85.13.4.1:"
Page 130, line 36 change "Insert the following rows into table 85.13.4.3:" to "Insert the following rows at the end of the table in 85.13.4.3:"
Page 302, line 5 change "Insert the following row into table 83A.7.3:" to "Insert the following row at the end of the table in 83A.7.3:"
Page 302, line 17 change "Insert rows in 83A.7.4:" to "Insert rows at the end of the table in 83A.7.4:"
Page 302, line 31 change "Insert rows in 83A.7.5:" to "Insert rows at the end of the table in 83A.7.5:"

Response *Response Status* **C**

ACCEPT.

Cl **85** *SC* **85.13.4.1** *P* **130** *L* **27** # 35

Anslow, Pete Ciena

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

The PICS items in the base standard end at PF18, so the next item should be PF19 not PF20

SuggestedRemedy

Renumber PF20 through PF22 to PF19 through PF21

Response *Response Status* **C**

ACCEPT.

Cl **01** *SC* **1.4.50a** *P* **22** *L* **5** # 36

Anslow, Pete Ciena

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

The draft P802.3bk amendment (currently in Sponsor Ballot) has deleted subclause 1.4.27, which has the effect of renumbering all of the subsequent subclauses. Assuming that the P802.3bk draft is approved before P802.3bj, this will have to be accounted for.

SuggestedRemedy

Change the numbering of the inserted subclauses accordingly.
Change the editing instructions to include the renumbering information, e.g. the first editing instruction would become:
"Insert the following definition after 1.4.49 (10GBASE-X renumbered from 1.4.50 by the deletion of 1.4.27 by IEEE Std P802.3bk-201x) as follows:"

Response *Response Status* **C**

REJECT.

The draft will be updated appropriately when the P802.3bk amendment has been published.

Cl **78** *SC* **78.4.2.3** *P* **65** *L* **15** # 37

Anslow, Pete Ciena

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

The editing instruction just says "Insert the following rows into Table 78-3", but it not clear what the resulting Table 78-3 would look like - should the new rows stay together, or be interleaved through the table?

If they stay together, should they be at the top or the bottom?

Since the Entity and Object class entries in the two left hand columns appear to be the same as in the base table, it seems better to interleave the new rows, but in what order?

SuggestedRemedy

If the new rows are to stay together, amend the editing instruction to say where they should go.
If the new rows are to be interleaved with existing rows, it seems better to make the editing instruction "Change" rather than "Insert" and show the complete table with the new rows in underline font.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Bring entire table into the draft and show changes.

Cl **80** *SC* **80.1.5** *P* **79** *L* **43** # 38

Anslow, Pete Ciena

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

Table 80-2a shows CAUI as per Annex 83B (chip to module) as optional for KR4 and CR4, but Tables 92-1, 93-1 and 94-1 show CAUI as per Annex 83A as optional

SuggestedRemedy

Change Table 80-2a to be consistent with Tables 92-1, 93-1 and 94-1 to show CAUI as per Annex 83A as optional

Response *Response Status* **C**

ACCEPT.

Cl **83C** *SC* **83C.1a.2** *P* **305** *L* **54** # 39

Anslow, Pete Ciena

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

The title of Figure 83C-2b says "XLAUI/CAUI", but is specific to 100G

SuggestedRemedy

Change "single XLAUI/CAUI" to "single CAUI"

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.92b.2** *P* **38** *L* **11** # 40

Anslow, Pete Ciena

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

The title of 45.2.1.92b.2 should be "FEC bypass indication ability (1.201.1)

SuggestedRemedy

Change the title from:
"FEC bypass correction ability (1.201.1)" to:
"FEC bypass indication ability (1.201.1)"

Response *Response Status* **C**

ACCEPT.

Cl **92A** *SC* **92A.5** *P* **313** *L* **19** # 41

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **A** *frequency range*

In the "where" section of Equation 92A-4 it says:
"f is the frequency in MHz"
This means that the insertion loss at 1 GHz (1000 MHz) is 0.1148*(sqrt(1000)) + 0.278*1000 = 281.6 dB

Similarly, for equation 92A-5, since the equations referred to in the where section have f in GHz, f should be in GHz here too.

SuggestedRemedy

Change "f is the frequency in MHz" to "f is the frequency in GHz" in the where sections of both equations 92A-4 and 92A-5

Response *Response Status* **C**

ACCEPT.
Use suggested remedy

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

Anslow, Pete Ciena

Comment Type **T** *Comment Status* **A** *frame error ratio*

Clauses 92, 93 and 94 all contain a sentence similar to:
"For a complete Physical Layer, this specification is considered to be satisfied by a frame error ratio less than 1.7 × 10^-10 for 64-octet frames with minimum inter-packet gap."

However, this text does not say where in the stack this FER is applied. A common place to do this would be the MAC/PLS service interface, but that is not appropriate as an FER of 1.7E-10 at that point would lead to unacceptable MTTFPA. Most of the errored frames are expected to be marked as bad by the FEC and dropped by the PCS.

Wording that is being proposed in P802.3bm is equivalent to:
"frame error ratio less than 1.7 × 10^-10 at the FEC service interface for 64-octet frames with minimum inter-packet gap when processed according to Clause 91."

SuggestedRemedy

Define the interface that the FER applies to in Clauses 92, 93, and 94 as this cannot be the MAC/PLS service interface due to this causing an unacceptable MTTFPA.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace:
"For a complete Physical Layer, this specification is considered to be satisfied by a frame error ratio less than 1.7 × 10^-10 for 64-octet frames with minimum inter-packet gap."

With:
"For a complete Physical Layer, this specification is considered to be satisfied by a frame loss ratio (the number of transmitted frames not received as valid by the MAC divided by the total number of transmitted frames) of less than 1.7 × 10^-10 for 64-octet frames with minimum inter-packet gap."

Also, add new definition in 1.4 if there is no other use of this term in 802.3-2012 that has a different meaning.

Cl **69** *SC* **69.1.3** *P* **53** *L* **39** # 43

Anslow, Pete Ciena

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

The editing instruction says "Change item f)".
The entirety of the text of item f) in the base standard is shown as deleted and then a new sentence is shown in normal font. This should be in underline font as it is being added.

The text says "as specified in Annex 83A or Annex 83B" but Annex 83B is not an option for any backplane PMD

Also, the added text discusses XLAUI, but there is no text for CAUI as included in Table 69-1a for KR4 and KP4

SuggestedRemedy

Show the new text in item f) in underline font
Remove "or Annex 83B" from the addition
Add a reference to CAUI either in item f) or an additional item.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement the suggested remedy.

To address CAUI do the following:
Add a new item (g) after (f) as follows:
"(g) The PMA service interface, which, when physically implemented as CAUI (100 Gigabit Attachment Unit Interface) at an observable interconnection port, uses a 10-lane data path as specified in Annex 83A."
Change (g) to (h).

Cl **92** *SC* **92.11.3.4** *P* **196** *L* **29** # 44

Anslow, Pete Ciena

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

As stated in 1.2.6, "Unless otherwise stated, numerical limits in this standard are to be taken as exact, with the number of significant digits and trailing zeros having no significance." Consequently, trailing zeros should not be shown in Equation 92-30

SuggestedRemedy

Change "1.0" to "1" in equation 92-30 (2 instances)

Response *Response Status* **C**

ACCEPT.

Use suggested remedy

Cl **91** *SC* **91.5.2.7** *P* **139** *L* **21** # 45

Anslow, Pete Ciena

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

The draft is not consistent as to whether there is a space after the comma in "RS(x,y)" or not.

Since it is used mostly without the space, remove the space from those instances that have it.

SuggestedRemedy

remove the space from:
Page 139, line 21 in RS(n, k)
Page 139, line 24 in RS(528, 514)
Page 139, line 24 in RS(544, 514)
Page 308, line 50 in RS(528, 514)
Page 309, line 3 in RS(544, 514)

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.92e** *P* **39** *L* **31** # 46

Anslow, Pete Ciena

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

In Table 45-72g, the row for 1.206.15 has "RS_FEC" rather than "RS-FEC"

SuggestedRemedy

Change "RS_FEC" to "RS-FEC"

Response *Response Status* **C**

ACCEPT.

Cl **83C** *SC* **83C.1a** *P* **305** *L* **1** # 47

Anslow, Pete Ciena

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

Clause 83C uses "RS FEC" rather than "RS-FEC" in 7 places
Also, the abbreviation RS-FEC is not included in the Figure abbreviation expansions

SuggestedRemedy

Change "RS FEC" to "RS-FEC" in 7 places (including figures) and add RS-FEC to the abbreviation expansions in figures 83C-2a and 83C-2b

Response *Response Status* **C**

ACCEPT.

Cl **69** *SC* **69.2.4** *P* **54** *L* **1** # 48

Anslow, Pete Ciena

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

In the base standard "Physical Layer signaling systems" is 69.2.3

SuggestedRemedy

change 69.2.4 to 69.2.3

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.6.a** *P* **31** *L* **28** # 49

Anslow, Pete Ciena

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

The form of: "If the PMA does not support EEE capability or is not able to stop the ingress direction AUI signaling (see 1.1.9) ..." would indicate a reference to subclause 1.1.9, but this is bit 1.1.9 in 45.2.1.2.a.

Similar issue in 45.2.1.6.b

SuggestedRemedy

Change "see 1.1.9" to "see 45.2.1.2.a"
In 45.2.1.6.b, change "see 1.1.8" to "see 45.2.1.2.b"
Make both cross-references links.

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.1** *P* **61** *L* **18** # 50

Anslow, Pete Ciena

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

The IEEE 802.3 working group guidelines at:
http://www.ieee802.org/3/WG_tools/editorial/requirements/words.html
says use "sublayer" not "sub-layer"

SuggestedRemedy

Change "sub-layer" to "sublayer"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make this change and also change the instance on P.86, l.21 (Table 80-3).

Cl **78** *SC* **78.1.3.3.1** *P* **61** *L* **52** # 51

Anslow, Pete Ciena

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

In the text:
"Fast wake refers to the mode for which the transmitter continues to transmit signals during the fast wake state (between the sleep and wake states) so that the receiver can resume operation with a shorter wake time ..."

The text "(between the sleep and wake states)" is confusing. When looking at Figure 78-3a, there are no sleep and wake states. It would have to be between active and idle states.

SuggestedRemedy

Either change to "(between the active and idle states)" or delete this.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Delete the parenthetical clause.

Cl **91** *SC* **91.6.2** *P* **155** *L* **43** # 52

Anslow, Pete Ciena

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

The fact that this variable (FEC_bypass_indication_enable) has no effect if FEC_bypass_correction_enable is asserted is contained in 91.5.3.3 (referred to by 91.6.2). However, it would be helpful to repeat that information here.

SuggestedRemedy

Add: "This bit shall have no effect (the decoder shall not bypass error indication) if FEC bypass correction enable (1.200.0) is set to one."

Response *Response Status* **C**

ACCEPT.

Cl **92** *SC* **92.8.3.4** *P* **174** *L* **8** # 53

Anslow, Pete Ciena

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

"20 dB" is split across two lines.
Use a non-breaking space to prevent this.

SuggestedRemedy

Make the space in "20 dB" non-breaking (ctrl-space)

Response *Response Status* **C**

ACCEPT.

Use suggested remedy

Cl **45** *SC* **45.2.1.92a** *P* **37** *L* **8** # 54

Anslow, Pete Ciena

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

Table 45-72c seems to be the first table that has been inserted after Table 45-72

SuggestedRemedy

Renumber Tables 45-72c through 45-72j to be Tables 45-72a through 45-72h

Response *Response Status* **C**

ACCEPT.

Cl **78** *SC* **78.2** *P* **63** *L* **24** # 55

Anslow, Pete Ciena

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

The editing instruction says "to for 100Gb/s Ethernet" which has a spurious "to" and rows have been added for 40 Gb/s Ethernet also.

SuggestedRemedy

Delete "to for 100Gb/s Ethernet"

Response *Response Status* **C**

ACCEPT.

Cl **79** *SC* **79.3.6** *P* **72** *L* **22** # 56

Anslow, Pete Ciena

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

Comment #53 against D1.3 has not been implemented:
Figure 79-6a is inserted after Figure 79-6 which is the last figure in Clause 79. This means that it should be numbered Figure 79-7

SuggestedRemedy

Change the figure number to 79-7

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1** *P* **315** *L* **24** # 57

Farhoodfar, Arash Cortina-Systems

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

Equation 93A-1 defines COM as 20log10(As/An) where "As" is the signal amplitude and "An" is the noise amplitude as defined in 93A.1.7. The "An" term includes ALL interference and noise terms including residual-ISI.
COM equalizer consists of a CTLE and a DFE. The COM timing recovery is a fixed zero-crossing timing recovery with no phase optimization capability. This is most often not complex enough an equalizer/timing-recovery and results in sub-optimal Equalization/Noise-Enhancement. The sub-optimality of COM is then scaled according "As/An" ratio resulting in a number that is grossly mis-leading.
For the KR4, misleading COM values are reported for longer/harder-to-equalize channels. It's particularly egregious to multiply ISI, since KP4 seems to be particularly hurt by lack of FFE.

SuggestedRemedy

Define COM as

The number of multiples of the baseline 'noise' (excluding ISI and xTalk) that you could add to the input of the receiver and still maintain BER < 1e-12

Response *Response Status* **W**

REJECT.

It should be noted that the "BER" is defined by the PMD that invokes the COM method, denoted as DER0, and is not necessarliy 1E-12.

COM is a measure of the relative eye opening (signal amplitude divided by noise amplitude) for a channel under test. It is not a measure of receiver margin.

Cl **93** *SC* **93.9.1** *P* **231** *L* **48** # 58

Farhoodfar, Arash Cortina-Systems

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

In table 93-9, "DER0" is specified at 10E-5. The actual value should be a funcion of DFE profile in COM. This can result in incorrect COM value as a function of the channel.

SuggestedRemedy

Make "DER0" a function of the DFE profile.
Remove "bmax" limitation from the table.

Response *Response Status* **U**

REJECT.

The method for the derivation of DER0 from the DFE profile is not defined.

The DER0 is tied to the minimum error ratio required for interference tolerance testing. The "DFE profile" of a given receiver under test may be unknown or not traceable to the COM model hence there may no common rigorous method to adjust the target error ratio to compensate.

A fixed DER0 is favored for a more rigid tie-in between channel requirements imposed by COM and receiver requirements imposed by interference tolerance.

Also note that bmax is set to 1 for 100GBASE-KR4 which is not an overly restrictive constraint.

Cl **94** *SC* **94.4.1** *P* **286** *L* **49** # 59

Farhoodfar, Arash Cortina-Systems

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

In table 94-19, "DER0" is specified at 3x10E-4. The actual value should be a funcion of DFE profile in COM. This can result in incorrect COM valu as a function of the channel.

SuggestedRemedy

Make "DER0" a function of the DFE profile.
Remove "bmax" limitation from the table.

Response *Response Status* **U**

REJECT.

See the response to comment 58.

Also, comment 80 response sets the bmax value for the first DFE tap to 1.

Cl **94** *SC* **94.2.2.4** *P* **248** *L* **24** # 60

Lusted, Kent Intel

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

Spec states "
Upon the transition from the last training frame to the first PMA frame the PRBS13 generator used during training advances without re-seeding (see 94.3.10.7.2
) and the output is used to generate the
termination bits. The PRBS13 generator continues to advance without re-seeding and without inversion."

But it isn't 100% clear that the PRBS13 is not inverted in the PMA frame (see lusted_3bj_01_1112.pdf slide 9)

SuggestedRemedy

consider changing to "
Upon the transition from the last training frame to the first PMA frame the PRBS13 generator used during training advances without re-seeding (see 94.3.10.7.2
), without inversion and the output is used to generate the
termination bits."

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.11.1.9** *P* **271** *L* **6** # 61

Lusted, Kent Intel

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

Figure is hidden on the next page and occurs in the next section (94.3.12)

SuggestedRemedy

Move to previous page and associate with 94.3.11.1.9

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make Figure 94-9 a non-floating Figure and insert at end of 94.3.11.1.9 (this is an exception to normal editorial practice) to keep it out of non-related section 94.3.12

<Editor changes subclause from "Figure 94-9" to 94.3.11.1.9.>

Cl **94** *SC* **94.3.11.1.9** *P* **271** *L* **6** # 62

Lusted, Kent — Intel

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

The vertical alignment of the structure and PRBS13 blocks in the diagram are not aligned. It distorts the graphic in pdf format.

SuggestedRemedy

fix

Response *Response Status* **C**

ACCEPT.

<Editor changes subclause from "Figure 94-9" to 94.3.11.1.9.>

Cl **94** *SC* **94.3.10.9** *P* **268** *L* **1** # 63

Lusted, Kent — Intel

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

The vertical alignment of the structure and PRBS13 blocks in the diagram are not aligned. It distorts the graphic in pdf format.

SuggestedRemedy

fix

Response *Response Status* **C**

ACCEPT.

<Editor changes subclause from "Figure 94-7" to 94.3.10.9.>

Cl **94** *SC* **94.3.11.1.9** *P* **271** *L* **6** # 64

Lusted, Kent — Intel

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

Figure 94-7 shows the sequence for Lane 0 and a PAO = 0. Add details for Lanes 1:3

SuggestedRemedy

See future presentation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changes subclause from "Figure 94-9" to 94.3.11.1.9.>

This comment is referring to Figure 94-9 rather than 94-7.

Adopt the PRBS13 sequences on slide 5 of lusted_3bj_01a_0513 for lanes 0 to 3. In Figure 94-9, add sequence for 3 more lanes and indicated the lane number for each.

Change the text in 94.3.11.1.9:
"The values for the PRBS13 in Figure 94–9 are specific to a transition with a PAO of zero on Lane 0. The values are different for other PAO values or lane numbers."

To:
"The values for the PRBS13 in Figure 94–9 are specific to a transition with a PAO of zero. The values are different for other PAO values."

Cl **94** *SC* **94.3.10.9** *P* **268** *L* **1** # 65

Lusted, Kent — Intel

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

Figure 94-7 shows the sequence for Lane 0. Other lanes will be different.

SuggestedRemedy

Add note related to Figure 94-7 such as: "The values for the PRBS13 are specific to a transition on Lane 0 and a PAO of zero. The values will be different for other lane numbers and different PAO values."

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **94** *SC* **94.3.10.9** *P* **268** *L* **1** # 66

Lusted, Kent — Intel

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

Figure 94-7 shows the sequence for Lane 0 and a PAO = 0. Add details for Lanes 1:3

SuggestedRemedy

See future presentation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changes subclause from "Figure 94-7" to 94.3.10.9.>

Adopt the PRBS13 sequence on slide 3 of lusted_3bj_01a_0513 for lanes 0 to 3. In Figure 94-7, add sequence for 3 more lanes and indicated the lane number for each.

Cl **81** *SC* **81.3a.3.1** *P* **96** *L* **35** # 67

Anslow, Pete — Ciena

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

The heading "Considerations for transmit system behavior" is 81.3a.3, but "Considerations for receive system behavior" is 81.3a.3.1 which is one layer down in the heading heierachy. Surely these should be at the same level.

SuggestedRemedy

Change 81.3a.3.1 to be 81.3a.4 so that the receive section is not part of the transmit section.

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.3.13.3** *P* **280** *L* **17** # 68

Ran, Adee — Intel

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

The links with the text "see Figure 94-18", in both comment b and comment c, point to _table_ 94-18 instead. In fact, the figure pertinent to these comments is 94-17, which describes the full path from TP0 to TP5.

SuggestedRemedy

Change "Figure 94-18" to "Figure 94-17" (twice), and correct the links.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The methodology in 94.3.13.3.2 step 6 says:
"6) Using the test setup in Figure 94-19 (also see Figure 93A-1), measure the scattering parameters, S , of the test channel (TPt to TP5 replica)."

So change twice:
"TP0 and TP5 (see Figure 94-18)"
To:
"TPt and TP5 (see Figure 94-19)"

Cl **92** *SC* **92.14.4.5** *P* **210** *L* **43** # 69

Ran, Adee — Intel

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

Items CA14 and CA16 have empty status.

SuggestedRemedy

Change status of CA14 to CAST1:M, and status of CA16 to CAST2:M.

Response *Response Status* **C**

ACCEPT.
Use suggested remedy

Cl **82** *SC* **82.6** *P* **117** *L* **20** # 70

Ran, Adee Intel

Comment Type **ER** *Comment Status* **A** *LPI state*

in Figure 82-17, two transitions (from RX_SLEEP to RX_ACTIVE, and from RX_WAKE to RX_ACTIVE) include the condition "R_TYPE(rx_coded) = IDLE".

But IDLE is not one of the values defined for R_TYPE (neither in 82.2.18.2.3 nor in 49.2.13.2.3).

SuggestedRemedy

Change IDLE in this figure to one of the values defined for R_TYPE in 82.2.18.2.3 (C?)

Alternatively, add the definition of IDLE to the R_TYPE value list.

Consider correcting Figure 49-13 as well (perhaps in maintenance).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change IDLE to C (all instances).

Cl **94** *SC* **94.3.13.3** *P* **280** *L* **10** # 71

Ran, Adee Intel

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

The objective that 100GBASE-KP4 is aimed at is "Define a 4 lane PHY... insertion loss of <=33 dB at 7.0 GHz".

Defining the test for the same loss at a lower frequency creates an excessive stress.

SuggestedRemedy

Change the parameter "Insertion loss at 6.875 GHz" to "Insertion loss at 7 GHz".

Response *Response Status* **C**

ACCEPT.

The proposed change is in line with the description in 69.2.4.

Cl **94** *SC* **94.3.10.7** *P* **264** *L* **23** # 72

Ran, Adee Intel

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

The "status report" field has two different definitions - tables 94-10 and 94-13. There are several issues with these definitions :

1. The countdown sub-fields in training and EEE modes are at different locations. This sub-field is used in both modes for the same purpose, but requires different decoding for each case.

2. PMA alignment offset is used in table 94-10, although it is not defined yet (and not required if this table is only for training mode).

3. Bit 6 is assigned twice in both table 94-10 and 94-13, and bit 14 is not assigned in table 94-13.

4. In EEE mode there are three separate "reserved" subfields, which is cumbersome and less useful for future usage.

The suggested remedy is aimed at making the definitions consistent, and avoid repetition of almost-identical text.

SuggestedRemedy

Change bit assignments in table 94-10 as below. Table 94-13 should have similar bit assignment, with possibly different descriptions for some fields.

Move 94.3.11.1.7 (PAO definition) to be a subclause of 94.3.10.7; specify that it must be zero for training frames (per 94.3.10.9 and figure 94-7).

Consider deleting table 94-13 and subclauses 94.3.11.1.4-94.3.11.8, and referring to table 94-10 instead.

Updated table 94-10:

Cell - Name (add to description)
---
19 - Parity
18 - Mode (0: training, 1: EEE)
17:16 - Countdown (same meaning for training and EEE)
15:13 - PMA alignment offset (always 000 for training)
12: 7 - Reserved
6 - Receiver ready (always 1 for EEE)
5: 4 - Coefficient (+1) status (always 00 for EEE)
3: 2 - Coefficient (0) status (always 00 for EEE)
1: 0 - Coefficient (-1) status (always 00 for EEE)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Adopt slides 4 and 5 in marris_3bj_01_0513 with the following exceptions.

Change the description of field 6 to the following:
1 = The local receiver has determined that
training is complete and is prepared to receive data..
0 = The local receiver is requesting that
training continue

The coefficient status fields will not change from Table 94-10.

Cl **93A** *SC* **93A.1.6** *P* **321** *L* **16** # 73

Ran, Adee Intel

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

According to the original COM proposal (mellitz_01_0712, slide 7), sigma_r represents noise at the receiver input, before the CTLE. It should be affected by the H_ctf transfer function, but in the current procedure it is not.

By the definition of H_rx as a noise filter (93A.1.4.1), it should be understood that sigma_r is the RMS noise at this filter's output, before applying the CTLE effect. COM should use a value after applying the CTLE effect.

Reduction of noise power due to CTLE can lead to significant improvement in COM results for long channels, and enable meeting the 33 dB loss objective of 100GBASE-KP4.

Presentation with more information will be supplied.

SuggestedRemedy

Define a CTF-adjusted version of sigma_r:

sigma_r_effective^2 = sigma_r^2/f_r * integral from 0 to f_r |H_ctf(f)|^2 df

In equations 93A-27, 93A-32, and 93A-42, use sigma_r_effective instead of sigma_r.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It should be noted that the quantity sigma_r^2/f_r implies a noise spectral density at the receiver input. Since f_r is related to the signaling rate, the suggested remedy imposes a spectral density that is ~1.9X (25.78125/13.59375) larger for 100GBASE-KP4 than 100GBASE-KR4. There is no justification for this difference.

Replace sigma_r with a noise spectral density at the input to the receiver noise filter that yields 1 mV RMS at its output for 100GBASE-KR4.

Use the same noise spectral density for both 93 and 94.

Cl **93A** *SC* **93A.1.6** *P* **321** *L* **16** # 74

Ran, Adee Intel

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

Calculation of FOM uses ISI, sigma_r and the contribution of RJ as noise sources. Later, when COM is calculated, the PDFs of the same noise sources are used, with additional crosstalk and DJ contributions.

Thus, FOM assumes lower noise than COM, which creates a bias in equalization selection; COM may be higher if another set of equalization parameters is selected instead.

SuggestedRemedy

Add a crosstalk RMS term to FOM, calculated as in eq. 93A-37, with max RMS phase selected per crosstalk source. This term will be calculated at each iteration, with TXFFE and CTF applied to FEXT sources, and CTF to FEXT sources.

Add a DJ noise term to FOM, calculated as (A_S*A_DD)^2.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It should be understood that the suggested remedy implies the single-bit response for each crosstalk aggressor is recomputed for each c(-1), c(1), and gDC value so that Equation 93A-37 may then be applied to get the power of that aggressor.

Adopt recommendation in ran_3bj_01a_0513 slide 10.

Cl **92** *SC* **92.7.12** *P* **170** *L* **29** # 75

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A** *training frame*

The values of "Initial output" column do not match the seed data. They do match if the seed is interpreted as "S0 to S10" instead of "S10 to S0". That is, the leftmost bit should correspond to S0, matching the order in figure 92-3.

SuggestedRemedy

Change heading of the third column from "Seed, S10 to S0" to "Seed bits (MSB in S0)". Alternatively, flip all seeds left to right.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment #161 makes the seeds programmable. Clarify that these seeds are default values.

Change heading of the third column from "Seed, S10 to S0" to "Default seed bits, S0 is leftmost bit".

Change: P170 L22 "represented by S10 through S0, shall be set to the value given in Table 92–5" to refer the values in the MDIO registers.

Change: "The PRBS generator for each lane shall implement the generator polynomial given in Table 92-5 and the state of the generator, represented by S10 through S0…" to refer to the values in the MDIO registers.

Editorial license to make the changes above.

Cl **94** *SC* **94.3.10.8** *P* **266** *L* **27** # 76

Ran, Adee Intel

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

The values of "Initial 16 bits" column do not match the seed data. They do match if the seeds are interpreted as "MSB in S0" instead of "MSB in S12". That is, the leftmost bit should correspond to S0, matching the order in figure 94-6.

SuggestedRemedy

Change heading of the second column from "Seed bits (MSB in S12)" to "Seed bits (MSB in S0)".
Alternatively, flip all seeds left to right.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make heading of second column read:
Seed bits
(leftmost bit in S0, rightmost in S12)

Cl **92A** *SC* **92A.5** *P* **313** *L* **19** # 77

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A** *frequency range*

f should be in GHz, otherwise Equation 92A-4 yields unreasonable values.

Also applies to line 32 (equation 92A-5).

SuggestedRemedy

Change "in MHz" to "in GHz", in both places.

Response *Response Status* **C**

ACCEPT.
See comment#41

Cl **94** *SC* **94.3.13.3** *P* **280** *L* **9** # 78

Ran, Adee Intel

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

If the channel is required to have COM of at least 3 dB, then a receiver which passes with any 3 dB COM channel, and any compliant transmitter (including worst case), should be compliant (with at least zero margin).

Requiring worse channel conditions (COM=1.5 dB, below the 3 dB requirement) over-stresses the receiver. This over-stress was not justified anywhere. Providing margin is the responsibility of each RX vendor; different vendors may aim to different margins, and may validate their margin in various ways. But the normative test should not require more than the worst case conditions; this "margin on the table" has a cost on each and every deployed system.

In addition, table 94-17 defines a "Max" value for COM which is equal to the "Min" value, implying zero tolerance. Calibrating this value of COM exactly is impossible in practice, so this test cannot be conducted as written (see also clause 1.2.6).

In addition, it is unclear whether the table defines a minimum stress required to make the test valid (as done in Annex 69A) or requires that a DUT must pass any test performed with these parameters (as often suggested).

The suggested remedy aims at making the test practical and following the spirit of Annex 69A, which defines minimum stress values.

SuggestedRemedy

1. Change the Max COM values in both tests to 3 dB (defining the minimum stress).
2. Remove the Min COM requirement.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

The 1.5 dB COM target ensures that the tested receiver works with any channel with 3 dB or better COM.

The specification has a 1.5 dB guardband relative to the channel target COM value. The channel COM target is currently 3 dB giving an interference tolerance target of 1.5 dB.

Leave the the 1.5 dB COM value in the Max column but remove the COM value from the Min column.

Cl **94** *SC* **94.3.13.3** *P* **280** *L* **10** # 79

Ran, Adee Intel

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

Insertion loss is defined with equal "Min" and "Max" values, implying zero tolerance. Creating a test fixture which has this insertion loss exactly is impossible in practice, so this test cannot be conducted as written (see also clause 1.2.6).

In addition, it is unclear whether the table defines a minimum stress required to make the test valid (as done in Annex 69A) or requires that a DUT must pass any test performed with these parameters (as often suggested).

The suggested remedy aims at making the test practical and following the spirit of Annex 69A, which defines minimum stress values.

The minimum stress for a short channel (test 1) defined by a maximum IL, and for a long channel (test 2), it is a minimum IL.

SuggestedRemedy

For test 1, change the insertion loss MAXIMUM value to 15.4 dB, and remove the minimum.
For test 2, change the insertion loss minimum value to 33 dB, and remove the MAXIMUM.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Commenter has not provided justification for changing the test 1 maximum value to 15.4 db, so keep at 14.4 dB.

The remedy should be just remove one of minimum/maximum for each test, and leave the other intact.

In Table 94-17...
For test 1, remove the minimum insertion loss value.
For test 2, remove the maximum insertion loss value.

Cl **93A** *SC* **93A.1.6** *P* **321** *L* **1** # 80

Ran, Adee Intel

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

Equation 93A-24 enables limiting the ISI cancellation capability using the parameter b_max. The intent was to protect against error propagation in a DFE implementation, especially in 100GBASE-KP4.

Currently the same b_max is used to limit all values of h(0)(n). However, 100GBASE-KP4 includes 1/(1+D) precoding that mitigates error propagation due to the first postcursor. In fact, some solutions presented to the task force rely on having the postcursor as large as the cursor.

Removing the first postcursor constraint enables better performance, and makes several submitted channels achieve the required COM, including channels with 33 dB loss at 7 GHz, which is one of our objectives. Error propagation analysis provided by Dariush Dabiri shows that error propagation effect does not increase if this constraint is removed.

It is proposed that b_max limitation for the 1st postcursor be relaxed or removed.

A presentation will be supplied to illustrate the effect of this change.

SuggestedRemedy

Change equation 93A-24 in either of the following (equivalent) ways:

(option 1)
Split the second case into two cases, n=1 and 2<=n<=N_b
For n=1, use 1 instead of b_max
For 2<=n<=N_b, use the existing equation.

(option 2)
Change the first case to be 0<=n<=1, and the second case to be 2<=n<=N_b.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

In Clause 93 clarify that bmax = 1 for 1<=n<=N_b.

Modify 94 to set bmax = 1 for n=1 and 0.2 for 2<=n<=N_b.

Change bmax in 93A to a vector.

Cl **93** *SC* **93.9.1** *P* **231** *L* **44** # 81

Ran, Adee Intel

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

A_DD should represent half of the peak-to-peak DJ (excluding DDJ) allowed from a transmitter - specified in table 93-4 as 0.15 UI.

The value in table 93-9, 0.07, doesn't match.

SuggestedRemedy

Change A_DD from 0.07 to 0.075.

Response *Response Status* **C**

REJECT.

The effective DJ (excluding DDJ) is allowed to be 0.15 and the effective RJ is allowed to be 0.15 UI. However, TJ (excluding DDJ) is limited to 0.28 UI.

The strategy for setting the ADD and sigma_RJ values for COM was to split the 0.28 UI evenly. So it was ADD = (TJ/2)/2 = 0.07 and sigmaRJ = (TJ/2)/(2*Q0) which for 1E-12 is ~0.01.

Increasing ADD to 0.075 UI implies the modeled transmitter would not satisfy the TJ requirements.

Cl **94** *SC* **94.4.1** *P* **286** *L* **46** # 82

Ran, Adee Intel

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

A_DD should represent half of the peak-to-peak CDJ allowed from a transmitter - specified in table 94-14 as 0.05 UI.

The value in table 93-9 is also 0.05 (though it is peak, not PTP).

In a few cases that were checked, the effect of this increased CDJ level is~0.2 dB degradation in COM.

SuggestedRemedy

Change A_DD to 0.025.

Response *Response Status* **C**

ACCEPT.

Cl **92** *SC* **92.8.4.3** *P* **180** *L* **34** # 83

Ran, Adee Intel

Comment Type **TR** *Comment Status* **A** *host rx interference tolerance*

The applied SJ frequency in this test, 15 MHz, may be well within the tracking bandwidth of a CDR. It is too low.

Compare to the corresponding KR4 test (table 93-7) which requires frequency "greater than 100 MHz". This value matches the guideline of Annex 69A which requires "sinusoidal jitter at a frequency no less than 1/250 of signaling speed".

SuggestedRemedy

In comment (a) of table 92-9, change 15 MHz to 100 MHz.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change CL92 jitter frequency to be consistent with CL93 i.e., greater than 100 MHz.

See Table 93-7-Receiver interference tolerance parameters [note (b] the frequency of the sinusoid must be greater than 100 MHz.

Cl **91** *SC* **91.5.4.2.1** *P* **148** *L* **28** # 84

Szczepanek, Andre Inphi

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

"reset
Boolean variablethat controls resetting of the FEC ... during power on, and when MDIO has put the PCS into low-power mode."

The RS-FEC sublayer may not be in the same device as the PCS.
Replace "PCS" with "PHY".

SuggestedRemedy

"reset
Boolean variablethat controls resetting of the FEC ... during power on, and when MDIO has put the PHY into low-power mode."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 5.4.2.1 to 91.5.4.2.1.>

MDIO provides independent low-power mode controls for each MMD (but not necessarily the entire PHY). Registers for the RS-FEC sublayer are located in MMD 1 (PMA/PMD) and there is no independent low-power mode control for the RS-FEC sublayer.

Change the definition of reset as follows.

"reset
Boolean variable that controls the resetting of the RS-FEC. It is true whenever a reset is necessary including when reset is initiated from the MDIO, during power on, and when the MDIO has put the RS-FEC into low-power mode."

Cl **91** *SC* **91.6** *P* **156** *L* **27** # 85

Szczepanek, Andre Inphi

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

The FEC sublayer adds two sets of PCSL related MDIO registers to the clause 45 PMA/PMD register set : "FEC_lane_mapping<x>" and "BIP_error_counter_i". Both only have relevance to a seperated FEC layer. They are redundant if FEC encoding is implemented as part of a MAC/PCS device.

These registers have been added to support implementations of seperated FEC sublayer devices. But where are the "Block x lock", "Lane x aligned" & "Lane alignment status" registers also needed by such implementations ?

The Clause 82 PCS layer has all these registers (and lane mapping and BIP error counters) defined for PCSL receive in Clause 45.2.3. The FEC sub-layer (where implemented) needs equivalent capability.

SuggestedRemedy

Add "Block x lock", "Lane x aligned" & "Lane alignment status" registers to Clause 91.6 and Clause 45.2.1

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 6 to 91.6.>

Add two rows and coordinate with Clause 45 editor for register names, numbers, and bit indices.

Block x lock | <Register name> | <Number> | block_lock<x>
Lane x aligned | <Register name> | <Number> | am_lock<x>

Cl **91** *SC* **91.5.4.2.1** *P* **148** *L* **20** # 86

Szczepanek, Andre Inphi

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

fec_lpi_fw is included as part of the non-EEE variables.
Shouldn't it be listed instead with the other "optional EEE capability" variables listed at the bottom of page 148 ?

SuggestedRemedy

Move fec_lpi_fw into list of optional EEE capability variables.

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 5.4.2.1 to 91.5.4.2.1.>

Cl **91** *SC* **91.6** *P* **154** *L* **52** # 87

Szczepanek, Andre Inphi

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

The optional RS-FEC MDIO capability does not comprehend the difference between integrated and seperated FEC sub-layers. It requires the same set of MDIO registers (via a "shall" statement) for both use cases.
In particular the implementation of BIP error counters and PCS lane mapping registers is totally redundant if the PCS and FEC layers are integrated together. As currently worded these registers must be implemented whenever an MDIO is implemented.

SuggestedRemedy

change
"The optional MDIO capability described in Clause45 defines several variables that provide control and status information for and about the RS-FEC. If MDIO is implemented, it shall map MDIO control variables to RS-FEC control variables as shown in Table 91-2, and MDIO status variables to RS-FEC status variables as
shown in Table 91-3."
to
"The optional MDIO capability described in Clause45 defines several variables that provide control and status information for and about the RS-FEC. If MDIO is implemented, it shall map MDIO control variables to RS-FEC control variables as shown in Table 91-2, MDIO status variables to RS-FEC status variables as
shown in Table 91-3, and if the FEC Service interface is connected to a PMA layer it should also map MDIO status variables to RS-FEC status variables as
shown in Table 91-3a."

Remove BIP error and PCS lane mapping rows from Table 91-3, and put them in a new table "Table 91-3a". This table should also hold block and AM lock registers - see my previous comment.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 6 to 91.6.>

Replace the first paragraph of 91.6 with the following:
"The optional MDIO capability described in Clause 45 defines several registers that provide control and status information for and about the RS-FEC. If MDIO is implemented, it shall map MDIO control variables to RS-FEC control variables as shown in Table 91-2, MDIO status variables to RS-FEC status variables as
shown in Table 91-3, and if a separated PMA (see 45.2.1) is connected to the FEC service interface it shall map additional MDIO status variables to additional RS-FEC status variables as shown in Table 91-x."

Move the following variables from Table 91-3 to Table 91-x:
1. BIP errors, PCS lanes 0 to 19
2. PCS lane x mapping
3. PCS lane alignment status, added per comment #4
4. Block x lock, added per comment #85
5. Lane x aligned, added per comment #85

In the course of the resolution of this comment, it was noted that Figure 83C-2b (page 305, line 54) contains an error. The MMD instances should be ordered, from bottom to top, as 1, 8, 9, and 10.

Cl **91** *SC* **91.5.3.6** *P* **145** *L* **21** # 88

Szczepanek, Andre Inphi

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

There is no explicit link between the Block Distribution process of codewords (in 91.5.3.6), and Alignment Marker (re)insertion.
Block Distribution is Round-Robin, whereas Marker insertion is in parallel every 4096 RS-codewords.
Note the only constraint on AM insertion in the current text is on the repetition rate, there is no constraint on where they are inserted in the codeword stream.
So specifying this way does NOT require that AMs are re-inserted at their original locations.
However for end-to-end opertaion of AM BIPs they must be re-inserted at their original location.

SuggestedRemedy

Instead of defining the repetion rate of AM insertion, define AM insertion relative to the FEC block boundary from which the FEC-AMs were removed. This ensures that they are re-inserted at the their original location.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 5.3.6 to 91.5.3.6.>

The insertion point for am_txmapped is also ambiguous. It is stated that am_txmapped is inserted as the first 1285 message bits transmitted from every 4096th codeword but its relationship to the following 257-bit blocks is unclear.

Implement the following changes to ensure the aligment markers are restored to the correct position for BIP check.

In 91.5.2.6, specify the first 257-bit block inserted after am_txmapped corresponds to the four 66-bit blocks received on PCS lanes 0, 1, 2, and 3 that immediately follow the alignment marker on each respective lane.

In 91.5.3.7, specify that am_0 to am_3 are inserted so that they are immediately followed by the rx_coded_0 to rx_coded_3, respectively, derived from the first 257-bit block following am_rxmapped. Similarly am_4 to am_7 are followed by the 66-bit blocks corresponding to the second 257-bit block following am_rxmapped, and so on.

Cl **93A** *SC* **93A.1.2.2** *P* **317** *L* **51** # 89

Moore, Charles Avago Technologies

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

Capacitor on opposite end of package trace from device should not be called "package-side capacitance" since there is no package side of the package.

SuggestedRemedy

Call capacitor on other end of package trace from device "board side Capacitor" and use C_b, and S^(b) to represent the value in equations.

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 93A1.2.2 to 93A.1.2.2.>

Cl **93** *SC* **93.8.2.3** *P* **228** *L* **25** # 90

Moore, Charles Avago Technologies

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

100GBASE_KR4 receiver test is tied to Tx specs through jitter and rise time but there is a gap between interference tolerance spec and COM used to specify channel. Use COM to calibrate interference tolerance as is done for 100GBASE_KP4. This will "close" the spec.

SuggestedRemedy

A presentation will be provided detailing how this should be done.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Adopt the proposed changes in moore_3bj_02_0513 slides 5 to 10.

Editorial license granted to implement the changes.

Ensure that relevant changes due to CL94 comments are incorporated in the new annex.

Cl **93A** *SC* **93A.1.2.2** *P* **317** *L* **41** # 91

Moore, Charles — Avago Technologies

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

In the interests of worst casing crosstalk, the NEXT transmitter should have a faster transition time than the victim transmitter. Since we assume that Tx transition time is due to the package, we should model the NEXT transmitter with a faster package than the victim channel.

SuggestedRemedy

Add to the end of clause 93A.1.2.2: "Values for C_d and C_p are specified for each PMD type. These values are used for the receiver package and the transmitter package for the victim and far end crosstalk channels. The transmitter package for any near end crosstalk channel should 0.5 times the specified value.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 93A1.2.2 to 93A.1.2.2.>

For the NEXT aggressors scale the values of C_d and C_p by a factor of 0.5.

Cl **93A** *SC* **93A.1.2.3** *P* **318** *L* **14** # 92

Moore, Charles — Avago Technologies

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

The values of rho_0 and gamma_0 given in Table 93A-2 have imaginary parts which are not integer multiples of pi. This means that according to equations 93A-9 and 93A-10, S_11 and S_21 will have non-zero imaginary parts at DC, which is non-physical

SuggestedRemedy

Choose a set of rho and gamma values for Table 93A-2 which give rho_0 and gamma_0 values which have imaginary parts which are integer multiples of pi. I suggest just zeroing the imaginary parts of rho_0 and gamma_0 currently in Table 93A-2 and making no other change, but i will accept any reasonable alternative.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 93A1.2.3 to 93A.1.2.3.>

See comment #101.

Cl **85** *SC* **85.8.3.3** *P* *L* # 93

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **R** *CR10 change*

Method given for computing coefficients c(-1), c(0), and c(1) can give different values for the coefficients for the same transmitter at the same equalization setting if different channel are interposed between the transmitter and the measurement. The coefficient value are supposed to measure the transmitter independent of the channel. I think that the problem comes because the 50% zero crossing measured in step 4 changes depending on the rise time of the signal and the amount of equalization.

SuggestedRemedy

Possible fixes could be:

1.

Take three pulses of the shape of the linear fit pulse response but beginning at times tr-1*UI, tr, and tr=1*UI. Weight them with coefficients d(-1), d(0), d(1) respectively. Sum them and adjust t0, d(-1), d(0), and d(1) to give the best LMS fit the equalized linear fit pulse response. Use the peak of the tr pulse as t0 in the sampling process in step 5.

2.

Like the first part of 1 but do not re-sample, just use c(-1)=d(-1), c(0)=d(0), and c(1)=d(1).

3. Possibly some other.

Response *Response Status* **C**

REJECT.

Changes to the existing specification for 40GBASE-CR4 and 100GBASE-CR10, not pertaining to EEE, are out of scope for this project.

Cl **93** *SC* **93.8.2.3** *P* **228** *L* **40** # 94

Moore, Charles — Avago Technologies

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

Values for a0, a1, a2, a4 are scaled for Hz, Napier, and gain rather than GHz, dB, and loss as used in annex 93A.3. Change scaling and sign of inequalities.

SuggestedRemedy

use values:

	Test 1	Test2	Test3	Test 4	Units
a0	0.9	0.9	0.9	0.0	dB
a1	3.3	3.3	3.3	3.3	dB Hz^-1/2
a2	--	--	--	--	dB Hz^-1
a4	0.022	0.030	0.030	0.043	db Hz^-2

change all "minimum" applying to a0, a1, a2, and a4 to maximum, "min" to "max", and "maximum" to "minimum" in table 93-7 and associated note "a"

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **116** *L* **24** # 95

Barrass, Hugh — Cisco

Comment Type **T** *Comment Status* **A** *LPI state*

Assuming that the changes to the recieve LPI state diagram described in barrass_3bj_02_0513 (or equivalent) are made, some of the function of the transmit LPI state diagram are redundant.

SuggestedRemedy

Make the changes to the receive LPI state diagram as shown in submission barrass_3bj_03_0513.

Response *Response Status* **C**

ACCEPT.

Cl **82** *SC* **82.2.18.3.1** *P* **117** *L* **23** # 96

Barrass, Hugh — Cisco

Comment Type **TR** *Comment Status* **A** *LPI state*

The receive LPI state diagram uses variable "received_tx_mode" when LPI_FW is TRUE, however there are no RAMs transmitted in that case, so the variable is unknown.

SuggestedRemedy

Various options were discussed to resolve this issue. Some of these are captured in the submission barrass_3bj_01_0513.pdf

The changes described as option #2 were considered preferable.

Make the changes to the receive LPI state diagram as shown in submission barrass_3bj_02_0513.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make the changes as proposed, but change IDLE to C - see #70.

Cl **93A** *SC* **93A.1.2.3** *P* **318** *L* **13** # 97

Ben-Artsi, Liav — Marvell

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

The parameter Zp (package trace length) is missing

SuggestedRemedy

Add the parameter Zp to table 93A-2 with a value of 12 (no units, as this is a multiplication of 1mm section)

Response *Response Status* **C**

REJECT.

<Editor changed subclause from "Table 93A-2" to 93A.1.2.3.>

The parameter zp is defined in Table 93A-1.

The value of zp is defined in the clause that invokes the COM method.

Cl **93** *SC* **93.9.1** *P* **230** *L* **15** # 98

Ben-Artsi, Liav Marvell

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

The required channel operating margin is currently 3dB and should be increased to properly account for Rx imperfections and implementation limitations as well as transmitter equalizer coefficients

SuggestedRemedy

Will be supplied by the presentation submission due date

Response *Response Status* **C**

REJECT.

See comment #103.

Cl **93** *SC* **93.11.4.4** *P* **240** *L* **34** # 99

Ben-Artsi, Liav Marvell

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

The required channel operating margin is currently 3dB and should be increased to properly account for Rx imperfections and implementation limitations as well as transmitter equalizer coefficients.

SuggestedRemedy

Will be supplied by the presentation submission due date

Response *Response Status* **C**

REJECT.

See comment #103.

Cl **92A** *SC* **92A.7** *P* **314** *L* **44** # 100

Ben-Artsi, Liav Marvell

Comment Type **TR** *Comment Status* **R** *channel COM*

The required channel operating margin is currently 3dB and should be increased to properly account for Rx imperfections and implementation limitations as well as transmitter equalizer coefficients

SuggestedRemedy

Will be supplied by the presentation submission due date

Response *Response Status* **C**

REJECT.

There have been a number of changes in the COM methodology in response to other comments. Given these changes it is not clear whether the proposed target is required.

Cl **93A** *SC* **93A.1.2.3** *P* **318** *L* **1422** # 101

Ben-Artsi, Liav Marvell

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

Rho0 and Gamma0 has imaginary parts which is not physical

SuggestedRemedy

Will be supplied by the presentation submission due date

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from "Table 93A-2" to 93A.1.2.3.>

Implement changes proposed in benartsi_3bj_01a_0513 slides 10 and 11.

Cl **92** *SC* **92.7.12** *P* **170** *L* **11** # 102

Ran, Adee Intel

Comment Type **T** *Comment Status* **A** *training process*

The control function defined in 72.6.10 does not require a received coefficient update request to be handled in any limited time. An implementation can sample the incoming requests at any slow rate and be compliant.

The result of a slow response is to consume time allocated for the update procedure and possibly limit the number of requests that a receiver can make within the link_fail_inhibit_timer period (500 ms).

It is suggested that, when frame_lock is TRUE, the delay between reception of a request frame to execution of the request and returning updated status be limited to a maximum of 2 ms. That would likely allow at least 100 request-response cycles to be passed between the link partners, even if reaching frame lock state requires as long as 100 ms.

Current implementations of 10GBASE-KR known to me are capable or replying within a maximum of 1 ms.

Comment also applies to clause 93.7.12 (a refererence to clause 92 is probably sufficient) and to clause 94 (94.3.10.12).

SuggestedRemedy

Add the following text in clause 92.7.12 (with editorial license):

"When frame_lock is true for a lane, the following requirements apply for that lane: The period from presenting at the receiver input a training frame which has a new request (coefficient update field different from the one in the previous training frame), to responding to that request by an appropriate change of the status report field in the transmitted training frame, and if needed, applying changes to the transmit output waveform, shall be less than two milliesconds."

Apply similarly to the corresponding text in clauses 93 and 94.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Editorial license and additional text to address unambiguos reference, e.g., time center transition of the frame marker. (easily visible on scope)

Cl **93** *SC* **93.9.1** *P* **230** *L* **15** # 103

Ran, Adee Intel

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

The minimum COM value of 3 dB accounts for receiver implementation penalty. Several components that consume this margin are discussed in an accompanying presentation.

The proposed updates to COM procedure yield a result of over 4 dB for a channel with 35 dB loss, which is the objective of the 100GBASE-KR4 PHY. It is proposed that this channel be regarded as the limit, and that a 4 dB margin be reserved for receiver implementation; this can enable more design freedom that can result in power saving.

SuggestedRemedy

Change the minimal COM required for 100GBASE-KR4 channels from 3 dB to 4 dB.

Response *Response Status* **C**

REJECT.

There have been a number of changes in the COM methodology in response to other comments. Given these changes it is not clear whether the proposed target is required.

Cl **94** *SC* **94.4.1** *P* **285** *L* **47** # 104

Ran, Adee Intel

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

The minimum COM value of 3 dB accounts for receiver implementation penalty. Several components that consume this margin are discussed in an accompanying presentation.

PAM-4 receivers are likely more complex than NRZ receivers, and may need higher margins. For example, analog front end linearity and detector sensitivity are more critical for PAM-4 receiver than for NRZ. It is therefore reasonable to allocate a higher margin for these receivers.

The proposed updates to COM procedure yield a result of over 5 dB for a channel with 33 dB loss, which is the objective of the 100GBASE-KP4 PHY. It is proposed that this channel be regarded as the limit, and that a 5 dB margin be reserved for receiver implementation; this can enable more design freedom that can result in power saving.

SuggestedRemedy

Change the minimal COM required for 100GBASE-KP4 channels from 3 dB to 5 dB.

Response *Response Status* **C**

REJECT.

Based on the large number of changes to the COM methodology as a result of other comments, more analysis is required to determine what the appropriate value should be.

Cl **82** *SC* **82.2.18.2.2** *P* **103** *L* **42** # 105

Keeley, James LSI Corperation

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

The variable down_count_done is not defined

SuggestedRemedy

Add definition for down_count_down to 82.2.18.2.2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add:

down_count_done
Boolean variable that indicates that the down_count counter has reached zero.

<Editor changed subclause from 2.18.2.2 to 82.2.18.2.2.>

Cl **91** *SC* **91.5.3.3** *P* **143** *L* **35** # 106

Keeley, James LSI Corperation

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

It is ambiguous on when the counting of the 8192 codeword sampling window for the measurement of total symbol errors is started. The current wording allows for different sampling windows that though correct make it difficult to verify an implmentation complies with 91.5.3.3

SuggestedRemedy

Start the the sampling window when the first codeword with a symbol error count > zero is detected. The symbol error count is cleared to zero when either the number of received codewords reaches 8192 or the number of symbol erros exceeds K

Change: If the number of symbol errors in a block of 8192 codewords exceeds
K
To: When the number of symbol errors withing a codeword sampling window exceeds K

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 5.3.3 to 91.5.3.3.>

The symbol error monitor operates in much the same way as the BER monitor in Clauses 49 and 82. In all cases, the measurement window is not started with the first detected error but instead represents consecutive intervals.

Also, it is unclear that "K-1 errors in 8192 codewords given the first error" is equivalent to "K errors in 8192 codewords". If it is not, the thresholds K would need to be recalibrated.

Regarding part 1 of the suggested remedy, make no changes to the draft.

Regarding the change of "if" to "when", see #119.

Cl **74** *SC* **74.7.4.8** *P* **556** *L* # 107

Keeley, James LSI Corperation

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

With the addtion of Rapid Alignment Markers in Clause 82 it was decided that the FEC in Clause 74 would still use the deterministic FEC blocks for Rapid FEC lock.

The wording in 74.7.4.8 suggest that there are only 2 types of determinstic FEC blocks which is true for a Clause 49 Type PCS, but is not the case for a Clause 82 type PCS to a Clause 74 FEC. When EEE is enabled for a clause 82 PCS and CL74 FEC is enabled the Rapid Alignamnet Markers would replace every 1 of 16 64-bit CL74 FEC words words as shown in Annex 74A for 40G and 1 of 8 64-bit CL74 FEC words as shwon in Annex 74A technically making the clause 74 FEC not 100% determinsitic.

SuggestedRemedy

Replace: PCS sublayer will be encoding /I/ during the wake
state and /LI/ during the refresh state, which produces the two types of deterministic FEC blocks.

With: A PCS sublayer of clause 49 will be encoding /I/ during the wake
state and /LI/ during the refresh state, which produces the two types of deterministic FEC blocks.

Add: A PCS sublayer of clause 82 will also be encoding /I/ during the wake
state and /LI/ during the refresh state, but in addtion inserting Rapid Alignment Markers into each of the PCS Lanes according to 82.2.8a. This causes the two types of determinitic FEC blocks to have a number of 65-bit words within the deterministic FEC block to be replaced with Rapid Alignment Markers thus not matching the two deterministic patterns as shown in Tables 74A-5 and 74A-6. The locations of the Rapid Alignment Marker though consistant for each Rapid FEC block for each entry into the wake or refresh states can be different for each entry. This modifcation to the two determininsitc patterns needs to be taken into account by the Rapid FEC Lock implmentation.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 7.4.8 to 74.7.4.8.>

Bring Clause 74 (back) into the draft.

Correcting a few typos in the suggested remedy:

Replace: PCS sublayer will be encoding /I/ during the wake state and /LI/ during the refresh state, which produces the two types of deterministic FEC blocks.

With: A Clause 49 PCS sublayer encodes /I/ during the wake state and /LI/ during the refresh state, which produces the two types of deterministic FEC blocks.

Add: A Clause 82 PCS sublayer also encodes /I/ during the wake
state and /LI/ during the refresh state, but in addition inserts Rapid Alignment Markers into each of the PCS Lanes (see 82.2.8a). This causes the two types of deterministic FEC blocks to have a number of 65-bit words within the deterministic FEC block replaced with Rapid Alignment Markers thus not matching the two deterministic patterns as shown in Tables 74A-5 and 74A-6. The locations of the Rapid Alignment Markers, though consistant for each Rapid FEC block for each entry into the wake or refresh states, can be different for a different entry. This modification to the two deterministic patterns needs to be taken into account by the Rapid FEC Lock implementation.

Cl **80** *SC* **80.1.3** *P* **77** *L* **13** # 108

Mitsuru, Iwaoka Yokogawa Electric Cor

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

In Figure 80-1, 100GBASE-P is missing.

SuggestedRemedy

Add 100GBASE-P to Figure 80-1.

Response *Response Status* **C**

ACCEPT.

See also #113

Cl **80** *SC* **80.3.2** *P* **81** *L* **17** # 109

Mitsuru, Iwaoka Yokogawa Electric Cor

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

p.81 line 17 says "Examples of inter-sublayer service interfaces for 40GBASE-R and 100GBASE-R with their corresponding instance names are illustrated in Figure 80-2, Figure 80-3, Figure 80-3a and Figure 80-3b". Though, in Figure 80.3a and Figure 80.3b, a 100GBASE-P is noted under the "MEDIUM" box.

SuggestedRemedy

Modify the sentence to "Examples of inter-sublayer service interfaces for 40GBASE-R, 100GBASE-R and 100GBASE-P with their corresponding instance names are illustrated in Figure 80-2, Figure 80-3, Figure 80-3a and Figure 80-3b" and add "100GBASE-P" to the title of Figure 80-3a.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.3.9.7** *P* **44** *L* **19** # 110

Trowbridge, Steve
Alcatel-Lucent

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

The sense of the variable seems reversed: every PHY >=40 Gb/s that supports EEE supports Fast Wake. Not every PHY >=40 Gb/s that supports EEE supports deep sleep.

SuggestedRemedy

Consider renaming the variable from LPI_FW to LPI_DS. Additional changes in clause 82 if this change is accepted.

Response *Response Status* **C**

REJECT.

The text is clear and unambiguous as it is.

Cl **79** *SC* **79.3.5** *P* **72** *L* **17** # 111

Trowbridge, Steve
Alcatel-Lucent

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

Clarify that TLV subtype=5 is not sent for >=40 Gb/s PHYs that do not support "deep sleep" operation.

SuggestedRemedy

Add: This message is exchanged between EEE-capable PHYs operating at rates <=10 Gb/s, or between EEE-capable PHYs operating at rates >=40 Gb/s where both the PHY and its link partner are capable of Deep Sleep operation as determined by the PHY type and the results of auto-negotiation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

TLV subtype 5 is used to negotiate the system wake times so that the system can use a longer wake time in order to increase energy savings. The use of this negotiation is orthogonal to the use of fast wake or deep sleep. However, there is utility in allowing PHYs to use LLDP to negotiate fast wake operation (and similarly rule out the use of LLDP to negotiate deep sleep operation in contrast to the autonegotiation function).

Clause 78.3:

Change: “The EEE capability shall be advertised during the Auto-Negotiation stage.”

To: “PHYs capable of deep sleep operation shall advertise that capability during the Auto-Negotiation stage.”

Add to the end of the same paragraph: “Fast wake capability may also be advertised using L2 protocol frames.”

Insert as a penultimate sentence in the second: “EEE deep sleep operation shall not be enabled unless both the local device and link partner advertise deep sleep capability during Auto-Negotiation for the resolved PHY type.”

Clause 78.4:

Append to the second paragraph:

“The use of the EEE fast wake TLV shall be interpreted as an indication that the device supports EEE fast wake operation, regardless of the capability advertised during the Auto-Negotiation stage. A device shall not indicate deep sleep capability using the EEE fast wake TLV unless both the local device and link partner advertise deep sleep capability during Auto-Negotiation for the resolved PHY type.”

Append to the third paragraph:

"Devices with an operating speed equal to or greater than 40 Gb/s shall support EEE fast wake TLV as defined in 79.3.6."

Cl **79** *SC* **79.3.6** *P* **72** *L* **22** # 112

Trowbridge, Steve — Alcatel-Lucent

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

Clarify that Transmit FW and Receive FW must be true unless both the PHY and its link partner (as determined by auto-negotiation) support "deep sleep" operation.

SuggestedRemedy

Add: Transmit FW and Receive FW are set to TRUE unless the PHY and its link partner are capable of Deep Sleep operation as determined by the PHY type and the results of auto negotiation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make the change in the subclauses:

79.3.6.1 Add "Transmit FW is set to TRUE unless the PHY is capable of deep sleep operation as determined by the PHY type and the results of auto-negotiation."

79.3.6.2 Add "Receive FW is set to TRUE unless the PHY is capable of deep sleep operation as determined by the PHY type and the results of auto-negotiation."

Change title of 79.3.6.2 to "Receive FW".

Cl **80** *SC* **80.1.3** *P* **77** *L* **23** # 113

Slavick, Jeff — Avago Technologies

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

100GBASE-P is not listed as one of the stack ups.

SuggestedRemedy

Add 100GBASE-P to the figures as a valid PHY type with a CGMII interface.
Also change 82-1

Response *Response Status* **C**

ACCEPT.

Change "100GBASE-R" to "100GBASE-R or 100GBASE-P" in 80-1 and 82-1

<Editor changed subclause from 80-4 to 80.1.3.>

Cl **82** *SC* **82.1.1** *P* **98** *L* **1** # 114

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **R** *PCS scope*

100GBASE-P is a Physical Layer that uses the clause 82 PCS.

SuggestedRemedy

Added 100GBASE-P Physical layer to the list of Physical Layers in 82.1.1

Response *Response Status* **C**

REJECT.

The scope paragraph describes this PCS only, it does not reference PHY types that use the PCS (other than pointing to Clause 80).

<Editor changed subclause from 1.1 to 82.1.1.>

Cl **82** *SC* **82.2.12** *P* **103** *L* **23** # 115

Slavick, Jeff — Avago Technologies

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

We have only 100GBASE-R PCS, but have 100GBASE-R and 100GBASE-P Physical Layers. Table 82-5 Column header is PCS, so remove -P/

SuggestedRemedy

Remove the -P/ from the PCS type entry

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 82-5 to 82.2.12.>

Cl **83** *SC* **83.5.3.1** *P* **00** *L* **0** # 116

Slavick, Jeff — Avago Technologies

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

We have added SP0 to the stack up in Figure 80-5a, but Clause 83 doesn't have a section for it in 83.5.3 (Skew and Skew Variation).

SuggestedRemedy

Change the titles of 83.5.3.1 and 83.5.3.2 to include SP0 and SP7
Add a references to Figure 80-5a to the text of both sections
Update the text add in SP0 and SP7 and account for SP7 being the opposite direction of data flow from SP1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changes subclause from 5.3.1 to 83.5.3.1.>

Bring 83.5.3 into the draft.

Change the last sentence to:

The limits for Skew and Skew Variation at physically instantiated interfaces
are specified at Skew points SP0, SP1 and SP2 in the transmit direction and SP5, SP6 and SP7 in the receive direction as defined in 80.5 and illustrated in Figure 80-4, Figure 80-5 and Figure 80-5a.

Insert 83.5.3.a before 83.5.3.1 as follows:

83.5.3.a Skew generation toward SP0

In an implementation with one or more physically instantiated CAUI interfaces, the PMA that sends data in the transmit direction toward the CAUI that is closest to the RS-FEC (SP0 in Figure 80-5a) shall produce no more than 29 ns of Skew between PCSLs toward the CAUI, and no more than 200 ps of Skew Variation.

Insert 83.5.3.7 after 83.5.3.6 as follows:

83.5.3.7 Skew generation toward SP7

In an implementation with one or more physically instantiated CAUI interfaces and RS-FEC, at SP7 (the receive direction of the CAUI closest to the PCS), the PMA or group of PMAs between the RS-FEC and the CAUI closest to the PCS shall deliver no more than 160 ns of Skew, and no more than 3.8 ns of
Skew Variation between output lanes toward the CAUI in the Rx direction.

Cl **91** *SC* **91.5.4.2.1** *P* **148** *L* **17** # 117

Slavick, Jeff — Avago Technologies

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

In the variable section the variable is called "fec_lane" while in the rest of the Clause it's called "fec_lane_mapping".

SuggestedRemedy

Change fec_lane to fec_lane_mapping<x>

Response *Response Status* **C**

REJECT.

<Editor changed subclause from 5.4.2.1 to 91.5.4.2.1.>

The variables fec_lane and FEC_lane_mapping<x> are not the same.

The definition of fec_lane is the FEC lane number (0 to 3) that is derived from the alignment marker sequence received from lane x of the PMA service interface.

FEC_lane_mapping<x> is the set of management variables (see 91.6.7) that contains the mapping between fec_lane and lane x of the PMA service interface. The assignment of fec_lane to FEC_lane_mapping<x> occurs in the 2_GOOD state for Figure 91-8.

Cl **91** *SC* **91.5.4.2.1** *P* **148** *L* **17** # 118

Slavick, Jeff — Avago Technologies

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

fec_lane/fec_lane_mapping state should be qualified with amps_lock<x>

SuggestedRemedy

Change "for lane x"
to "for lane x when amps_lock<x> = true"

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 5.4.2.1 to 91.5.4.2.1.>

Cl **91** *SC* **91.5.3.3** *P* **143** *L* **38** # 119

Slavick, Jeff — Avago Technologies

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

Change the If to a When so that immediately upon exceeding the threshold the 60-75ms of sync header corruption begins. With the If it means you could do it immediately or wait for the 8192 codewords duration to complete and then evaluate and do the corruption period.

SuggestedRemedy

Per comment.

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 5.3.3 to 91.5.3.3.>

Cl **30** *SC* **30.3.2.1.2** *P* **23** *L* **46** # 120

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **R** *PHY types*

Removing the 64B/66B from the 100GBASE-* definintions removes information about the encoding of the PCS lanes that is present for all others in the list.

SuggestedRemedy

Have the text read:
100GBASE-R Clause 82 100 Gb/s multi-PCS lane 64B/66B using 2-level PAM
100GBASE-P Clause 82 100 Gb/s multi-PCS lane 64B/66B using > 2-level PAM

Make same change in 30.3.2.1.3

Response *Response Status* **C**

REJECT.

The 64B/66B was removed from the definition for two reasons: firstly the 64B/66B is transcoded for PHYs that use RS-FEC, so it is not externally visible; secondly it is only one defining feature of the BASE-R PCS - the PCS lane structure, alignment markers, etc. are also considered defining features.

<Editor changed subclause from 3.2.1.2 to 30.3.2.1.2.>

Cl **30** *SC* **30.5.1.1.11** *P* **00** *L* **0** # 121

Slavick, Jeff — Avago Technologies

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

aBIPErrorCount states "For 40/100GBASE-R PHYs, an array of BIP error counters." We have added the definintion for 100GBASE-P PHYs as well.

SuggestedRemedy

Add 100GBASE-P as a valid PHY type for providing this field.
Make the same change to 30.5.1.1.2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Make the change for 30.5.1.1.11 and 30.5.1.1.12 (not 30.5.1.1.2)

<Editor changed subclause from 5.1.1.11 to 30.5.1.1.11.>

Cl **30** *SC* **30.5.1.1.12** *P* **00** *L* **0** # 122

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A** *FEC management*

aLaneMapping needs to include the clause 91 MDIO registers

SuggestedRemedy

Added the list of Lane mapping registers to include 45.2.1.92j and change "MDIO Interface to the PCS" to "MDIO Interface to the PHY"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The lane mapping in the RS-FEC is independent of the ones in the PCS. Therefore a new object (& subclause) is needed:

30.5.1.1.27 aRSFECLaneMapping

Copy content from 30.5.1.1.12 with appropriate changes.

Add object to Table 30-1e

<Editor changed subclause from 5.1.1.12 to 30.5.1.1.12.>

Cl **30** *SC* **30.5.1.1.16** *P* **25** *L* **13** # 123

Slavick, Jeff — Avago Technologies

Comment Type **T** *Comment Status* **A** *FEC management*

We do have the ability to disable the RS-FEC correction capability by setting 1.200.0 to a 1. It's status should read through aFECmode.

SuggestedRemedy

Change: "When Clause 73 Auto-Negotiation is enabled for a PHY supporting Clause 74 FEC a SET operation is not allowed and a GET operation maps to the variable FEC_enabled in Clause 74."
to:
"When Clause 73 Auto-Negotiation is enabled for a PHY supporting Clause 74 FEC or Clause 91 RS-FEC a SET operation is not allowed and a GET operation maps to the variable FEC_enabled in Clause 74 or the inverse of FEC_bypass_correction_enable in Clause 91."

and add 45.2.1.92a to the list of MDIO registers accessed.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The RS-FEC management is different to the Clause 74 FEC, therefore it would be simpler to add objects that reflect the RS-FEC management, rather than stretch the meaning of the existing object.

Therefore add objects (& subclauses) as needed:

30.5.1.1.28 aRSFECBypassAbility

30.5.1.1.29 aRSFECIndicationAbility

30.5.1.1.30 aRSFECBypassEnable

30.5.1.1.31 aRSFECIndicationEnable

The Ability objects will resemble the aFECability object (30.5.1.1.15)

The enable objects will resemble the aFECmode object (30.5.1.1.16), but without reference to autonegotiation.

<Editor changed subclause from 5.1.1.16 to 30.5.1.1.16.>

Cl **91** *SC* **91.5.3.3** *P* **143** *L* **40** # 124

Slavick, Jeff — Avago Technologies

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

The FEC_bypass_indication error monitoring logic will cause the link to go down.

SuggestedRemedy

Add a MDIO status register that indicates when this logic caused constant invalid sync headers to occur. This will assist in debug of why link downs occur. Should probably be a LH bit that defaults 0.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 5.3.3 to 91.5.3.3.>

Insert the following row into Table 91-3.

RS-FEC high SER | RS-FEC status register | 1.201.x | hi_ser

Add the following description of the new variable.

"91.6.y hi_ser
This variable is defined when the FEC_bypass_indication_ability variable is set to one. When FEC_bypass_indication_enable is set to one, this bit is set to one if the number of RS-FEC symbol errors in a window of 8192 codewords exceeds the threshold (see 91.5.3.3) and is set to zero otherwise."

The bit will be defined as latch-high in Clause 45.

Coordinate with Clause 45 editor to select the register/bit and make the appropriate modifications.

Cl **91** *SC* **91.5.3.3** *P* **143** *L* **41** # 125

Slavick, Jeff — Avago Technologies

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

What happens if FEC_bypass_indication_enable error monitor fires and we're hooked to a Optical module and AN isn't present, or AN is disabled. Then we'll cause a HI_BER to occur, but will the link go down?

SuggestedRemedy

Assuming that a MDIO register to flag that bypass_indication error monitor fired and caused a HI_BER situation has been added. We could add that flag to the qualfication to enable bypass_indication. Along with qualifying that using or not using error_indication is set when fec_align_status transitions to true. Then you'd have to induce restart_lock => true and reboot the RS-FEC with error_indication turned on (because the flag is set).

Response *Response Status* **C**

REJECT.

<Editor changed subclause from 5.3.3 to 91.5.3.3.>

The intent of the symbol error monitor is to inhibit the reception of frames when acceptable MTTFPA performance can no longer be guaranteed. The assertion of hi_ber is sufficient for this purpose.

As the text notes, when Auto-Negotiation is supported and enabled, assertion of hi_ber also causes Auto-Negotiation to restart which will temporarily take the link out of service. This is not an objective of the symbol error monitor but a side effect.

No changes to draft are required as a result of this comment.

Cl **91** *SC* **91.5.3.3** *P* **35143** *L* **35** # 126

Slavick, Jeff — Avago Technologies

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

The FEC_bypass_indication_enable error monitor should be disabled while rx_lpi_active = true.

SuggestedRemedy

Add "while rx_lpi_active = false" to the end of the 2nd sentence. And add "When rx_lpi_active transitions from true to false the error monitor will begin counting a new block of 8192 codewords."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 5.3.3 to 91.5.3.3.>

Functions associated with the optional EEE deep sleep capability are usually segregated from the "mainstream" requirements. In order to be consistent with this practice, add the following paragraph before the last paragraph of 91.5.3.3.

"For the optional EEE capability, the error monitor employed when FEC_bypass_indication_enable is asserted shall be disabled when rx_lpi_active=true. The next block of 8192 codewords considered by the error monitor shall begin on the codeword boundary following the transition of rx_lpi_active from true to false."

Cl **82** *SC* **82.2.8a** *P* **100** *L* **45** # 127

Slavick, Jeff — Avago Technologies

Comment Type **TR** *Comment Status* **A** *LPI state*

RAMs should be added when the Tx LPI State machine is NOT in TX_ACTIVE, or TX_FW.

SuggestedRemedy

Change "LPI transmit state other than TX_ACTIVE, LPI_FW = FALSE and down_count_done = FALSE."
to:
"LPI transmit state other than TX_ACTIVE or TX_FW."
and
Change the transition into to TX_FW to come from TX_ACTIVE when LPI_FW & TX_RAW = LI and change the transition from TX_ACTIVE to TX_SLEEP to occur when !LPI_FW & TX_RAW = LI

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Slightly better wording:

"LPI transmit state other than TX_ACTIVE or TX_FW while down_count_done = FALSE"

The state diagrams changes are included in comment #96.

Cl **91** *SC* **91.5.2.6** *P* **138** *L* **41** # 128

Slavick, Jeff Avago Technologies

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

Add the missing s to the word trancoding to make it transcoding. (after the 64B/66B to 256/257B)

SuggestedRemedy

See comment.

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 5.2.6 to 91.5.2.6.>

Cl **91** *SC* **91.5.2.8** *P* **141** *L* **8** # 129

Slavick, Jeff Avago Technologies

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

Missing reference "(refer to)"

SuggestedRemedy

Add link to 94.2.1.1.1

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 5.2.8 to 91.5.2.8.>

Cl **91** *SC* **91.5.4.3** *P* **151** *L* **43** # 130

Slavick, Jeff Avago Technologies

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

The variable name is fec_lane_mapping not FEC_lane_mapping

SuggestedRemedy

Downcase FEC in the 2_GOOD state.

Response *Response Status* **C**

REJECT.

<Editor changed subclause from 91-8 to 91.5.4.3.>

This refers to the management variable FEC_lane_mapping<x> defined in 91.6.7. The case is correct.

Cl **91** *SC* **91.5.4.3** *P* **152** *L* **15** # 131

Slavick, Jeff Avago Technologies

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

deskew_done is Boolean, no need to compare to "TRUE"

SuggestedRemedy

Change the 2 instances of "deskew_done = true" to deskew_done

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 91-9 to 91.5.4.3.>

Cl **30** *SC* **30.5.1.1.15** *P* **24** *L* **44** # 132

Slavick, Jeff Avago Technologies

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

Clause 91 defines the mandatory RS-FEC

SuggestedRemedy

Change "Clause 91 mandatory FEC" to "Clause 91 mandatory RS-FEC"

Response *Response Status* **C**

ACCEPT.

<Editor changed subclause from 5.1.1.15 to 30.5.1.1.15.>

Cl **78** *SC* **78.4.24** *P* **65** *L* **38** # 133

Slavick, Jeff — Avago Technologies

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

Poor wording:

examine_TxFW_change
This function decides if the new value of FW_enable
that the local transmit system can support when there is an updated request from the remote system or if local system conditions require a change in the value of the presently supported FW_enable.

SuggestedRemedy

examine_TxFW_change
This function decides if the new value of FW_enable
is supported by the local transmit system when there is an updated request from the remote system or if local system conditions require a change in the value of the presently supported FW_enable.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

examine_TxFW_change
This function decides if the new value of FW_enable is acceptable by the local transmit system when there is an updated request from the remote system or if local system conditions require a change in the value of the presently supported FW_enable.

examine_RxFW_change
This function decides if the new value of FW_enable is acceptable by the local receive system when there is an updated request from the remote system or if local system conditions require a change in the value of the presently supported FW_enable.

<Editor changed subclause from 4.24 to 78.4.24.>

Cl **80** *SC* **80.3** *P* **00** *L* **0** # 134

Slavick, Jeff — Avago Technologies

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

Introduction paragraph of section 80.3 refers to 40GBASE-R and 100GBASE-R Physical Layers, but not 100GBASE-P.

SuggestedRemedy

Add 100GBASE-P to the list of Physical layers in 80.3 and 80.3.2

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Bring 80.3 into the draft and edit it to read:

The service interface specification for 40GBASE-R, 100GBASE-R and 100GBASE-P Physical Layers is as per the definition in 1.2.2. Note that the 40GBASE-R, 100GBASE-R and 100GBASE-P inter-sublayer service interfaces use multiple scalar REQUEST and INDICATION primitives, to indicate the transfer of multiple independent streams of data units, as explained in 80.3.1 through 80.3.3.

See #109 for 80.3.2

<Editor changed subclause from 3 to 80.3.>

Cl **82** *SC* **82.2.8a** *P* **101** *L* **50** # 135

Slavick, Jeff — Avago Technologies

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

BIP statitics are only updated when in RX_ACTIVE, and turn on after receiving the first normal. In FW mode, we never send RAMs.

SuggestedRemedy

Turning off BIP statistics is a way to save power so change
"The BIP statistics will be first updated after transitioning from RAMs to normal AMs on the first received normal AM."
to
The BIP statistics will be first updated after transitioning from RAMs to normal AMs on the first received normal AM when LPI_FW is FALSE and on the second received AM when LPI_FW is TRUE.

Response *Response Status* **W**

ACCEPT.

<Editor changes subclause from 2.8a to 82.2.8a.>

Cl **80** *SC* **80.5** *P* **88** *L* **27** # 136

Slavick, Jeff — Avago Technologies

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

The RS-FEC receive logic runs on 4 lanes not 20. So the UI duration used to estimate the Maximum Skew for 100GBASE-R lane should be based on 25.78125GBd signaling rate.

SuggestedRemedy

Change the estimated UI count for "At RS-FEC recieve" to 4641. Add a footnote attached to this number denoting that 1 UI is based on a 25.78125GBd signaling rate.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change the UI number as proposed, add a footnote "d" to "At RS-FEC receive" that says:

"The skew at the RS-FEC receive is the skew between RS-FEC lanes. The symbol <double-tilde> indicates approximate equivalent of maximum Skew in UI for RS-FEC lanes with a signaling rate of 25.78125GB/s."

Add a similar footnote in Table 80-5:

"The skew at the RS-FEC receive is the skew between RS-FEC lanes."

<Editor changed subclause from 80-4 to 80.5.>

Cl **30** *SC* **30.5.1.1.11** *P* **00** *L* **0** # 137

Slavick, Jeff — Avago Technologies

Comment Type **TR** *Comment Status* **A** *FEC management*

Clause 91 also optinally provides BIP counters.

SuggestedRemedy

Added the list of BIP error counters to include 45.2.1.92h and change "MDIO Interface to the PCS" to "MDIO Interface to the PHY"

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

The BIP errors in the RS-FEC are independent of the ones in the PCS. Therefore a new object (& subclause) is needed:

30.5.1.1.26 aRSFECBIPErrorCount

Copy content from 30.5.1.1.11 with appropriate changes.

Add object to Table 30-1e

<Editor changed subclause from 5.1.1.11 to 30.5.1.1.11.>

Cl **93A** *SC* **93A.1.1** *P* **315** *L* **53** # 138

Brown, Matthew — APM

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

Reference to TP0 and TP5 should be WRT to a system diagram.

SuggestedRemedy

Change "TP0 to TP5" to "TP0 to TP5 (see Figure 93B-1)"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

COM is also used to recommend channels for 100GBASE-CR4 per Annex 93A. Since the reference model in Figure 93B-1 does not apply to 100GBASE-CR4, the reference is not appropriate.

Future projects may also employ COM and not the reference model in Figure 93B-1.

TP0 and TP5 will be indicated on the system diagram added per comment #143.

Cl **93A** *SC* **93A.1.4** *P* **319** *L* **34** # 139

Brown, Matthew — APM

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

Need hyphen.

SuggestedRemedy

Change "single bit response" to "single-bit response".
Fix multiple similar instances in 93A.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to "pulse response" in all instances. This equally applies to bits mapped to two-level signals or multiple bits mapped into multi-level signals.

Cl **93A** *SC* **93A.1** *P* **316** *L* **1** # 140

Brown, Matthew — APM

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

As a service to future readers, make Table 93A-1 more readable by providing references to the subclause that defines each parameter set.

SuggestedRemedy

For each parameter set (or row) provide a reference to the sub-clause that defines the paratmeter(s).

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.6** *P* **320** *L* **39** # 141

Brown, Matthew APM

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

Procedure here uses lettered list while procedures in 94 use number number lists.

SuggestedRemedy

In 93A, used numbered lists for procedures.

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **93A** *SC* **93A.1.7.3** *P* **323** *L* **9** # 142

Brown, Matthew APM

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

word error

SuggestedRemedy

Change "index a i" to "index as i".

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.1** *P* **316** *L* **1** # 143

Brown, Matthew APM

Comment Type **ER** *Comment Status* **A** *com system diagram*

References to several components is not totally clear. A system diagram showing the device resister/capacitor, package txline/capacitor, etc., would be helpful. It would be further helpful to include start and end points for the various channel responses such as victim path and agressor paths.

SuggestedRemedy

Add a system diagram showing each of the elements specified in Table 93A-1 and showing the start and end points of the victim and agressor channels.

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.1** *P* **316** *L* **51** # 144

Brown, Matthew APM

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

"time step" should be "frequency step"

SuggestedRemedy

Change "time step" to "frequency step".

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.2.3** *P* **318** *L* **35** # 145

Brown, Matthew APM

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

In equation 93A-11, the summation is for integer i from integer 1 to length value z_p. z_p is not technically an integer and is equal to N_p*1_mm.

SuggestedRemedy

Change "zp is an integer multiple of 1 mm" to "zp is an integer multiple, N_p, of 1mm". Change Eq. 93A-11 summation upper limit to N_p.

Alternately, define length as being z_p*1_mm, where z_p is an integer. Change "whose length zp is an integer multiple of 1 mm" to "whose length is an integer multiple, zp, of 1 mm".

Proposed Response *Response Status* **Z**

REJECT.

This comment was WITHDRAWN by the commenter.

Cl **93A** *SC* **93A.1.2.4** *P* **318** *L* **47** # 146

Brown, Matthew APM

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

I would consider "device" to be the "package plus die", where "device" here refers specifically to the die.

SuggestedRemedy

Change "device" to "die".

Response *Response Status* **C**

REJECT.

The use of this term is consistent throught the annex and associated clauses in that there are "devices" that are contained within "device packages".

This is pointed out repeatedly in Figure 93-2, Figure 94-4, and Figure 93B-1. It may also be clarified by the system diagram proposed by #143.

Cl **91** *SC* **91.5.1** *P* **135** *L* **47** # 147

Brown, Matthew APM

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

In Figure 91-2, the note "optional for eee implemention" is incorrect or at least misleading. These signals are required when EEE has been implemented and negotiated and otherwise are not required. See terminology used in 82.2.3.4.

SuggestedRemedy

Change note to "Optional when EEE is negotiated."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The suggested text is incorrect because when EEE is negotiated the primitives are no longer optional.

Change the note to "for optional EEE capability" to be consistent with Figure 82-2.

Cl **93** *SC* **93.11.4.2** *P* **238** *L* **6** # 148

Brown, Matthew APM

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

capitalization

SuggestedRemedy

"GHz"

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.2.3** *P* **80** *L* # 149

Marris, Arthur Cadence Design Syste

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

Use of the words "most" and "certain" is too vague and not accurate enough. The y could be replaced with "some" and "other" but please consider proposed remedy below.

SuggestedRemedy

Change first paragraph to read:
"A Forward Error Correction sublayer is available for all 40GBASE-R and 100GBASE-R copper and backplane PHYs. It is optional for 40GBASE-KR4, 40GBASE-CR4 and 100GBASE-CR10 PHYs and mandatory for 100GBASE-CR4, 100GBASE-KR4 and 100GBASE-KP4 PHYs. The FEC sublayer can be placed in between the PCS and PMA sublayers or between two PMA sublayers."

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.1** *P* **241** *L* **8** # 150

Marris, Arthur Cadence Design Syste

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

Change "physical" to "Physical Layer"

SuggestedRemedy

Change "physical" to "Physical Layer"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment 211

Cl **82** *SC* **82.6** *P* **117** *L* **22** # 151

Marris, Arthur Cadence Design Syste

Comment Type **TR** *Comment Status* **A** *LPI state*

Cannot determine the state of received_tx_mode in Figure 82-17 LPI Receive state diagram.

SuggestedRemedy

I understand that Hugh Barrass is proposing a remedy for this.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

See #96

Cl **80** *SC* **80.1.3** *P* **76** *L* **41** # 152

Marris, Arthur — Cadence Design Syste

Comment Type **T** *Comment Status* **A** *PHY types*

80.1.3 says:
"While this specification defines interfaces in terms of bits, octets, and frames, implementations may choose other data-path widths for implementation convenience. The only exceptions are as follows:

j) There is no electrical or mechanical specification of the MDI for backplane Physical Layers."

Item j does not seem relevant in this context.

SuggestedRemedy

Change item j) to read:

j: The PMDs as specificied in Clause 84 for 40GBASE-KR4, in Clause 93 for 100GBASE-KR4 and in Clause 94 for 100GBASE-KP4 all use a 4 lane data path.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

That wording was adopted to explain why the backplane PHYs are not enumberated in the preceding items.

Change item j) to read:

j: Although there is no electrical or mechanical specification of the MDI for backplane Physical Layers, the PMDs as specificied in Clause 84 for 40GBASE-KR4, in Clause 93 for 100GBASE-KR4 and in Clause 94 for 100GBASE-KP4 all use a 4 lane data path.

Cl **91** *SC* **91.5.2.6** *P* **138** *L* **3** # 153

Gustlin, Mark — Xilinx

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

Currently each FEC lane has a unique Alingment Marker pattern consisting of 5 regular AMs per FEC lane. On the receive side, where you don't know which FEC lane you are locking to, and if you are trying to quickly lock by doing a parallel search, you have to replicate the search logic x4. This can be very expensive, especially when you have to quickly lock, such as for EEE.

SuggestedRemedy

Implement a single pattern that is constant across the FEC lanes, along with a unique patterns in order to identify the given FEC lane. This will allow a recevier to lock first to a single pattern independent of the FEC lane, and then look at a unique pattern to identify the lane. This will significantly reduce the logic especially for a fast lock case.
A presentation will be made to detail the proposed solution.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Straw poll #2
Make the changes recommended on slide 5 and option 1 on slide 6 of gustlin_3bj_01a_0513.
Yes: 16
No: 2

Therefore, make the changes recommended on slide 5 and option 1 on slide 6 of gustlin_3bj_01a_0513.

Cl **94** *SC* **94.4.1** *P* **286** *L* **21** # 154

Healey, Adam — LSI Corporation

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

The rows for "Transmitter 3 dB bandwidth" were to be removed with the inclusion of an transmitter device and package model. These parameters are no longer used for the calculation of COM.

SuggestedRemedy

Remove the row.

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.3** *P* **319** *L* **11** # 155

Healey, Adam LSI Corporation

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

The equation for reflection coefficient is incorrect. It should be -1 when Rd is 0.

SuggestedRemedy

Change the equation to:
GAMMA1(f) = GAMMA2(f) = (Rd-R0)/(Rd+R0)

Response *Response Status* **C**

ACCEPT.

Cl **93A** *SC* **93A.1.5** *P* **320** *L* **13** # 156

Healey, Adam LSI Corporation

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

The factor of 1/(L-1) in Equation (93A-21) accounts for the loss of separation between levels for PAM-L modulation. As a result, the reduction is built into the single-bit response and consequently As.

However, this causes the separation loss to be double-counted in a number of instances.

1. Equation (93A-26) includes the level separation loss and the value of ISI variance given by Equation (93A-25) is incorrectly reduced.

2. Equation (93A-30) includes the level separation loss. The ISI and crosstalk amplitude distributions are computed incorrectly e.g. the amplitude is scaled by 1/(L-1)).

3. The variance of the voltage error due to random jitter (As*sigma_RJ)^2 in Equation (93A-27) and Equation (93A-32) incorrectly includes the loss in level separation.

4. The distribution of the voltage error due to dual-Dirac jitter in Equation (93A-34) is also incorrect as it includes the level separation loss.

SuggestedRemedy

Remove the factor of 1/(L-1) from Equation (93A-21).
Define As to be h^(0)(0)/(L-1).
Scale sigma_RJ and A_DD by h^(0)(0) rather than As.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Remove the factor of 1/(L-1) from Equation (93A-21).

Define As to be h^(0)(0)/(L-1).

Also, see comment #157 with reference to the third item in the suggested remedy.

Cl **93A** *SC* **93A.1.7.2** *P* **322** *L* **22** # 157

Healey, Adam LSI Corporation

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

The approximation used to derive the amplitude error resulting from timing jitter is too coarse.

A better estimate employs the first derivative of the single-bit response. The improved estimate is readily incorporated into the computation of FOM Equation (93A-27) and the computation of the noise amplitude distribution 93A.1.7.2.

SuggestedRemedy

A contribution will be submitted with the suggested equations.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Adopt slides 5 and 6 in healey_3bj_01a_0513.

Cl **93A** *SC* **93A.1.6** *P* **320** *L* **41** # 158

Healey, Adam LSI Corporation

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

It appears that the choice of the sampling time ts is based on the Mueller and Muller phase detector algorithm with the assumption that the decision feedback equalizer almost completely cancels the first post-cursor ISI contribution.

However, the magnitude of the first equalizer coefficient is limited by bmax and complete cancellation cannot be assured.

The sampling time should satisfy the equation:

h^(0)(ts-T) = h^(0)(ts+T)-min(h^(0)(ts+T), bmax*h^(0)(ts))

SuggestedRemedy

Change the definition of ts per the comment.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It is possible that future PMDs that employ COM will not include decision feedback equalization. Therefore, this proposed definition of the sampling time, as well as the definition of hISI in Equation (93A-24) should be modified to accommodate the case where Nb is 0 (and bmax is not applicable).

Adopt the changes in healey_3bj_01a_0513 slide 16.

Cl **93** *SC* **93.1** *P* **213** *L* **38** # 159

Healey, Adam — LSI Corporation

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

The second sentence states that the receiver bit error ratio is less than 1E-12 when signals from a compliant transmitter are received through "a channel with better performance than the worst-case specifications in 93.9."

"Better performance" is not sufficiently quantified. Channel specifications that enable a 1E-12 bit error ratio should be added.

SuggestedRemedy

Define parameter values for the calculation of COM that correspond to the case where the RS-FEC sublayer is configured to bypass error correction. The only parameter to change from the case where error correction is not bypassed is the target detector error ratio (1E-12 when error correction is bypassed).

Revise the paragraph in 93.1 to reference the added channel specification.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Replace the second to last paragraph of 93.1 (starting on page 213 line 37).

"The receive path of the RS-FEC sublayer may have the option to perform error detection without correction to reduce the data delay (see 91.5.3.3). When the receive path of the RS-FEC sublayer performs error correction, the link is required to operate with a BER of 1E-5 or better. When the RS-FEC sublayer is configured to bypass error correction, the link is required to operate with a BER of 1E-12 or better. In this context, a link consists of a compliant PMD transmitter, a compliant PMD receiver, and a channel meeting the requirements of 93.9.1."

In 93.9.1, specify that the calculation of COM use DER0=1E-12 for the case where the RS-FEC sublayer is configured to bypass error correction.

Cl **83A** *SC* **83A.3.2a** *P* **300** *L* **16** # 160

Healey, Adam — LSI Corporation

Comment Type **T** *Comment Status* **R** *EEE/CAUI*

A physical instance of XLAUI or CAUI does not provide a means to communicate the primitives required for correct operation of the optional EEE deep sleep capability.

SuggestedRemedy

A contribution will be submitted with a suggested remedy.

Response *Response Status* **C**

REJECT.

A presentation was not submitted and therefore there is no recommended action for the editor.

Cl **92** *SC* **92.7.12** *P* **170** *L* **18** # 161

Slavick, Jeff — Avago Technologies

Comment Type **TR** *Comment Status* **A** *training frame*

This text changes the PRBS sequence used in the PMD training pattern for 100G-KR4 and 100G-CR4 to be a unqiue constant repeating PRBS sequence for each lane. In systems you can have multiple PMDs coming from the same source and you will have the existance of Lane 0 routed by Lane 0 from two different PMDs, both of which can be running training at the same time. Those two lanes will now be running PMD training with highly correlated noise for the entirety of training. The purpose for changing this from how 40G works is to reduce the correleated noise.

This is also the only modification we've done for PMD training in Clause 92/93 (other then rate scaling).

SuggestedRemedy

Remove the text changing the PRBS sequences used during PMD trainig for Clause 92&93.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 7.12 to 92.7.12.>

Define an MDIO field and object for each lane to program seed to initialize the training pattern. Default values align with currently specified seed values.

Define an MDIO field and object for each lane to select the training pattern polynomial. Default values align with currently specified polynomials for each lane. Each lane must be configured to use a different polynomial than the other three.

Cl **92** *SC* **92.7.12** *P* **170** *L* # 162

Slavick, Jeff — Avago Technologies

Comment Type **TR** *Comment Status* **A** *training frame*

Label "Seed, S10 to S0" is backwards and should be "S0 to S10".

SuggestedRemedy

Per comment.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

<Editor changed subclause from 92-5 to 92.7.12.>

See response to comment #75.

Cl **92** *SC* **92.7.12** *P* **170** *L* **31** # 163

Slavick, Jeff — Avago Technologies

Comment Type **TR** *Comment Status* **R** *training frame*

The start of the training pattern within the PMD training frame does not force a delineation of the Control Channel to the PRBS sequences. The currently selected seeds that are used at the start of every PRBS training pattern begin with a run of ones.

SuggestedRemedy

Advance each of the 4 initial seeds by 5 states to cause the Initial Output to begin with a 01. To induce a transition early in the sequence.

S0 -> S10 Initial Output
Lane 0 : 11111101011 : 7e3967d4
Lane 1 : 11111110010 : 763ccca8
Lane 2 : 01111011111 : b4fe7fb5
Lane 3 : 01111111101 : 5ff48d68

Response *Response Status* **C**

REJECT.

<Editor changed subclause from 92-5 to 92.7.12.>

Comment #161 allows an arbitary seed to be set by the user so the receiver must tolerate the conditions described in the comment.

Cl **92** *SC* **92.8.3.6** *P* **177** *L* **19** # 164

Moore, Charles — Avago Technologies

Comment Type **T** *Comment Status* **A** *host tx test points*

This clause states incorrectly that Transmitter tests are made at TP2 or TP3. No Tx test are done at TP3 although Tx noise is measured at TP4.

SuggestedRemedy

Change:
"Transmitter measurements and tests defined in Table 92-6 are made at TP2 or TP3 using the test fixture of Figure 92-14, or its equivalent."

to

Transmitter measurements and tests defined in Table 92-6, except Tx Noise measurement, are made at TP2 using the test fixture of Figure 92-14, or its equivalent.. Similarly, Receiver test are largely made at TP3."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Note: P177 L17 is for 92.8.3.6 Insertion loss TP0 to TP2 or TP3 to TP5

Response:
P177 L19
Delete sentence: "Transmitter measurements and tests defined in Table 92-6 are made at TP2 or TP3 using the test fixture of Figure 92-14, or its equivalent.

Cl **92** *SC* **92.8.3.7.2** *P* **178** *L* **27** # 165

Moore, Charles — Avago Technologies

Comment Type **TR** *Comment Status* **R** *host tx jitter*

I have a several problems with the way jitter is specified, including:

1. The way TJ is defined is either unclear or it fails to use the definition of Jn given 92.8.3.7.4 and is likely to be too difficult to measure.
2. Measuring Q9 is overkill for a system which only needs a BER of about 1e-5.
3. Data dependent jitter is treated as being a form of deterministic jitter but actually behaves a lot like RJ.

SuggestedRemedy

A presentation will be made on this subject

Response *Response Status* **U**

REJECT.

There was no consensus to implement the proposal in moore_3bj_01_0513.

There is no formula for odd-even jitter and does not address 1E-12 operation without FEC for 100GBASE-KR4.

Cl **94** *SC* **94.3.13.3** *P* **280** *L* **9** # 166

Moore, Charles — Avago Technologies

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

Receiver interference tolerance test for 100GBASE_KP4 could be "gamed" by using a channel with a large amount of ISI which can be equalized by the DUT but is not equalized by COM reference channel, so no added broadband noise is needed.
This would allow receivers with no actual margin for crosstalk to pass.

SuggestedRemedy

In Table 94-17 add a line "COM before adding effects of broadband noise minimum" and set values to 4dB. A value greater that the nominal 3dB for channel spec is recommended since test channel has no crosstalk.

Response *Response Status* **U**

REJECT.

Discussed by the committee.

It is not clear that the proposed solution prevents the cited problem.

Straw poll #1
Should we make the change in suggested remedy?
Yes: 5
No: 7

No consensus to make this change.

Cl **94** *SC* **94.3.13.3.1** *P* **282** *L* **1** # 167

Moore, Charles — Avago Technologies

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

Intent of specifying frequency variation in NSD used in ITOL test is to insure

1. Somewhat realistic broadband interference
2. No one "games" the measurement by having a relatively high average NSD while at high frequencies, where the COM CTLE is peaked, NSD is lower, reducing the actual effect of the noise.

Having a lower bound on NSD which decreases with frequencies, as equation 94.16 and Figure 94-16 do, runs counter to point 2 and is doubtless due to a typo in the comment which generated this clause.

SuggestedRemedy

Either:

1. Explicitly include noise generator frequency dependent NSD in the COM calibration of BBN and use fairly loose, flat NSD vs frequency spec.

or

2. Specify:

10*log_10(NSD(f)/NSD_average) > -3 *(1-1.2*f/fb)

and re-draw or delete Figure 94-16.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Option 2 was the intention in the previous draft, but a typo in both the comment and in the presentation resulted in the current noise specification.

Go with option 2:
Change bottom portion of equation 94-16 to:

10*log_10(NSD(f)/NSD_average) > -3 *(1-1.2*f/fb)

and re-draw Figure 94-16.

Cl **92** *SC* **92.14.4.4** *P* **209** *L* **6** # 168

Petrilla, John — Avago Technologies

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

Since RC1 is written for 92.11.1.1 but the relevant equation is in 92.11.3.2, it would be helpful to include the equation # in the Value/Comment field. Also it seems RC1 is redundant with CA9 (see page 210).

SuggestedRemedy

Change "Meets equation constraints" to "Meets equation (92-28) constraints"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the "value/comment" to…
"Meets the requirements of 92.11.3.2."

Cl **94** *SC* **94.3.12.6.2** *P* **276** *L* **4** # 169

Petrilla, John — Avago Technologies

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

There appears to be a space missing between vf and is.

SuggestedRemedy

Replace "vfis" with "vf is"

Response *Response Status* **C**

ACCEPT.

Cl **92** *SC* **92.14.4.5** *P* **210** *L* **19** # 170

Petrilla, John — Avago Technologies

Comment Type **ER** *Comment Status* **A** *test fixture insertion loss*

CA6 references subclause 92.11.2 but there is no shall statement in 92.11.2.

SuggestedRemedy

Either add a shall statement into 92.11.2 or delete CA6

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change sentence P192 L12
From: "The reference test fixture printed circuit board insertion loss is given in Equation (92-25)."

To: "The test fixture printed circuit board insertion loss values determined using Equation (92-25) shall be used as the reference test fixture insertion loss."

Note: Language consistent with 92.11.1.2 Test fixture insertion loss

Cl **92** *SC* **92.14.4.5** *P* **210** *L* **22** # 171

Petrilla, John — Avago Technologies

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

CA7 appears to have an incorrect reference 92.11.3.1 instead of 92.11.3

SuggestedRemedy

Change the reference from 92.11.3.1 to 92.11.3

Response *Response Status* **W**

ACCEPT.
Use suggested remedy

Cl **93A** *SC* **93A.1.2.3** *P* **318** *L* **14** # 172

Petrilla, John — Avago Technologies

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

In Table 93A-2, the values given for "rho 0" and "gamma 0" are such that s-parameters will have non-zero imaginary components at DC.

SuggestedRemedy

In Table 93A-2, adjust values given for "rho 0" and "gamma 0" such that s-parameters will not have non-zero imaginary components at DC.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

<Editor changes subclause from 83A.1.2.3 to 93A.1.2.3.>

See #101.

Cl **69** *SC* **69.1.2** *P* **51** *L* **17** # 173

Booth, Brad — Dell

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

Amendments generally are intended to "do no harm" to previous work that has been documented. Completely eliminating the objectives and converting them to BER objectives is breaking the "do no harm" rule. The previous objectives should not be stricken, especially considering that 802.3-2012 was just ratified and published.

SuggestedRemedy

If the task force does not agree with the objectives in 802.3-2012, then they should provide a means to differentiate the objectives based on data rate or some other means.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change 69.1.1 to the following text
Backplane Ethernet supports the IEEE 802.3 full duplex MAC at 1000 Mb/s, 10 Gb/s, 40 Gb/s, or 100 Gb/s providing a bit error ratio (BER) better than or equal to 10–12 at the MAC/PLS service interface. For 1000 Mb/s operation, the family of 1000BASE-X Physical Layer signaling systems is extended to include 1000BASE-KX. For 10 Gb/s operation, two Physical Layer signaling systems are defined. For operation over four logical lanes, the 10GBASE-X family is extended to include 10GBASE-KX4. For serial operation, the 10GBASE-R family is extended to include 10GBASE-KR. For 40 Gb/s operation, there is 40GBASE-KR4 that operates over four lanes. For 100 Gb/s operation, the 100GBASE-R family is extended to include 100GBASE-KR4 and 100GBASE-KP4 that operates over four lanes. Auto-Negotiation enables PHY selection amongst Backplane Ethernet Physical Layer signaling systems. Energy Efficient Ethernet (EEE) is optionally supported for all Backplane Ethernet PHYs.

Delete 69.1.2

Cl **80** *SC* **80.1.2** *P* **76** *L* **5** # 174

Booth, Brad Dell

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

Amendments generally are intended to "do no harm" to previous work that has been documented. Completely eliminating the objectives and converting them to BER objectives is breaking the "do no harm" rule. The previous objectives should not be stricken, especially considering that 802.3-2012 was just ratified and published.

SuggestedRemedy

If the task force does not agree with the objectives in 802.3-2012, then they should provide a means to differentiate the objectives based on data rate or some other means.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change 80.1.1 to the following text:
"40 Gigabit and 100 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer, connected through a Media Independent Interface to 40 Gb/s and 100 Gb/s Physical Layer entities such as those specified in Table 80–1, providing a bit error ratio (BER) better than or equal to 10–12 at the MAC/PLS service interface.

40 Gigabit and 100 Gigabit Ethernet is defined for full duplex operation only."

Delete 80.1.2.

Cl **99** *SC* **99** *P* **1** *L* **2** # 175

Booth, Brad Dell

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

First use of IEEE Std 802.3-2012 should have a trademark.

SuggestedRemedy

Change to read: IEEE Std 802.3TM-2012

Response *Response Status* **C**

ACCEPT.

Cl **99** *SC* **99** *P* **1** *L* **10** # 176

Booth, Brad Dell

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

Shows this as Amendment X whereas line 13 on page 3 indicates it is Amendment 1.

SuggestedRemedy

Change title on page 1 to be Amendment 2.

Same change for page 3 and 21.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Editorial staff determines the Amendment number at the time of publication. Change "Amendment 1" to "Amendment X" on page 3, line 13

Cl **99** *SC* **99** *P* **6** *L* **13** # 177

Booth, Brad Dell

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

Chair and editor-in-chief information needs to be updated.

SuggestedRemedy

See comment.

Response *Response Status* **C**

ACCEPT.

Cl **01** *SC* **1.4.50a** *P* **22** *L* **8** # 178

Booth, Brad Dell

Comment Type **TR** *Comment Status* **R** *PHY types*

There is only one 100GBASE-P port type in the document; therefore, it can be covered by the 100GBASE-KP4 definition. There isn't a new sublayer (other than the PMD) so this really isn't needed.

SuggestedRemedy

Delete definition.

Response *Response Status* **U**

REJECT.

The definition of the 100GBASE-P port type was necessarily provided to describe a class of ports alternate to the 100GBASE-R port class in Clause 30 and Clause 80.

In addition, see comment #209.

Cl **01** *SC* **1.4.51a** *P* **22** *L* **14** # 179

Booth, Brad Dell

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

Definition contains more information than is required. The clause specifies what is required and the reach capabilities.

SuggestedRemedy

Change to read:
IEEE 802.3 Physical Layer specification for 100 Gb/s using 100GBASE-R encoding over four lanes of shielded balanced copper cabling. (See IEEE Std 802.3, Clause 92.)

Response *Response Status* **W**

REJECT.

Inclusion of Clause 91 FEC encoding is appropriate since it is mandatory and it modifies and supplements 100GBASE-R encoding.

Inclusion of the medium length is appropriate as it gives tangible indication of the application space. As a precedent, the medium length is included in the definition of 40GBASE-CR4. See 1.4.61.

Cl **01** *SC* **1.4.53a** *P* **22** *L* **20** # 180

Booth, Brad Dell

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

Definition contains more information than required.

SuggestedRemedy

Change to read:
IEEE 802.3 Physical Layer specification for 100 Gb/s using 100GBASE-R encoding and 4-level pulse amplitude modulation over four lanes of an electrical backplane. (See IEEE Std 802.3, Clause 94.)

Response *Response Status* **W**

REJECT.

Inclusion of Clause 91 FEC encoding is appropriate since it is mandatory and it modifies and supplements 100GBASE-R encoding.

Inclusion of the medium length is appropriate as it gives tangible indication of the application space. As a precedent, the medium length is included in the definition of 40GBASE-KR4. See 1.4.63.

Cl **01** *SC* **1.4.53b** *P* **22** *L* **24** # 181

Booth, Brad Dell

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

Definition contains more information than required.

SuggestedRemedy

Change to read:
IEEE 802.3 Physical Layer specification for 100 Gb/s using 100GBASE-R encoding and 2-level pulse amplitude modulation over four lanes of an electrical backplane. (See IEEE Std 802.3, Clause 93.)

Response *Response Status* **W**

REJECT.

Inclusion of Clause 91 FEC encoding is appropriate since it is mandatory and it modifies and supplements 100GBASE-R encoding.

Inclusion of the medium length is appropriate as it gives tangible indication of the application space. As a precedent, the medium length is included in the definition of 40GBASE-KR4. See 1.4.63.

Cl **92** *SC* **92.7.1** *P* **167** *L* **45** # 182

Dudek, Mike QLogic

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

The wording implies a mandatory requirement is in the subclause while it is actually a recommendation.

SuggestedRemedy

Change "The maximum insertion loss" to "The recommended maximum insertion loss"

Response *Response Status* **C**

ACCEPT.

Use suggested remedy

Cl **92** *SC* **92.7.5** *P* **168** *L* **36** # 183

Dudek, Mike QLogic

Comment Type **T** *Comment Status* **R** *signal detect*

This sentence is contradicting the following paragraph for the situation where EEE is supported as PMD_signal_detect_i needs to be set to zero at some times.

SuggestedRemedy

Change the sentence to "If training is disabled by management, and EEE is not supported, PMD_signal_detect_i shall be set to one for i=0 to 3.

Response *Response Status* **C**

REJECT.

State of PMD_signal_detect_i is clearly defined in the context of the conditions it's used.

(1) value of signal_detect for lane i is set to true.

(2) If training is disabled by management, PMD_signal_detect_i shall be set to one for i=0 to 3.

(3) If the optional EEE capability is supported, the following requirements apply.
The value of PMD_signal_detect_i (for i=0 to 3) is set to zero when rx_mode is first set to QUIET. While rx_mode is set to QUIET, PMD_signal_detect_i shall be set…

Cl **92** *SC* **92.8.4** *P* **179** *L* **25** # 184

Dudek, Mike QLogic

Comment Type **T** *Comment Status* **A** *host rx return loss*

There is a contradiction in the document. The summary table 92-8 has different values for the Differential to Common-mode input return loss than the referenced subsection 92.8.4.2.

SuggestedRemedy

Change the value to "(Equation 92-6)

Response *Response Status* **C**

ACCEPT.

Use suggested remedy

See comment #238.

Cl **92A** *SC* **92A.5** *P* **313** *L* **4** # 185

Dudek, Mike QLogic

Comment Type **T** *Comment Status* **A** *cable insertion loss*

The value of ILcamax5m is not based on the maximum allowed values of the coefficients because as noted one cannot have all the maximum values simultaneously.

SuggestedRemedy

Change the definition to "is the maximum 5 m cable assembly insertion loss given in Table 92-12 for the maximum insertion loss at 12.8906 GHz."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #188. The coefficients have been deleted.

Remove maximum in sentence P313 L3
Change: is the maximum 5m cable assembly insertion loss using
Equation(92-8) and the maximum allowed values of the polynomial coefficients a1,a2 and a4 given in Table 92-12 corresponding to the maximum insertion loss at 12.8906 GHz.

To: is the maximum 5m cable assembly insertion loss.

Cl **92** *SC* **92.8.3** *P* **172** *L* **15** # 186

Dudek, Mike QLogic

Comment Type **TR** *Comment Status* **A** *cable/host parameters*

There is a potential source of interfering signal that could cause high error rates that is not controlled. There is an allowed common mode output amplitude from the Tx. Also the cable is allowed to convert an uncontrolled amount of differential energy into common mode energy. The Rx has no common mode return loss specification so 100% of the energy can be reflected to the Tx, where 100% of this reflected common mode energy can be converted to interfering differential energy.

SuggestedRemedy

Add a cable specification for differential to common mode conversion (SCD21) of 10dB to section 92.10. Also add a specification for Common mode to differential conversion reflection for the Tx output (SDC22) to table 92-6 and a subsection to describe it. Suggested limit would be 3dB more relaxed than equation 92-6.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add SDC22 specification to the host Tx. Set limit to SCD11 for host Rx (as modified by comment #187) relaxed by 3 dB. Show in graph.

Add SCD11/22 specifications for the cable. Set limit to be the same as the SCD11 specification of the host rx. Show in graph.

Add SCD21 specification for the cable. Set limit to SDD21-SCD21 > 10 dB.

Editorial granted to change S parameters (gain terms) to losses and update reference and descriptions.

Cl **92** *SC* **92.8.4.2** *P* **180** *L* **3** # 187

Dudek, Mike QLogic

Comment Type **TR** *Comment Status* **A** *test fixture CM parameters*

There is no specification for the mated compliance board common mode to differential return loss despite there being a specification for this for the receiver. With a realistic specification (that adopted by OIF VSR) at high frequencies the host product specification for the common mode to differential conversion is too close to that of the mated compliance boards making the specification almost impossible to meet. I will bring a presentation showing the effect to the Victoria meeting.

SuggestedRemedy

Add a specification for the mated compliance board common mode to differential return loss. Specification to be minimimum 30-5/7*f dB for 0.01<f<14 GHz and 25-5/14*f dB for 14<f<25 GHz. Change the product specification in equation 92-6 above 12.89Ghz from 12dB flat to -18 + 6/25.78*f which matches the specification OIF adopted for VSR at their last meeting.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Implement suggested remedy.

Also, in section 92.11.3 to change "conversion loss" to "conversion insertion loss".

Editorial license is granted.

Cl **92** *SC* **92.10** *P* **183** *L* **45** # 188

Dudek, Mike QLogic

Comment Type **TR** *Comment Status* **A** *cable COM specification*

The cable specifications in subclause 92.10 are not a good predictor of system performance as indicated using the Channel Operating Margin (COM). In particular a number of cables that have good COM when simulated with additional host traces fail the existing cable specifications. A presentation will be made Dudek_3bj_02_0513 describing the problem.

SuggestedRemedy

Replace the specification for the Insertion Loss Deviation, Integrated Crosstalk Noise, and fitted insertion loss coefficients with a single modified COM specification. The modification to the COM code would be to concatenate additional host trace loss on each end of the cable S parameters for this Cable test.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment: Normative requirements for Insertion Loss Deviation, Integrated Crosstalk Noise, and fitted insertion loss coefficients replaced with a modified COM specification.

Changes required:

(1) Remove maximum fitted coefficients and associated notes in "Table 92-12-Maximum and minimum cable assembly insertion loss characteristics"

(2) Delete sentence P184 L42-45 "The maximum allowed values of the polynomial coefficients a1, a2, and a4 of the fitted cable assembly insertion loss of each pair of the 100GBASE-CR4 in Equation (92-8) corresponding to the maximum insertion loss at 12.8906 GHz shall meet the specifications summarized in Table 92-12 unless otherwise noted." Editorial license to ensure all references to deleted sections are updated including PICS.

(3)Change sentence P184 L46,
From:" The fitted insertion loss corresponding to one example of the maximum insertion loss at 12.8906 GHz and allowed values of a1, a2, and a4 are illustrated in Figure 92-9."
To: The fitted insertion loss corresponding to one example of the maximum insertion loss at 12.8906 GHz is illustrated in Figure 92-9.

(4)Delete: Equations (92-13) and (92-14) and Figure 92-11. Editorial license to ensure all references to deleted sections are updated including PICS.

(5)Delete:Equation (92-23) and Figure 92-13. Editorial license to ensure all references to deleted sections are updated including PICS.

(6) Modify 93A to provide an additional method for determining COM for cable assemblies Add the additional step of concatenating an extra 6.26dB of PCB loss on each end of the cable. The host PCB frequency dependent loss will be calculated according to benartsi_3bj_02_0513. Note that the input data to the COM post-process is the standard cable S parameter files (IL + 3 FEXT + 4 NEXT).

(7)Add new cable assembly subclause as follows:

92.10.8 Channel operating margin

The performance of the cable assembly is evaluated using the channel operating margin (COM) procedure in 93A and the parameters in Table 93-9 plus the additional PCB loss parameters. The cable assembly (COM) is derived from the cable assembly scattering parameter measurements of the insertion loss of a receive lane and the four individual pair-to-pair differential NEXT losses and three individual pair-to-pair differential FEXT losses that can couple into a receive lane.

The channel insertion loss between TP0 and TP5 for the cable assembly (COM) consists of the cable assembly insertion loss measurement and an insertion loss allocation of 6.26 dB for TPO to MDI and 6.26 dB for TP5 to MDI to account for the transmitter and receiver PCB insertion losses and the additional MDI insertion loss.

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

Editorial license is granted.

Cl **78** *SC* **78.1.3.3.1** *P* **61** *L* **49** # 189

Bennett, Michael LBNL

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

parenthesis around the phrase (that implement EEE) is not needed.

SuggestedRemedy

Remove the parenthesis. Its in a section titled PHY LPI transit operation - actually the phrase could be removed. If you want to be explicit, use the phrase "for PHYs that implement the optional EEE capability"

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to "For PHYs that implement the optional EEE capability"

Cl **82** *SC* *P* **100** *L* **42** # 190

Bennett, Michael LBNL

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

The in the phrase RAM insertion - optional EEE function, the word function should be changed to capability to be consistent with the rest of the use of "the optional EEE capability" in the document

SuggestedRemedy

replace function with capability

Response *Response Status* **W**

ACCEPT.

Cl **82** *SC* **82.6** *P* **110** *L* **41** # 191

Bennett, Michael LBNL

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

The note is truncated in Figure 82-10-Block lock state diagram.

SuggestedRemedy

replace the truncated text with the entire text

Response *Response Status* **W**

ACCEPT.

Cl **78** *SC* **78.1.3.3** *P* **61** *L* **51** # 192

Bennett, Michael LBNL

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

The definition of "fast-wake" is somewhat confusing. Fast wake refers to the mode for which the transmitter continues to transmit signals during the fast wake state (between the sleep and wake states) so that the receiver can resume operation with a shorter wake time. This definition can be clarified by changing the term "fast wake" to quiescent.

SuggestedRemedy

Replace "fast wake" with "quiescent" throughout the document. Replace acronym referring to "fast wake" (FW) with (Q).

Response *Response Status* **W**

REJECT.

"quiescent" would be inappropriate as it is the term used in deep sleep operation to describe the period when the PHY ceases transmission. "unquiescent" would be a better term.

In general, a rose by any other name would smell as sweet. The specific terms used are of secondary importance to the functions defined, as long as terms are used consistently.

Cl **99** *SC* *P* **6** *L* **13** # 193

D'Ambrosia, John Dell

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

Listing of Task Force Chairs needs to be modified, as D'Ambrosia is no longer Task Force Chair, and at May meeting it is anticipated that Mr. Healey will be chair and Matt Brown will be Editor-in-Chief.

SuggestedRemedy

List John D'Ambrosia as Task Force Chair, Phase 1
List Adam Healey (assumed confirmation) as Task Force Chair, Phase 2
List Adam Healey as Task Force Editor-in-Chief, Phase 1
List Matt Brown as Task Force Editor-in-Chief, Phase 2

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.4** *P* **78** *L* **14** # 194

D'Ambrosia, John Dell

Comment Type **E** *Comment Status* **R** *PHY types*

reference to 4-level pulse amplitude modulation. Other places pointing to clause 94 refer to greater than 2 levels modulation

SuggestedRemedy

use consistent terminology in reference to clause 94. It seems that any references to Clause 94 should use 4-level pulse amplitude modulation, as that is what is specified in that clause.

Response *Response Status* **C**

REJECT.

See comment #209 for discussion.

Where "100GBASE-P" is defined, we use "greater than 2 level", where "100GBASE-KP4" is defined, we use "4 level"

In this instance and in other instances that the editor identified, these terms are used consistently.

Cl **69** *SC* **69.1.1** *P* **51** *L* **12** # 195

D'Ambrosia, John Dell

Comment Type **ER** *Comment Status* **A** *PHY types*

Inconsistency in manner in which PHYs are described. In addition, the description of 100GBASE-KP4 is inconsistent with the definition of 1.4 that implies that 100GBASE-P is another family of devices (which uses a 100GBASE-R encoding, but does not state it is a member of the 100GBASE-R family)

SuggestedRemedy

1. add "operates over 4 lanes" to the description of the 100GBASE-R / 100GBASE-P family.
2. Replace definition of 100GBASE-P in 1.4 to:

An IEEE 802.3 family of Physical Layer devices that is a subset of the 100GBASE-R family of devices that uses 100GBASE-R encoding in combination with a physical medium dependent sublayer that employs pulse amplitude modulation with more than 2 levels for 100 Gb/s operation. (See IEEE Std 802.3 Clause 94.)

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See response to comment #209.

Also.

Change:
"For 100 Gb/s operation, the 100GBASE-R family is extended to include 100GBASE-KR4 and 100GBASE-KP4."

To:
"For 100 Gb/s operation, the 100GBASE-R family is extended to include 100GBASE-KR4 and 100GBASE-KP4 that operate over four lanes."

Cl **80** *SC* **80.1.4** *P* **77** *L* **45** # 196

D'Ambrosia, John Dell

Comment Type **ER** *Comment Status* **A** *PHY types*

there is inconsistentency in the way definitions are given. In 1.4, CR4/ KP4 / KR4 refer to using 100GBASE-R encoding, while the 100GBASE-P family refers to using "physical coding sublayer defined in Clause 82." In the cited text here references made to Clause 82 PCS, but this is defined as 100GBASE-R encoding

SuggestedRemedy

changes references to Clause 82 Physical COding Sublayer to either 40GBASE-R or 100GBASE-R encoding as appropriate

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #209

Cl **80** *SC* **80.1.4** *P* **78** *L* **13** # 197

D'Ambrosia, John Dell

Comment Type **ER** *Comment Status* **A** *PHY types*

reference to 100GBASE-KP4 using 100GBASE-P encoding. 100GBASE-P is a family of specifications that uses 100GBASE-R encoding

SuggestedRemedy

change 100GBASE-P to 100GBASE-R

Response *Response Status* **C**

ACCEPT.

See also comment #209

Cl **80** *SC* **80.1.5** *P* **79** *L* **44** # 198

D'Ambrosia, John Dell

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

No indication for KP4 regarding Clause 83 PMA, which is optional per Clause 94 (For CAUI Implementation)

SuggestedRemedy

Make Clause 83 PMA optional for KP4.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.2.4** *P* **80** *L* **28** # 199

D'Ambrosia, John Dell

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

The statement "the PMA for 100GBASE-KP4 is specified in Clause 94" as any instantiation of the CAUI Interface will require the Clause 83 PMA

SuggestedRemedy

add text that states "Instantiations of the CAUI interface will require at least one instance of the PMA specified in Clause 83.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The first paragraph makes it clear that the PMA is necessary for the service interfaces.

Change the added text to read:

"the PMA specific to the 100GBASE-KP4 PMD is specified in Clause 94"

Cl **80** *SC* **80.3.2** *P* **83** *L* **11** # 200

D'Ambrosia, John Dell

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

The flexibility of the 802.3ba architecture is based on the assumption that the service interface is the same for all layers. This appears to have been broken by the diagram in 80-3b. The PMA above and below FEC sublayer has different service interfaces.

SuggestedRemedy

It is not clear to me how to fix this - one could argue that it is an optional mode, so not an issue. At a minimum some type of warning should be noted in the text regarding this issue.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The primitive IS_RX_LPI_ACTIVE.request is only required for a PMA that is between the PCS and a Clause 74 FEC sublayer. This should be made clear in the primitive definition.

Add a penultimate sentence in 80.3.3.6 as follows:

"This primitive is only used for a PMA sublayer that is between the PCS and a Clause 74 FEC sublayer, in all other cases the primitive is never invoked and has no effect."

Cl **80** *SC* **80.5** *P* **87** *L* **15** # 201

D'Ambrosia, John Dell

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

Directly below the RS-FEC sublayer - there is a PMA sublayer, but this is not noted as a CAUI, this is noted as PMD service interface. THerefore, there should be no PMA sublayer directly under the RS-FEC

SuggestedRemedy

Delete PMA directly adjacent and below to the RS-FEC.

Response *Response Status* **C**

REJECT.

There is nothing incorrect in the diagram. The interface shown is a logical service interface.

Cl **82** *SC* **82.1.5** *P* **99** *L* **31** # 202

D'Ambrosia, John Dell

Comment Type **TR** *Comment Status* **A** *802.3ba*

Optional support for EEE has created service interfaces that differ from each other that will impact the flexibility of the architecture

SuggestedRemedy

add cautionary warning for all service interfaces that are now different that 802.3ba defined service interfaces.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It is not clear what type of warning would be appropriate. The note clearly indicates that these interfaces are only for EEE. Reference to "802.3ba" would be inappropriate as no such entity exists.

See also #200

However, the phrase "EEE support" is inconsistent with usage elsewhere. Change "EEE support" to "EEE capability"

See #190.

Cl **91** *SC* **91.3** *P* **133** *L* **33** # 203

D'Ambrosia, John Dell

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

PMA compatibility states that the PMA service interface upstream and downstream must be set to 4 lanes. However, there was supposed to be something added that stated a CAUI(-10) could not be instantiated below the RS-FEC sublayer. I thought this was going to be addressed by Annex 83C, but the diagram only shows the proper CAUI above the RS-FEC sublayer, and i could not find any text that prevents this.

SuggestedRemedy

add text that prevents implementation of a CAUI-10 below the RS-FEC sublayer.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change the draft to limit the number of lanes services interfaces below the RS-FEC will be less than or equal to 4. This will prohibit the use of the CAUI-10.

Cl **91** *SC* **91.6.4** *P* **156** *L* **1** # 204

D'Ambrosia, John Dell

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

FEC is necessary to meet the stated BER requirement. If it is bypassed, it would seem that the user is taking a risk in meeting stated BER requirements based on insertion loss channel recommendations.

SuggestedRemedy

Add warning that when FEC is bypassed, the ability to meet stated BER requirements is channel dependent, and that stated channel recommendations require FEC.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Insert a NOTE after the third paragraph of 91.5.3.3.

"NOTE -- The PHY may rely on the error correction capability of the RS-FEC sublayer achieve its performance objectives. It is recommended that acceptable performance of the underlying link is verified before error correction is bypassed."

Cl **94** *SC* **94.6.3** *P* **291** *L* **10** # 205

Law, David HP

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

Since the status of item RS-FEC is M, since Table 94-1 lists Clause 94 RS-FEC as required, the support should be just Yes [].

SuggestedRemedy

Change 'Yes [ ] No [ ]' to read 'Yes [ ]'.

Response *Response Status* **C**

ACCEPT.

Cl **94** *SC* **94.2.1.1.1** *P* **243** *L* **32** # 206

Law, David HP

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

Typo.

SuggestedRemedy

The full stop in '(tx_bit.start)' should be a comma '(tx_bit,start)'.

Response *Response Status* **C**

ACCEPT.

Cl **99** *SC* *P* **6** *L* **13** # 207

Law, David HP

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

Please update the participant list based on the officer changes and the Working Group membership at the start of the ballot.

SuggestedRemedy

[1] Update Task Force officers list to read as follows, add other Task Force officers as required:

John D'Ambrosia, IEEE P802.3bj Task Force Chair, Phase 1
Adam Healey, IEEE P802.3bj Task Force Chair, Phase 2
Adam Healey, IEEE P802.3bj Task Force Editor-in-Chief, Phase 1
Matt Brown, IEEE P802.3bj Task Force Editor-in-Chief, Phase 2

[2] Include the voter list supplied by the IEEE 802.3 Working Group Chair.

Response *Response Status* **C**

ACCEPT.

Cl **45** *SC* **45.2.1.92b.2** *P* **38** *L* **11** # 208

Law, David HP

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

typo.

SuggestedRemedy

Suggets that 'FEC bypass correction ability (1.201.1)' should read 'FEC bypass indication ability (1.201.1)'.

Response *Response Status* **C**

ACCEPT.

Cl **80** *SC* **80.1.4** *P* **77** *L* **45** # 209

Law, David HP

Comment Type **ER** *Comment Status* **A** *PHY types*

Subclause 80.1.4 'Nomenclature' states that '40GBASE-R or 100GBASE-R represents a family of Physical Layer devices using the Clause 82 Physical Coding Sublayer ... and a PMD implementing 2-level pulse amplitude modulation (PAM).', however subclause 1.4.53a (see page 22, line 20) '100GBASE-KP4' states that 'IEEE 802.3 Physical Layer specification for 100 Gb/s using 100GBASE-R encoding ... and 4-level pulse amplitude modulation ...'. If, as subclause 80.1.4 states, 100GBASE-R represents a PMD implementing 2-level PAM, then 100GBASE-KP4 can't be defined as using 100GBASE-R.

Further, IEEE Std 802.3-2012 subclause 1.4.51 defines '100GBASE-R' as '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.).' and does not mention the modulation used, further subclause 1.4.50a defines '100GBASE-P' as 'An IEEE 802.3 family of Physical Layer devices using the physical coding sublayer defined in Clause 82 and .. pulse amplitude modulation with more than 2 levels for 100 Gb/s operation.' so avoids the reference to 100GBASE-R encoding through a direct reference to Clause 82.

Table 80-1 '40 Gb/s and 100 Gb/s PHYs' however states in the 100GBASE-KP4 entry that it is a '100 Gb/s PHY using 100GBASE-P encoding ..' while, as noted above, subclause 1.4.53a states that 100GBASE-KP4 is a 'IEEE 802.3 Physical Layer specification for 100 Gb/s using 100GBASE-R encoding ..'.

I think the problem is that we are trying to encode both the PCS and PMD modulation in the letter 'P' in 100GBASE-P and now add a PMD modulation meaning to 100GBASE-R through these changes. I therefore suggest that if we are to continue to use this approach we should define a new term 100GBASE-R encoding, which is the 64B66B 100Gb/s encoding defined in Clause 82, separate from a 100GBASE-R PHY, which is a PHY that uses 100GBASE-R encoding with 2-level PAM PMD.

We will also need to make a similar change to the definition of 40GBASE-R since 80.1.4 is being changed to define both 40GBASE-R or 100GBASE-R as a family of PHYs implementing 2-level PAM. Fortunately I note that all the definitions for 40GBASE-R and 100GBASE-R PHYs in IEEE Std 802.3-2012 subclause 1.4, and IEEE P802.3bj changes to subclause 1.4, reference either '40GBASE-R encoding' or '100GBASE-R encoding' already and so will need no change.

A 100GBASE-P PHY would then be a PHY that uses 100GBASE-R encoding with a more than 2-level PAM PMD, although this still leaves the issue of 4 meaning 4 levels or 4 lanes in the case of 100GBASE-KP4. Personally, for consistency, I believe the 4 should mean 4 lanes with R now meaning 2-level PAM and P meaning 4-level PAM, and if another modulation scheme is selected in the future a new letter should be selected.

SuggestedRemedy

Based on my comment, suggest that:

[1] Change IEEE Std 802.3-2012 subclause 1.4.51 '100GBASE-R' to read An IEEE 802.3 family of Physical Layer devices using 100GBASE-R encoding and a PMD that employs 2-level pulse amplitude modulation. (See IEEE Std 802.3, Clause 80.)
[2] Add new subclause 1.4.51a that reads '100GBASE-R encoding: The physical coding sublayer encoding defined in Clause 82 for 100 Gb/s operation. (See IEEE Std 802.3, Clause 82.)'
[3] Change IEEE Std 802.3-2012 subclause 1.4.60 '40GBASE-R' to read 'An IEEE 802.3 family of Physical Layer devices using 40GBASE-R encoding and a PMD that employs 2-level pulse amplitude modulation. (See IEEE Std 802.3, Clause 80.)
[4] Add new subclause 1.4.60a that reads '40GBASE-R encoding: The physical coding sublayer encoding defined in Clause 82 for 40 Gb/s operation. (See IEEE Std 802.3, Clause 82.)'
[5] Subclause 1.4.50a '100GBASE-P' should be changed to read 'An IEEE 802.3 family of Physical Layer devices using 100GBASE-R encoding and a PMD that employs 4-level pulse amplitude modulation. (See IEEE Std 802.3, Clause 80.)
[6] Change the 100GBASE-P entry in subclause 30.3.2.1.2 'aPhyType' and 30.3.2.1.3 'aPhyTypeList' to read 'Clause 82 100 Gb/s multi-PCS lane 64B/66B using 4-level PAM'.
[7] Change the end of the first sentence of the 4th paragraph of subclause 80.1.4 to read '.. a PMD implementing 4-level pulse amplitude modulation (PAM).'.
[8] Change the start of the description entry for 100GBASE-KP4 in table 80-1 from '100 Gb/s PHY using 100GBASE-P encoding ..' to read '100 Gb/s PHY using 100GBASE-R encoding ..'.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Separating the concept of "100GBASE-R encoding" and adding that as a definition will improve the standard.

The use of "P" to denote "more than 2-level" is intended to allow for future 100G PHYs to use complex modulation without using a new letter for each schema. (see also comment #194) These two issues should be discussed separately as they are largely orthogonal.

Proposed actions:

For 1 through 4, make changes to 1.4.51 & 1.4.60 as proposed.

[5] Subclause 1.4.50a '100GBASE-P' should be changed to read 'An IEEE 802.3 family of Physical Layer devices using 100GBASE-R encoding and a PMD that employs pulse amplitude modulation with more than 2 levels. (See IEEE Std 802.3, Clause 80.)

[6] Change the 100GBASE-P entry in subclause 30.3.2.1.2 'aPhyType' and 30.3.2.1.3 'aPhyTypeList' to read 'Clause 82 100 Gb/s multi-PCS lane using >2 level PAM'.

[7] Don't make the change as proposed in suggested remedy (See also comment #194)

[8] Make change as proposed in this suggested remedy (see also comment #197)

Cl **94** *SC* **94.6.3** *P* **291** *L* **12** # 210

Law, David HP

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

According to Table 94-1 the Clause 83 PMA is optional and the Clause 94 PMA is Mandatory yet there is only one entry in the PICS, item PMA, and this has the status of M.

SuggestedRemedy

Suggest that:

[1] In Table 94-1 change '83-PMA' to read '83-PMA for 100GBASE-R'.
[2] In Table 94-1 change '94-PMA' to read '94-PMA for 100GBASE-KP'.
[3] In subclause 94.6.3 change the status of PMA to read 'O' and the support to read 'Yes [ ] No [ ]'

Note: I have submitted another comment that would delete the '94-PMA' entry from Table 94-1, I've include item [2] in case that comment is not accepted.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Comment 211 deletes the '94-PMA' entry from Table 94-1 so accept items 1 and 3 in the suggested remedy. Item 1 is consistent with what is in Clauses 92 :

[1] In Table 94-1 change '83-PMA' to read '83-PMA for 100GBASE-R'.
[3] In subclause 94.6.3 change the status of PMA to read 'O' and the support to read 'Yes [ ] No [ ]'

Cl **94** *SC* **94.1** *P* **241** *L* **8** # 211

Law, David HP

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

The first paragraph of the overview isn't of the usual format (see IEEE St 802.3-2012 subclause 84.1 and 85.1 as well as IEEE P802.3bj subclause 93.1), for example doesn't include the usual text that Clause 45 registers or equivalent should be supplied, has a typo in the statement in respect to how to form a PHY ('.. 100GBASE-KP4 physical shall ..'), and has self-references to the PMA and PMD in Table 94-1.

SuggestedRemedy

Suggets that:

[1] Delete the text 'A 100GBASE-KP4 physical shall include the required sublayers and may include the optional sublayers specified in Table 94-1.'.
[2] Add a new second paragraph that reads 'When forming a complete Physical Layer, a PMD and PMA shall be connected to the appropriate PMA or RS-FEC as shown in Table 94-1, to the medium through the MDI and to the management functions that are optionally accessible through the management interface defined in Clause 45, or equivalent.'.
[3] Delete the entries '94-PMA Required' and '94-PMD Required' from Table 94-1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.
Unlike other 40G/100G PHYs, the CL94 PHY has a unique PMD and PMA that come as a package, the Clause 91 FEC is mandatory, and there is not physical instantiation of the service interface between the PMA and FEC.

Make the following changes:
[1] Delete the text 'A 100GBASE-KP4 physical shall include the required sublayers and may include the optional sublayers specified in Table 94-1.'.
[2] Add a new second paragraph that reads 'When forming a complete Physical Layer, the PMA shall be connected to the RS-FEC, the PMD shall be connected to the medium through the MDI as shown in Figure 94-1, and the PMA and PMD shall be connected to the management functions that are optionally accessible through the management interface defined in Clause 45, or equivalent.'.
[3] Delete the entries '94-PMA Required' and '94-PMD Required' from Table 94-1.

See also comment 210

Cl **93** *SC* **93.1** *P* **213** *L* **37** # 212

Law, David HP

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

Subclause 93.1 states in the 5th paragraph that 'Differential signals received at the MDI from a transmitter that meets the requirements of 93.8.1 and have passed through the channel specified in 93.9 are received with a BER less than 10-5. When the receive path of the RS-FEC sublayer is configured to bypass error correction (see 91.5.3.3), differential signals received at the MDI from a transmitter that meets the requirements of 93.8.1 and have passed through a channel with better performance than the worst-case specifications in 93.9 are received with a BER less than 10-12.'

Reading the first paragraph it seems to state that with a PMD TX that meets 93.8.1 and a channel that meets 93.9, with no mention of the configuration of the RS-FEC, the BER is less than 10-5. Reading the second paragraph it seems to state that with a PMD TX that meets 93.8.1 and a channel 'with better performance than' 93.9 (which could be 0.0001% better), with the RS-FEC in bypass error correction, the BER is 10-12. That doesn't seem correct, and I understand that this isn't really the intent of the text, instead I believe the intent is to state that:

[1] If FEC is not bypassed, the link may operate at up to BER of 1E-5.
[2] If FEC is bypassed, the link has to operate at a BER of at least 1E-12.

SuggestedRemedy

Change the text to state that to meet the frame error ratio, if FEC is not bypassed, the link may has to operate at BER of 1E-5 or better, if FEC is bypassed, the link has to operate at a BER of 1E-12 or better.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See #159.

Cl **93** *SC* **93.11.4.1** *P* **236** *L* **10** # 213

Law, David HP

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

The Value/Comment field of item FS2 states 'Positive output voltage of corresponds to tx_bit = one', a positive output voltage of what?

SuggestedRemedy

Suggest this be changed to read either 'Positive differential output voltage corresponds to tx_bit = one' or 'Positive differential output voltage (SLi<p> minus SLi<n>) corresponds to tx_bit = one'. A similar change should be made to item FS5.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change FS3 Value/Comment to:
"Positive differential output voltage corresponds to tx_bit = one"

Change FS5 Value/Comment to:
"Positive differential input voltage corresponds to rx_bit = one"

Cl **93** *SC* **93.7.8** *P* **219** *L* **4** # 214

Law, David HP

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

The third paragraph states that 'Control of the loopback function is specified in 45.2.1.1.5' but this is only correct if the optional PMA/PMD control 1 register described in subclause 45.2.1.1 is implemented. If this option is not implemented then equivalent management capabilities are required, as stated in subclause 93.1, '... and to the management functions that are optionally accessible through the management interface defined in Clause 45, or equivalent.'. Based on this I suggest that the approach used for other control registers be used here, map the bit to a variable in Table 93-2, and reference the variable in the text, not the register.

SuggestedRemedy

[1] Add entry to Table 93-2 that reads: PMA local loopback; PMA/PMD control 1; 1.0.0; PMA_local_loopback
[2] Change the second sentence of subclause 93.7.8 to read 'When the PMA_local_loopback variable is set to one, transmission requests passed to each transmitter are sent directly to the corresponding receiver, overriding any signal detected by each receiver on its attached link.'.
[3] Delete the second paragraph that currently reads 'Control of the loopback function is specified in 45.2.1.1.5.'.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Local loopback mode is provided by the adjacent PMA. Its behavior and management are described in 83.5.8. As 93.6 defines the PMD MDIO function mapping it is not clear that this PMA variable should be included.

Change:
"Control of the loopback function is specified in 45.2.1.1.5."

To:
"Control of the loopback function is specified in 83.5.8."

Modify Clauses 92 and 94 to be consistent.

Cl **30** *SC* **30.5.1.1.2** *P* **24** *L* **11** # 215

Law, David HP

Comment Type **TR** *Comment Status* **A** *PHY types*

The existing enumeration '100GBASE-R' is to support the case of a pluggable PMDs port where no PMD is plugged in, or where the PMD is plugged in but does not support optional management. In these cases all that can be reported in the PCS type. As such the enumeration '100GBASE-R' can't be defined in reference to the PMD type, if the PMD type is known the correct enumeration such as '100GBASE-KR4' has to be returned, and the 100GBASE-P enumeration can't be added, again if the PMD type is known '100GBASE-KP4' has to be returned. All that can be returned when the PMD type is not known is '100GBASE-R'. This is another issue caused by the trying to encode both the PCS and PMD modulation in the letter 'P' and redefining the letter 'R' to also include modulation.

SuggestedRemedy

Suggest that:

[1] The enumeration '100GBASE-R' be restored to read 'Multi-lane PCS as specified in Clause 82 over undefined PMA/PMD'.
[2] The enumeration '100GBASE-P' be deleted.
[3] Change the text '.. 40GBASE-R, 100GBASE-R, and 100GBASE-P shall only be returned if the underlying PMD type is unknown.' to read '.. 40GBASE-R, and 100GBASE-R shall only be returned if the underlying PMD type is unknown.'.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

[1] The enumeration '100GBASE-R' be restored to read "Multi-lane PCS as specified in Clause 82 over undefined 100GBASE-R or 100GBASE-P PMA/PMD"

[2] & [3] as proposed.

Cl **30** *SC* **30.5.1.1.15** *P* **24** *L* **46** # 216

Law, David HP

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

The optional MDIO Interface is defined for individual MDIO Manageable Devices (see subclause 45.2) such as PCS and PMA/PMD. As such there is no requirement to support the MDIO Interface defined for a PHY and it is permissible to have an implementation that support the optional Clause 45 MDIO Interface to a subset of MMDs within a PHY. Based on this I don't think a MIB attribute can have text that is predicated on 'Clause 45 MDIO Interface to the PHY is present'. If the MDIO Interface is present on the PCS MMD then this mapping is true.

SuggestedRemedy

Suggest that the text ' If a Clause 45 MDIO Interface to the PHY is present ..' be restored to read 'If a Clause 45 MDIO Interface to the PCS is present ..' here and in elsewhere in the Clause 30 changes.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Register 45.2.8.2 (here referenced) is in the Clause 22 extension registers MMD - which is defined for PHYs, not for individual sublayers. So the text as written is correct in this instance.

However, the FEC ability is also found in register 45.2.1.89.

In order to encompass the variety of MMDs, change to "If a Clause 45 MDIO Interface is present" in all instances.

Add the second reference.

In 30.5.1.1.16, 17 & 18 the reference appears OK - so no further change required.

Cl **93A** *SC* **93A** *P* **315** *L* **6** # 217

Dawe, Piers IPtronics

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

I was looking for the COM spec and I found "Characteristics of electrical backplanes" but that sounded like advice about how to make backplanes, or recommendations like Annex 69B - "informative" stuff, and I was looking for a normative specification. This annex needs a more assertive title that does justice to its contents.

SuggestedRemedy

Specification methods for electrical backplanes

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change title to "Specification methods for electrical channels"

This annex is expected also to be used for channels other than backplanes.

Cl **93** *SC* **93.9.1** *P* **230** *L* **15** # 218

Dawe, Piers IPtronics

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

Give a specific reference.

SuggestedRemedy

Change "the procedure in Annex 93A" to "the procedure in Annex 93A.1".

Response *Response Status* **C**

ACCEPT.

Cl **92** *SC* **92.10.2** *P* **186** *L* **6** # 219

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **R** *cable insertion loss*

Putting related information in separate graphs makes it harder for the reader to follow what's going on as well as adding to the bulk of the document.

SuggestedRemedy

Please combine Figure 92-9, Example maximum cable assembly insertion loss and Figure 92-10, Minimum cable assembly insertion loss.

Response *Response Status* **C**

REJECT.

Max IL graphed in figure is an example that meets equation constraints. Min IL is a limit given in equation 92-11. The two graphs are conveying different information. Combining on a single graph may create problem in interpertation as a result of labeling both on single graph.

Cl **92** *SC* **92.8.3.3** *P* **173** *L* **53** # 220

Dawe, Piers IPtronics

Comment Type **E** *Comment Status* **A** *host transition time*

This says "Transmit equalization may be disabled by asserting the preset control defined in Table 45-60 and 45.2.1.81.3." but neither of those define what disabled transmit equalization means. Same problem with Table 92-6. It seems the punch line is actually in 72.6.10.2.3.1: "a state where equalization is turned off ... the pre-cursor (k = -1) and post-cursor (k = +1) coefficients shall be set to a zero value and the main (k = 0) coefficient shall be set to its maximum value".

SuggestedRemedy

Refer to 72.6.10.2.3.1, e.g. here "when transmit equalization is disabled (see 72.6.10.2.3.1). Transmit equalization may..."
and Table 92-6 note b "Transmit equalization may be disabled (see 72.6.10.2.3.1) by asserting the preset control defined in Table 45-60 and 45.2.1.81.3."

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add reference to 72.6.10.2.3.1.

Change paragraph to the following:

"Transition times (rise and fall times) are defined in 86A.5.3.3. The transition times shall be greater than or equal to 8 ps when transmit equalization is disabled (see 72.6.10.2.3.1)."

Make similar changes to 93 and 94.

Cl **92** *SC* **92.8.3** *P* **172** *L* **16** # 221

Dawe, Piers IPtronics

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

Wrong reference for Transition time.

SuggestedRemedy

Change 92.8.3.4 to 92.8.3.3.

Response *Response Status* **C**

ACCEPT.

Use suggested remedy

Cl **92** *SC* **92.11.1** *P* **191** *L* **10** # 222

Dawe, Piers IPtronics

Comment Type **ER** *Comment Status* **A** *test fixture terminology*

Use well-established, recognizable names for things. This "TP2 or TP3 Test fixture" is the familiar Host Compliance Board.
Also, using its usual name would reduce confusion with the other two or three test fixtures in this project.

SuggestedRemedy

Change "TP2 or TP3 Test fixture" or "test fixture" when referring to this test fixture not the TP1/TP4 or TP0a/TP5a test fixtures, to "Host Compliance Board".

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Test fixture used in base document; IEEE Std 802.3ba-2010; 84.8.1.1 Test fixture; 85.8.3.5 Test fixture. "Test fixture" is well understood description of function performed.

In 92.11.1, Change the start of the first sentence to "The test fixture (also known as Host Compliance Board)".

Cl **92** *SC* **92.8.3.7.2** *P* **178** *L* **29** # 223

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R** *host tx jitter*

This spec uses FEC so a BER of 10^-12 is irrelevant. Generally TJ at 10^-12 isn't truly measured anyway but found by extrapolation (92.8.3.7.4 gives an example method), so we might as well cut out the back-and-forth and specify something more relevant and more measurable.

SuggestedRemedy

Replace the spec for TJ-DDJ with one for J4-DDJ (most relevant and measurable) or J5-DDJ or J9-DDJ (because we need J5 and J9 anyway to find ERJ).

Response *Response Status* **C**

REJECT.

1E-12 is required for 100GBASE-KR4 with RS-FEC correction bypassed.

See comment #165.

Cl **92** *SC* **92.10.4** *P* **187** *L* **31** # 224

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R** *cable return loss*

Because of the (through) loss of the MCB, this return loss limit is ineffective at high frequencies: the cable itself behind the MCB can get away with somewhere around 1 dB at 18 to 19 GHz. We know from plugfests that cables do better than that. Although a minimum host loss (which is less than 2 dB) will damp down echoes from the host IC, echoes are still a significant concern and there is no cost saving to leave such a weakness in the overall spec.

SuggestedRemedy

Tighten the limit at high frequencies by up to twice the MCB trace loss.

Response *Response Status* **C**

REJECT.

There is no consensus on whether a change is required. The suggested remedy does not provide a solution that can be implemented by the editors.

Resubmit of D1.2 comment#408

From Comment#408: Note that the host trace minimum insertion loss (92A-2) is consistent with the cable assembly test fixture insertion loss. In other words, the insertion loss included in the measurement is also expected to be present in an actual system.

In addition, specified return loss includes the effect of the test fixture insertion loss.

Cl **94** *SC* **94** *P* **241** *L* **1** # 225

Dawe, Piers IPtronics

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

I haven't noticed any 100GBASE-KP4 silicon. Does 100GBASE-KP4 now have Broad Market Potential (multiple vendors and numerous users) or is 100GBASE-KR4 the de facto standard?

SuggestedRemedy

Show Broad Market Potential (commitment from multiple vendors and numerous users) or remove the clause.

Response *Response Status* **C**

REJECT.

There is no justification for removing Clause 94. The 802.3 working group approved the following objective at the March 2012 IEEE 802 Plenary:
"Define a 4 lane PHY for operation over a printed circuit board backplane with a total channel insertion loss of <= 33 dB at 7.0 GHz"

Cl **92** *SC* **92.8.3.3** *P* **173** *L* **53** # 226

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R** *host tx transition time*

The transition times (per 92.8.3, at TP2 with the HCB of 92.11.1 and a fourth-order Bessel-Thomson low-pass response with 33 GHz 3 dB bandwidth) shall be greater than or equal to 8 ps when transmit equalization is disabled.
72.6.10.2.3.1 says "where equalization is turned off... the pre-cursor (k = -1) and post-cursor (k = +1) coefficients shall be set to a zero value and the main (k = 0) coefficient shall be set to its maximum value". This appears to be at TP0. Notice that KR4 has an 8 ps limit, at TP0a. For a host with significant PCB loss, the signal at TP0 can be as fast as it likes and the signal at TP2 will always exceed 8 ps - so this spec has effect only for hosts with very little loss and non-KR4-compliant ICs. It might help with NEXT for those hosts but does nothing for FEXT. Is this what's intended?

SuggestedRemedy

Options:
Try to constrain the transition time at TP0 - not feasible?
Delete this spec, as ineffective.
Tighten this spec (more ps), to what an 8 ps IC behind a minimum-loss host PCB, good connector and HCB would deliver at TP2.
Leave this spec - probably harmless.
Other?

Response *Response Status* **C**

REJECT.

Suggested remedy proposal lacking sufficient recommended changes to implement in the draft.

Limiting the minimum transition time measured at TP2 serves to bound the crosstalk in the medium. Annex 92A.2 recommends that the transmitter is constrained at TP0 according to 93.8.1 (100GBASE-KR4 "Transmitter Characteristics").

In addition see, Table 92-13 "Cable assembly integrated crosstalk parameters" for usage of rise and fall times.

Cl **92** *SC* **92.8.3.7** *P* **178** *L* **20** # 227

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R** *host tx jitter*

These jitter metrics must be met regardless of the transmit equalization setting. For a maximum host channel with the transmitter at Preset, this might be challenging because the eye at TP2 is pretty closed up, but this is not relevant to real-world use with an equalizer.

SuggestedRemedy

Consider if "regardless of the transmit equalization setting" is too wide, and the specifications should apply above some threshold of emphasis.

Response *Response Status* **C**

REJECT.

The transmitter equalization may be different for different channels therefore even-odd jitter must be tested over range of allowable equalization settings.

The algorithm is capable of measuring even-odd jitter on a distorted waveform.

Cl **92** *SC* **92.8.3.7** *P* **178** *L* **20** # 228

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R** *host tx jitter*

This spec assumes that DDJ is harmless, and constrains the difference between TJ and DDJ, and the difference between effective DJ and DDJ. However, the jitter specs allow the DDJ to contain large amounts of true DCD (imbalance between ones and zeros), which consumes SNR, has to be corrected in the receiver, and for a differential driver output, is not necessary. Is this true DCD constrained enough by the max RMS normalized error (linear fit) spec?

SuggestedRemedy

If not, add a true DCD spec. True DCD is easily measured: from an eye, by selecting the scope menu item called "DCD", or from the DDJ method by comparing rising and falling edges.

Response *Response Status* **C**

REJECT.

DCD is sufficiently constrained by the maximum RMS normalized error and Even-odd jitter. The assumptions is that "true DCD" referred to by commenter is rise fall asymmetry.

Cl **92** *SC* **92.10.2** *P* **184** *L* **19** # 229

Dawe, Piers IPtronics

Comment Type **T** *Comment Status* **R** *cable frequency range*

I was reading 93A.3 and had difficulty finding the values for fmax.
92.10.2, Cable assembly insertion loss, doesn't use the terms fmin or fmax.

93.8.2.3, Receiver interference tolerance, mentions them in the text.

In 93.9.1, Table 93-9, Channel operating margin parameters, has an fmin that's probably a different one.

94.3.13.3, Receiver interference tolerance, mentions them in a footnote to Table 94-17, but I can't find that fmax by searching the pdf.

94.4.2, Channel insertion loss, eqn 94-19, has a conflicting fmax.

SuggestedRemedy

Explicitly name fmin and fmax in 92.10.2, e.g. with entries in Table 92-12, Maximum and minimum cable assembly insertion loss characteristics.
Use a more consistent layout in the three clauses.
Write fmax the same way each time so Acrobat sees them as the same.
Resolve the discrepancy between 94.3.13.3 and 94.4.2, and between 93.8.2.3 and Table 93-9 e.g. by renaming one of each fmax and fmin.

Response *Response Status* **C**

REJECT.

Refer to page 325 line 28 which states "the values assigned to fmin and fmax are defined by the phsical layer specification that invokes this method."

Clauses 93 and 94 invoke the this method for interference tolerance testing at which point the fmin and fmax points are defined. This method is not invoked in Clause 92.

Editor will check the format of fmin and fmax to facilitate search.

Cl **92** *SC* **92.8** *P* **171** *L* **8** # 230

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *cable/host parameters*

The following items are needed for a viable spec (technical completeness):
Host common-mode output return loss
Absorbs common-mode energy
Host mixed-mode output return loss or termination mismatch
Limits conversion of reflected common-mode signal into interfering differential signal
Cable common-mode return loss
Absorbs common-mode energy
Integrated Common-Mode Conversion Noise or differential to common mode through loss
Limits conversion into common mode that would otherwise exceed the AC common-mode output voltage spec and the AC common-mode tolerance of the receiver, and could cause EMI - relevant to low loss cables in particular
These items are present in the InfiniBand FDR spec. Comparison with 40GBASE-CR4 and 100GBASE-CR10 may be interesting but does not justify gaps in this spec.

SuggestedRemedy

Add specs:
Host common-mode output return loss, -2 dB, 50 MHz to 20 GHz
Host common mode to differential output return loss, 16-1.22f, 50 MHz to 20 GHz
Cable common-mode return loss, -2 dB, 50 MHz to 20 GHz
Integrated Common-mode Conversion Noise, 40 mV.
Integrated Common-mode Conversion Noise is defined analogously to Integrated Crosstalk Noise. If that isn't clear enough, see the InfiniBand FDR spec, part of InfiniBand Architecture Specification Volume 2 Release 1.3.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Add Host common mode to differential output return loss. See comment#186.

Add the following specifications:
Host common-mode output return loss, 2 dB, 200 MHz to 19 GHz
Cable common-mode return loss, 2 dB, 200 MHz to 19 GHz

Cl **92** *SC* **92.8.3.7.2** *P* **178** *L* **27** # 231

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **R** *host tx jitter*

TJ, DDJ and ERJ as used in this project are all proper nouns because they have definitions that are not the obvious meaning of the phrases: TJ is not all the jitter there is, DDJ is not all the data-dependent jitter, ERJ could contain any fraction that's random, EDJ is probably far from all the deterministic jitter. Other clauses may have used similar but uncapitalized terms without definition (making them common nouns, if technically unsatisfactory), or may have simply ignored the rules on proper nouns in Merriam-Webster. But we aren't required to repeat or correct those problems: this clause has definitions (good!) Jitter terminology can be confusing enough without erroneous typesetting - let's do it right to help our readers.

SuggestedRemedy

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

Response *Response Status* **W**

REJECT.

The use of capital letters for the cited jitter terms are consistent with similar terms in 802.3-2012.

In addition, see response to capitalization Comment#135 against D1.0.

Cl **92** *SC* **92.8.4** *P* **179** *L* **22** # 232

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *host rx overload*

This incorporates the overload spec in 72.7.2.4 which says "shall accept differential input signal peak-to-peak amplitudes produced by compliant transmitters connected without attenuation to the receiver, and still meet the BER requirement specified in 72.7.2.1." but that's not appropriate because:
1. There is a minimum loss for the cable and a recommended minimum loss for the host PCB traces - signals from less loss than that don't need to be supported;
2. In 72, training is not actually required; here I understand that it is, and
3. The BER in 72.7.2.1 is 1e-12.
In a scenario where training must be available, what the receiver has to do with an overload challenge is train it to what it likes THEN receive it.

SuggestedRemedy

We don't need to write a separate overload section.
Delete this row in Table 92-8.
In Table 92-9, add a column for another test, with parameters for a minimum-loss cable and host channel (same as Test 1, I believe). Simplify the noise and jitter parameters for this new column if appropriate. Add a row for (initial and maximum) peak-to-peak voltage. For tests 1 and 2, 800 mV: refer to this row from 92.8.4.3.4. For the new column, the peak-to-peak voltage is 1200 mV at Initialize as attenuated by the minimum-loss cable, i.e. something less than 1000 mV (to be calculated).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

It should be noted that, for the receiver to adjust the transmitter amplitude to be less than the maximum permitted value, it is necessary for it to participate in the start-up protocol while (initially) receiving that maximum amplitude (with the transmitter in the INITIALIZE state).

To specify that the receiver has the ability to do so, add the following subclause before 92.8.4.1 (which then becomes 92.8.4.2).

“92.8.4.1 Receiver input amplitude tolerance
100GBASE-CR4 receiver shall operate at a BER better than 10^(-5) when connected to a compliant transmitter whose peak-to-peak differential output voltage, as defined by 92.8.3.1 using preset equalizer coefficients, is 1200 mV using a compliant cable assembly with the minimum insertion loss defined in 92.10.2. The receiver is allowed to control the transmitter equalizer coefficients, using the protocol defined in 92.7.12 or an equivalent process, to meet this requirement."

In Table 92-8, replace the first row with the following:

"Receiver input amplitude tolerance | 92.8.4.1 | 1200 mV as measured at TP2"

Update other Table 92-8 cross-references due to the subclause renumbering. Update PICS accordingly.

Cl **92** *SC* **92.10.3** *P* **186** *L* **40** # 233

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *cable ILD*

The ILD limit is near to double the 40GBASE-CR4 limit (scaled for signalling rate). I don't believe this draft spec works, even with FEC, unless the ICs are much better than needed for 100GBASE-KR4. Those who want a 100GBASE-CR4 need to do their homework to see whether this is viable.

SuggestedRemedy

Do the analysis of this draft spec and tighten ILD or reflection or maximum loss specs to make it work with KR4 grade ICs.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #188. Deletes ILD specification.

Cl **93** *SC* **93.8.2.3** *P* **228** *L* **28** # 234

Dawe, Piers IPtronics

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

92.8.4.3.5, 100GBASE-CR4 Receiver interference tolerance test procedure, says: During the tests, the disturbers transmit... and all of the transmitters in the device under test transmit ...

This is normal practice, seen in many PMD clauses.

93.8.2.3, 100GBASE-KR4 Receiver interference tolerance, refers to Annex 69A, which says "The interfering signal can come from ... NEXT" but then forgets to require that the other input lanes and the output lanes of the port under test be active during BER measurement.

SuggestedRemedy

Explain that there are three FEXT disturbers, and add (at the end of the subclause?): During the tests, the disturbers transmit at their calibrated level and all of the transmitters in the device under test transmit either scrambled idle or PRBS31, with the maximum compliant amplitude and equalization turned off (preset condition).

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

The response to comment #90 requires that COM be used to calibrate the broadband noise applied to the receiver under test.

This requires the incorporation of, or reference to, the text in 94.3.13.3. This text accounts for the multi-lane nature of the interface.

See #90.

Add the following text to the paragraph on page 282 line 14 …

During the test, the transmitters of the PMD under test transmit the pattern specified by the PMD clause, with the transmitters in the preset condition.

Cl **93** *SC* **93.8.1.1** *P* **220** *L* **48** # 235

Dawe, Piers IPtronics

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

Obviously, a 100GBASE-KR4 port must be able to transmit and receive simultaneously and overcome its own FEXT and NEXT. Testing this would be impractical with separate transmitter and receiver test fixtures, as well as adding the expense of another test fixture.

SuggestedRemedy

Combine the two test fixtures. Specify test fixture NEXT and FEXT if it helps.

Response *Response Status* **C**

REJECT.

93.8.1.1 and 93.8.2.1 specify the performance of the signal path from TP0 (TP5) to TP0a (TP5a) and not the implementation of the test fixtures. Both "fixtures" could be on the same test card and thereby incur no additional expense.

Any far- or near-end crosstalk in the test fixture only inhibits the ability of the transmitter or receiver under test from meeting the specifications of this Clause. It is therefore in the interest of the implementer to minimize these sources of noise and no explicit specification is required.

Cl **92** *SC* **92.11.3** *P* **196** *L* **22** # 236

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *test fixture CM conversion*

We need mated compliance board Sdc11, Sdc22, Scd11, Scd22 specs that are at least 2.5 to 3 dB better than the host receiver differential to common-mode input return loss spec in 92.8.4.2. At the moment we have just through conversion: Sdc21, Sdc12, Scd21, Scd12 (or some of them - not clear what "common-mode conversion loss" means exactly).

SuggestedRemedy

Add mated compliance board Sdc11, Sdc22, Scd11, Scd22 specs that are at least 2.5 to 3 dB better than the host receiver differential to common-mode input return loss spec. Expect a presentation.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #187.

Cl **92** *SC* **92.11** *P* **191** *L* **51** # 237

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **R** *test fixture loss*

Are the 100GBASE-CR4 HCB, MCB PCB losses achievable in practice?

SuggestedRemedy

If not, make adjustments, keeping consistency with the OIF/InfiniBand EDR specifications.

Response *Response Status* **U**

REJECT.

Confidence expressed that current specifications can be met. Implementations to verify are pending.

Cl **92** *SC* **92.8.4.2** *P* **180** *L* **2** # 238

Dawe, Piers IPtronics

Comment Type **TR** *Comment Status* **A** *host rx return loss*

The receiver differential to common-mode input return loss spec in eqn 92-6 doesn't agree with Table 92-8, Receiver characteristics at TP3 summary.

SuggestedRemedy

Correct whichever one is wrong.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

See comment #184

Cl **00** *SC* **0** *P* **1** *L* **1** # 239

Dawe, Piers IPtronics

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

It's time for the project to move to the next stage. Now that we have a near-complete proposal based on viewgraphs and simulations, it needs to be validated as a specification based on reality. Here's an example from P802.3ae:
To demonstrate a BER of 10^-12 over the rated distance; shown to be interoperable between PMD of at least two vendors for each PMD type.
Path to full compliance is explained credibly.

Other bodies such as OIF and InfiniBand report on test fests or interoperability demonstrations. I don't believe 802.3 needs to organise such events if vendors will show off their products anyway.
Also, there has been very little reported on 100GBASE-CR4 to the current draft, even in simulation.

SuggestedRemedy

Assess the 100GBASE-CR4 draft by simulation.
For each PHY type, before starting Sponsor Ballot, demonstrate the specified error performance over the worst specified channels with interoperation between PHYs of at least two vendors for each PHY type. Explain credibly the path to full compliance.

Response *Response Status* **C**

REJECT.

No specific issue with the specifications in the current draft have been identified by the commenter. Neither does the suggested remedy provide any changes to the specifications.

The qualification of the end to end (chip to chip) channel as specified for KP4 and KR4 and recommended for CR4 (see 92A.1, 92A.2, and 92A.7) is based upon COM. COM is based on realistic and/or specified device parameters, specified driver performance, and a practical receiver architecture based on published literature. Public demonstrations of technologies comparable to KR4 have been made.

We have adopted per comment #188 the use of COM to specify the CR4 cable assembly performance.

With respect to CR4, the recommended COM constraint is the same as that for KR4 so we can infer that any evidence that supports the viability of KR4 does the same for CR4.

Cl **93** *SC* **93.8.1.4** *P* **222** *L* **47** # 240

Dawe, Piers IPtronics

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

The S-parameter specs go only as far as 19 GHz, implying that energy above 19 GHz is non-existent or harmless, yet time-domain signals are defined in a 33 GHz bandwidth, implying that energy between 19 GHz and 33 GHz could be present and important. These are not consistent. This issue applies more to KR4 than CR4, where one could always use thinner cables if too much high frequency energy were an issue.
As the S-parameter specs are frequency-aware limits, there is no particular reason to stop at 19 GHz. Do some instruments stop at 20 GHz?
For scopes: a 33 GHz bandwidth allows in frequencies and noise that a real receiver wouldn't, so it's not optimal. Worse, it probably costs more than a slower scope! Some slow scopes might degrade peak-to-peak and jitter measurements but the Bessel-Thomson response with its excellent phase response was chosen to avoid this while filtering irrelevant noise and so on.
This is a TR comment because it may take a while for people to assure themselves of the consequences of either a change or no change.

SuggestedRemedy

Change 19 GHz to 20 GHz for S-parameter ("loss") specs throughout (it may be fine to leave it at 19 for insertion loss fitting). Consider changing 33 GHz to 25 GHz for scope response, throughout except for transition time. For comparison, an optical signal would be measured in~19 GHz (3/4 of signalling rate).

Response *Response Status* **U**

REJECT.

The bandwidth of interest for the channel was deemed to be 75% of the signaling rate which in this case is approximately 19 GHz. The capability of an instrument to measure higher frequencies is not a justification to specify them.

Measurements made directly at the transmitter output (or at the output of a test fixture with controlled loss) do not include the high frequency attenuation introduced by the channel. A broader bandwidth, e.g. 125% of the signalling rate, is used for consistent and accurate measurement of transmitter parameters such as transition times and jitter. The benefit of reducing the bandwidth of the measurement for other parameters is unclear.

Cl **91** *SC* **91.5.3.3** *P* **143** *L* **20** # 241

Law, David HP

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

Suggest that '.. or contains errors but was not corrected .. should read '.. or contains errors that were not corrected ..'.

SuggestedRemedy

See comment.

Response *Response Status* **C**

ACCEPT.

Also modify similar text in other instances e.g. 91.6.6.

Cl **91** *SC* **91.6.4** *P* **156** *L* **1** # 242

Law, David HP

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

Typo.

SuggestedRemedy

Suggest that 'FEC bypass indication ability' should read 'FEC_bypass_indication_ability'.

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.6** *P* **215** *L* **15** # 243

Law, David HP

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

Clause 45 defines registers.

SuggestedRemedy

Suggest the text 'The optional MDIO capability described in Clause 45 defines several variables that ..' should read 'The optional MDIO capability described in Clause 45 defines several regsiters that ..'.

Response *Response Status* **C**

ACCEPT.

The are a number of occurrences of this "boilerplate" text in the draft. Ensure that all instances are consistent.

Cl **93** *SC* **93.8.1.1** *P* **220** *L* **49** # 244

Law, David HP

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

Suggest reference to TP0a be added in this paragraph.

SuggestedRemedy

Suggest '.. are made at the output of a test fixture as shown ..' should be changed to read '.. are made at the output of a test fixture (TP0a) as shown ..'.

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.11.4.2** *P* **238** *L* **31** # 245

Law, David HP

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

As items TC11, TC12 and TC12 are mandatory predicated on EEE the support column should be 'Yes [ ] N/A [ ]'.

SuggestedRemedy

Change the support column to read 'Yes [ ] N/A [ ]' for items TC11, TC12 and TC12.

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.11.4.2** *P* **238** *L* **45** # 246

Law, David HP

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

The support column is missing a value for TC15.

SuggestedRemedy

Add 'Yes [ ]' to the TC15 support column.

Response *Response Status* **C**

ACCEPT.

Cl **93** *SC* **93.11.4.2** *P* **238** *L* **48** # 247

Law, David HP

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

Subclause 93.8.1.4 specifies Transmitter output return loss.

SuggestedRemedy

Suggest that the feature column of item TC16 be changed from 'Common-mode input return loss' to read 'Common-mode output return loss'.

Response *Response Status* **C**

ACCEPT.

Cl **73** *SC* **73.5.1** *P* **56** *L* **25** # 248

Law, David HP

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

The existing text refences the lane-by-lane transmit disable in subclauses 71.6.7, 84.7.7, and 85.7.7 as does the 100GBASE-KR4 refernce (93.77) yet the global transmit disable is refernce in 100GBASE-CR4 (92.7.6) and 100GBASE-KP4 (94.3.6.6). Suggest that the refernce here should always be to the lane-by-lane transmit disable.

SuggestedRemedy

Suggest that the text '.. 92.7.6, 93.7.7, or 94.3.6.6.' should be changed to read '.. 92.7.7, 93.7.7, or 94.3.6.7.'.

Response *Response Status* **C**

ACCEPT.

Cl **83** *SC* **83.1.1** *P* **120** *L* **19** # 249

Law, David HP

Comment Type **T** *Comment Status* **A** *PHY types*

This subclause states that 'The 100GBASE-R PMA(s) can support any of the 100 Gb/s PMDs in Table 80-2a, except 100GBASE-KP4 (Clause 94).'. Is this correct, Table 94-1 lists the Clause 83 PMA as optional and wouldn't it be required for an implementation that used CAUI between the 100GBASE-R PCS and the RS-FEC (see figure 83C-2b). Isn't the restriction that the PMA that provides the PMD services interface in a 100GBASE-KP PHY can't be a Clause 83 PMA.

SuggestedRemedy

Either change the text in this subclause 83.1.1 to clarify the restriction or remove Clause 83 as an option in Table 94-1.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change "except 100GBASE-KP4 (Clause 94)" to "but does not provide the PMD service interfaces for 100GBASE-KP4 (Clause 94)"

Cl **93** *SC* **93.7.5** *P* **218** *L* **9** # 250

Law, David HP

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

Suggest a cross reference to how management disables training.

SuggestedRemedy

Suggest that text 'If training is disabled by management, ..' be changed to read 'If training is disabled by management variable mr_training_enable (see 93.6), ..'.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change to:
"If training is disabled by the management variable mr_training_enable (see 93.6), ."

Modify Clauses 92 and 94 as needed for consistency.

Cl **73** *SC* *P* **56** *L* **5** # 251

Geoff Thompson GraCaSI S.A.

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

The normative text starts with the word "Note", yet this portion of the text is not a note. The use of this terminology is unnecessary.

SuggestedRemedy

Delete the words "Note that although" at the beginning of the sentence and capitalize the "t" in "the". The resulting text will not be confused with a note.

Response *Response Status* **C**

ACCEPT IN PRINCIPLE.

Change the paragraph to:
"Auto-Negotiation defined in this clause was originally intended for use with Backplane Ethernet PHYs. It is also specified for use with 40GBASE-CR4, 100GBASE-CR10, and 100GBASE-CR4 PHYs."

Cl **93A** *SC* **93A.1** *P* **315** *L* **24** # 252

Farhoodfar, Arash Cortina-Systems

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

TX SNDR is not modeled in COM. TX SNDR is defined in 94.3.12.9 for PAM4 but not modeled in COM.

SuggestedRemedy

Shoul ad TX noise as a new noise PDF to the COM. Need to resolve the issue of how to combine this with Dual-dirac Jitter model.

Response *Response Status* **C**

REJECT.

<This comment was received after the ballot closed. Since the comment is late and is non-binding, the editor changed the comment type from TR to T.>

It has not been established that the SNDR of the transmitter modeled by COM is significantly better than the minimum specified value.

The suggested remedy is incomplete as it does not specify the properties of the noise or how it should be added. The suggested remedy also implies an issue combining the proposed noise sources with existing noise sources but offers no resolution.