Cl **80** *SC* **80.2.2** *P* **33** *L* **8** # 22

Lusted, Kent — Intel

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

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

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

SuggestedRemedy

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

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

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

Cl **92** *SC* **92.7.1** *P* **89** *L* **41** # 141

Dawe, Piers — IPtronics

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

"Functional specifications" are brief, high-level (logic level) specifications of what the PMD layer does. This text is going too far into the electrical detail which is better placed elsewhere, e.g. at the beginning of the "Definitions of parameters and measurement methods" subclause.

SuggestedRemedy

Try to move some of the material between line 41 line "A mated connector pair has been included" and p90 line 2 "Annex 92A." into the channel or "Definitions of parameters and measurement methods" subclause.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

92.7.1 text describes the link block diagram and supports the defined test point definitions in Table 92-4 100GBASE-CR4.

Cl **92** *SC* **92.7.1** *P* **90** *L* **48** # 212

Dudek, Mike — QLogic

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

In table 92-4 The Test points TP0 to TP1 and TP4 to TP5 don't match the description. There are no mated connector pairs between eg TP0 and TP1

SuggestedRemedy

Change the test points on this row from TP1 to TP2 and from TP4 to TP3

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Change Table 92-4 row 3 from "TP0 to TP1" to "TP0 to TP2" and from "TP4 to TP5" to "TP3 to TP5".

Cl **92** *SC* **92.7.1** *P* **90** *L* **7** # 161

Dawe, Piers — IPtronics

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

Figure 92-2 shows TP0 just by the PMD transmit function, TP1 just by the connector and so on. This is at odds with the text: TP1-4 are offset from the connector by the HCB or MCB trace loss, TP0 and TP5 are not offset.

SuggestedRemedy

Make the arrow for TP0 and TP5 point exactly at the end of the function, move the arrows for TP1-4 further from the connectors. Thanks!

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In Figure 92-2 move TP0 and TP5 as close to end of Tx/Rx functions as possible. TP1 to TP4 includes cable assembly text fixture loss; move TP1 and TP4 further back from MDI.

Cl **92** *SC* **92.7.8** *P* **92** *L* **16** # 165

Dawe, Piers IPtronics

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

This (a PMD clause) says "Local loopback mode shall be provided by the adjacent PMA (see 83.5.8) as a test function to the device." That's impossible: only the PMA clause can tell the PMA what to do.
"Device" is not a standards word (too vague).
Why is this loopback needed?

SuggestedRemedy

83.5.8, PMA local loopback mode, says "PMA local loopback shall be provided by the PMA adjacent to the PMD for 40GBASE-KR4, 40GBASECR4, and 100BASE-CR10 PMDs."
If it's really necessary, explain in the comment response, and add 100BASE-CR4 to the list in 83.5.8, and here in 92.7.8, change to "The PMA adjacent to the PMD provides PMA local loopback mode (see 83.5.8) as a test function."
Otherwise, chnage to "The PMA adjacent to the PMD may optionally provide PMA local loopback mode (see 83.5.8) as a test function."
Similarly for 93.7.8 and 94.2.9.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The commenter correctly points out the normative requirement is already stated in 83.5.8. It sets the precedent that loopback is required for 40 Gb/s and 100 Gb/s copper PHYs.

Change the first sentence of 83.5.8 as follows.

"PMA local loopback shall be provided by the PMA adjacent to the PMD for 40GBASE-KR4, 40GBASE-CR4, 100GBASE-CR10, 100GBASE-KR4, and 100GBASE-CR4 PMDs."

Change the first sentence of 92.7.8 and 93.7.8 to:
"Local loopback mode is provided by the adjacent PMA (see 83.5.8) as a test function."

Cl **92** *SC* **92.8** *P* **94** *L* **1** # 140

Dawe, Piers IPtronics

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

The layout of these clauses makes them hard to use, with PMD specifications on the one hand, and measurement and definition detail on the other, muddled together.

SuggestedRemedy

Follow the usual layout of a PMD clause, with subclause for transmitter and receiver then a separate subclause: Definition of parameters and measurement methods.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Clause 92 (PMD) structure follows Clause 85 providing Tx and Rx subclauses and subclauses for link segment parameters etc...Proposal insufficently supported and lacking sufficient recommended changes to implemet in the draft.

Cl **92** *SC* **92.8.3** *P* **94** *L* **1** # 170

Dawe, Piers IPtronics

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

"92.8.3 Transmitter characteristics" sounds like a datasheet. Please write in normative standards language!
Also follow the house style of 100GE unless improving on it.

SuggestedRemedy

Change "92.8.3 Transmitter characteristics" to "92.8.3 Transmitter electrical specifications". Similarly for receiver and the other PMD clauses.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Characteristics used in normative standards language; see..
Table 93-4
Table 93-6
Table 94-4
Table 94-6
Table 58-3
Table 58-4

Cl **92** *SC* **92.8.3** *P* **94** *L* **13** # 169

Dawe, Piers IPtronics

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

Trying to define the nominal unit interval is not necessary, very difficult to do precisely, and not usual: most PMD clauses including 93 and 94 don't.

SuggestedRemedy

Delete this row, and in Table 92-7. In 92.8.3.9 and 92.8.4.4, change "nominally" to "approximately" or delete the sentences.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Unit UI used extensively throughout clause. In addition, subclauses include percentage of UI e.g., 92.8.3.3 Transmitter output waveform .

In 92.8.3.9 change "nominally" to "approximately". In 92.8.4.4 delete nominal.

Cl **92** *SC* **92.8.4.5** *P* **106** *L* **49** # 153

Dawe, Piers IPtronics

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

"The low frequency 3 dB cutoff of the AC coupling shall be less than TBD kHz." On the one hand, the signalling rate is 2.5x higher. On the other, the signal integrity challenge is much higher. Anyway, one would expect backwards compatibility of a passive cable.

SuggestedRemedy

50 kHz, or perhaps lower.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In 92.8.4.5 replace TBD with 50 kHz.

Cl **92** *SC* **92.8.4.5** *P* **106** *L* **49** # 171

Dawe, Piers IPtronics

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

"The 100GBASE-CR4 receivers are AC coupled. AC coupling shall be part of the receive function for Style-2 100GBASE-CR4 connectors. For Style-1 100GBASE-CR4 plug connectors, the receive lanes are AC coupled; the coupling capacitors shall be within the plug connectors."
But, isn't there only one connector type at present, with the AC coupling in the cable, therefore not needed in the receiver?

SuggestedRemedy

Delete the first two sentences and "Style-1".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Use suggested remedy.

Cl **92** *SC* **92.8.4.5** *P* **106** *L* **49** # 219

Dudek, Mike QLogic

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

The Style 2 connector isn't to be used for 100G-CR4 and we haven't defined different Style connectors.

SuggestedRemedy

Delete the sentence "AC coupling shall be part of the receive function for Style-2 100GBASE-CR4 connectors." and delete "style 1" in the next sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response comment #171.

Cl **92** *SC* **92-1** *P* **85** *L* # 187

Sela, Oren
Mellanox Technologies

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

Need to add CL72 to the table due to startup protocol and the PMD control which is referenced to CL72

SuggestedRemedy

Add to table 92-1:
72-PMD control required

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The 10GBASE-KR PMD sublayer is not required to form a complete 100GBASE-CR4 Physical Layer. Instead, the 100GBASE-CR4 PMD sublayer incorporates a PMD control function that is functionally equivalent, but not identical, to the function described in 72.6.10.

Cl **93** *SC* **7.12** *P* **130** *L* **33** # 97

Slavick, Jeff
Avago Technologies

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

Clause 72 allows for multiple tap coefficient change requests to occur at the same time. The update for each tap is done independent of each other. There are variables that combine the current overall setting of the transmitter and are used by each TAP when evaluating if it's allowed to make the change. When multiple requests are made simultaneously that cause the transmitter to go beyond it's operating range, there is no clear definition of what should be done. You can for example service one or two of the requests because it doesn't cause you to go out of bounds, or you can deny all.

SuggestedRemedy

Add the following text to 93.7.12 and 92.7.12 to the end of the first paragraph.

Each lane shall only request an adjustment to one Coefficient at a time and shall wait until receiving a response for that request before sending another request.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

It is agreed that Clause 72 is unclear on how the status report fields should be set when a parallel coefficient update results in a violation of the peak or steady state voltage constraints.

That said, while Clause 72 allows parallel coefficient update requests, it does not require it.

The implication is that an adaptation algorithm that cannot deal with ambiguity in status reports corresponding to constraint violations with parallel coefficient updates may send individual coefficient updates serially.

Conversely, an adaptation algorithm that is insensitive to this ambiguity may send coefficient updates in parallel if it wishes.

Therefore, the initiator of coefficient updates has the ability to choose whether to send coefficient updates serially or in parallel and therefore there is no ambiguity imposed by the standard. It is an implementation consideration.

The commenter does not provide justification constrain the implementation in the manner proposed in the suggested remedy.

Cl **93** *SC* **8.1** *P* **131** *L* **34** # 203

Hidaka, Yasuo — Fujitsu Laboratories of

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

Table 93-4.
Total jitter excluding DDJ is defined as 0.28UI.
It was defined as 0.25UI excluding DDJ in clause 85.
It was defined as 0.28UI including DDJ in clause 72.
OIF define it as 0.28UI including DDJ.

We should change it to 0.25UI as it excludes DDJ.

SuggestedRemedy

Change 0.28UI with 0.25UI.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Pending discussion by the Task Force and a measurement of the consensus to make the proposed change.

Cl **93** *SC* **92.8.3.8** *P* **135** *L* **48** # 154

Dawe, Piers — IPtronics

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

This says "the measurement bandwidth should be at least TBD GHz". But a definition needs to be precise and not biased: we can't say whether more bandwidth is "better", or less bandwidth. We give the reader the hint in the next sentence that it may not be critical. (I don't think it makes a huge difference as long as it's a reasonable linear-phase response.)

SuggestedRemedy

Change "For DDJ measurements, the measurement bandwidth should be at least TBD GHz." to "The waveform is observed through a fourth-order Bessel-Thomson response with a bandwidth of 33 GHz."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #146.

Cl **93** *SC* **93.7.12** *P* **130** *L* **31** # 175

Dawe, Piers — IPtronics

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

This says "Each lane of the 100GBASE-KR4 PMD shall use the same control function as 10GBASE-KR, as defined in 72.6.10." and 72.6.10 says "The control channel is signaled using differential Manchester encoding (DME) at a signaling rate equal to one quarter of the 10GBASE-KR signaling rate. Since each DME symbol contains two DME transition positions and each transition position is four 10GBASE-KR UI, one control channel bit is transmitted every eight 10GBASE-KR UI.
Do you mean use the same training frames run 2.5 times faster (including DME 2.5 times faster) or DME at rate stated above but PRBS 2.5x faster?

SuggestedRemedy

Please make this clear.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The timing parameters in 72.6.10 should be scaled by a factor of 0.4 for 100GBASE-KR4 to account for the reduction in the unit interval.

Add the following sentence the end of the first paragraph of 93.7.12.

"The training frame structure used by the 100GBASE-KR4 PMD control function shall be as defined in 72.6.10 with the exception that 25.78125 GBd symbols replace 10.3125 GBd symbols and 100GBASE-KR4 UI replace 10GBASE-KR UI, i.e. all times are multiplied by a factor of 0.4."

Make similar changes to 92.7.12.

Cl **93** *SC* **93.8.1** *P* **131** *L* # 145

Dawe, Piers IPtronics

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

For robustness, it would help if there were something like a minimum VMA spec (say 0 to 50 mV) so that the Tx would never set the signal to invert if the Rx asked for one too many tap weight changes.

SuggestedRemedy

Consider adding a minimum VMA spec, or similar, so that Tx can never invert the signal or set all its the taps to zero when still technically transmitting.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The PMD control function gives the receiver complete control of the transmit equalizer or, stated another way, several lengths of enough rope with which to hang itself.

While the commenter points out the extreme case where receiver forces that transmitter steady state voltage to zero, or even opposite the symbol polarity, for a given channel there likely exists other settings that yield the same effect which is the inability to effectively communicate.

When this happens, the receiver is given multiple escape routes such as sending preset or initialize to the transmitter in order to return to a known state.

So, while a minimum VMA specification could eliminate one problematic case, it does not solve the problem of an errant algorithm sending the transmitter into a bad state. Given this, it may be preferrable to not impose such a constraint since these constraints, as pointed out by comment #97, can be problematic for some algorithms.

The merits of the proposed specification should be discussed by the Task Force.

Cl **93** *SC* **93.8.1.2** *P* **131** *L* **50** # 143

Dawe, Piers IPtronics

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

A pattern with a 2 UI period is not a "square wave":
52.9.1.2 Square wave pattern definition
A pattern consisting of four to eleven consecutive ones followed by an equal run of zeros may be used as a square wave.
Table 86-11-Test patterns
Square wave (8 ones, 8 zeros)
And this is a bad choice: the true peak-to-peak voltage could be significantly larger. We really want to contain the VMA or steady-state voltage because more of that passes though a lossy channel.

SuggestedRemedy

Use a mixed frequency pattern: PRBS31 or scrambled idle, possibly PRBS9.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The test patterns that may be provided by the PMA are PRBS9, PRBS31, and a square wave test pattern with a period of 16 UI. It would be beneficial to base the requirements on one of these patterns or scrambled idle.

While there is no test pattern that is entirely alternating 1 and 0 symbols, this pattern can be found in either the PRBS9 or PRBS31 test pattern. PRBS9 is a convenient test pattern since it is used to test transmit equalizer compliance.

Also note that no test pattern is defined for DC or AC common-mode output voltage and DC or AC common-mode output voltage requirements should apply regardless of the transmit equalizer setting.

Change the second and third paragraph of 93.8.1.2 to:
"The peak-to-peak differential output voltage shall be less than or equal to 1200 mV regardless of the transmit equalizer setting. The peak-to-peak differential output voltage shall be less than or equal to 30 mV when the transmitter is disabled (refer to 93.7.6 and 93.7.7)."

"The DC common-mode output voltage shall be between 0 V and TBD V with respect to signal ground. The AC common-mode output voltage shall be less than or equal to 12 mV RMS with respect to signal ground. Common-mode output voltage requirements shall be met regardless of the transmit equalizer setting."

Add the following paragraph to end of 93.8.1.2:
"Differential and common-mode signal levels are measured with a PRBS9 test pattern."

Cl **93** *SC* **93.8.1.2** *P* **131** *L* **51** # 146

Dawe, Piers IPtronics

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

At present, this and other signal parameters are specified as if observed in an infinite bandwidth. At these rates, that's just too expensive. And noisy.

SuggestedRemedy

Define output voltage, transition time, DCD, TJ, AC common-mode output voltage and more as observed through a 33 GHz fourth-order Bessel-Thomson response.
(Someone with a much faster scope can use a software filter for most parameters, which would give great accuracy.)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The lack of a recommendation on measurement bandwidth does not imply that the bandwidth is prescribed to be infinite, only that no recommendation on the bandwidth (or filter shape for that matter) is made.

It is agreed that if such a filter were to be defined, it should be common to all measurements.

Task Force should discuss whether or not such a filter needs to be defined, and if so, if a 33 GHz Bessel-Thompson filter the correct filter.

Cl **93** *SC* **93.8.1.2** *P* **132** *L* **2** # 155

Dawe, Piers IPtronics

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

Need to define the measurement filter for AC common-mode output voltage. It is convenient (lower cost) if it is the same as for DDJ and so on.

SuggestedRemedy

"The signal is observed through a fourth-order Bessel-Thomson response with a bandwidth of 33 GHz."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See comment #146.

Cl **93** *SC* **93.8.1.3** *P* **132** *L* **21** # 85

Moore, Charles Avago Technologies

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

Tx output return loss is TBD, we need values for equations (93-1) and (93-2)

SuggestedRemedy

use:
DifferentialReturnLoss(f) =
10 x log10((0.026 + (f/32)^2) / (1 + f/32)^2)) dB, 0.05<f<20 (93-1)

CommonModeReturnLoss(f) =
6 dB, 0.05<f<20 (93-2)

f in GHz

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending discussion by the Task Force and a measurement of the consensus to make the proposed change.

Cl **93** *SC* **93.8.1.3** *P* **132** *L* **22** # 65

Mellitz, Richard Intel Corporation

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

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Refer to comment #85.

Cl **93** *SC* **93.8.1.5.1** *P* **134** *L* **19** # 147

Dawe, Piers — IPtronics

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

This isn't a test spec. No "shall be verified" or "shall be tested" allowed! All we ask is that the thing comply - it might be established by design or batch testing. The wording in 93.8.1.4 Transition time is nicer.

SuggestedRemedy

Change "The steady state voltage and linear fit pulse peak values shall be verified after the transmit equalizer coefficients have been set to the "preset" values." to "The steady state voltage and linear fit pulse peak values shall comply with the specifications in Table 93-4 when the transmit equalizer coefficients have been set to the "preset" values."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The suggested remedy adds normative requirements that are redundant with subsequent paragraphs. Replace the text of 93.8.1.5.1 with the following.

"The steady state voltage vf is defined to be the sum of the linear fit pulse p(k) divided by M (refer to 85.8.3.3 step 3). The steady state voltage shall be greater than or equal to 0.4 V and less than or equal to 0.6 V after the transmit equalizer coefficients have been set to the "preset" values.

The peak value of p(k) shall be greater than 0.8 × vf after the transmit equalizer coefficients have been set to the "preset" values."

Cl **93** *SC* **93.8.2.1** *P* **136** *L* **21** # 86

Moore, Charles — Avago Technologies

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

Rx output return loss is TBD, we need values for equations (93-3) and (93-4)

SuggestedRemedy

use:
DifferentialReturnLoss(f) =
10 x log10((0.026 + (f/32)^2) / (1 + (f/32)^2)) dB, 0.05<f<20 (93-3)

CommonModeReturnLoss(f) =
6 dB, 0.05<f<20 (93-4)

f in GHz

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending discussion by the Task Force and a measurement of the consensus to make the proposed change.

Cl **93** *SC* **93.8.2.1** *P* **136** *L* **22** # 63

Mellitz, Richard — Intel Corporation

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

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Refer to comment #86.

Cl **93** *SC* **93.8.2.2** *P* **136** *L* **42** # 88

Moore, Charles — Avago Technologies

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

Receiver used in clause 93 is a package PHY, where clause 85 receiver is defined at a bulkhead connector. Using procedure defined in 85.8.4.2 in not appropriate, use annex 69A instead.

SuggestedRemedy

change:
"Receiver interference tolerance is characterized using the procedure defined in 85.8.4.2"
to:
"Receiver interference tolerance is characterized using the procedure defined in Annex 69A."
Change Annex 69A.2.2 to allow definition of channel loss either in terms of ~mTC and bTC or a0, a1, a2, and a4.
Delete reference to channel noise which is not defined.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The parameters listed in the table are not an exact fit to the test procedure described in either Annex 69A or 85.8.4.2. However, Annex 69A appears to be the closer fit.

Change the reference to Annex 69A as proposed in the suggested remedy and implement the following changes.

1. Neither "Channel noise" nor "TX-RX re-reflection noise are defined terms so delete this row from Table 93-7 as suggested.

2. Use the test channel calibration methodology from 85.8.4.2.3 in place of what is described in 69A.2.2. This may be accomplished by adding a new subclause to Annex 69A or defining an exception in 93.8.2.2 (favoring the latter).

3. The "channel insertion loss at 12.89 GHz" is not used in 85.8.4.2.3 and thus its role must be defined or the parameter should be deleted.

Cl **93** *SC* **93.8.2.2** *P* **137** *L* **19** # 61

Mellitz, Richard — Intel Corporation

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

Since FEC changes the minimum BER applied broad band noise should be constrained with an appropriate crest factor

SuggestedRemedy

Add entry in table after Applied RMS noise for "Applied Crest factor" are the like. Suggested value for is erfcinv(2*minimum BER)*sqrt(2). This could go into Annex 69A.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The response to this comment assumes that the basis of the interference tolerance test is changed to Annex 69A (see comment #88).

The crest factor of the broadband noise is specified in 69A.2.3 to be no less than 5.

The commenter does not make it clear why the existing crest factor specification is inappropriate.

Cl **93** *SC* **93.8.2.2** *P* **137** *L* **3** # 78

Moore, Charles — Avago Technologies

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

table 93-7 is technically imcomplete: full of TBD's

SuggestedRemedy

replace TBD's with values from moore_02A_0312.pdf page 30. If we wish to use a_n values in the same way as 92.10.2 the numbers from moore_02A_0312.pdf page 30 which are expressed in Napier and Hz will have to be converted to dB and GHz.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending discussion by the Task Force and a measurement of the consensus to make the proposed change.

Cl **93** *SC* **93-1** *P* **123** *L* # 188

Sela, Oren — Mellanox Technologies

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

Need to add CL72 to table 93-1 due to startup protocol and reference to PMD control

SuggestedRemedy

Add to table 93-1:
72 - PMD control required

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The 10GBASE-KR PMD sublayer is not required to form a complete 100GBASE-KR4 Physical Layer. Instead, the 100GBASE-KR4 PMD sublayer incorporates a PMD control function that is functionally equivalent, but not identical, to the function described in 72.6.10.

Cl **94** *SC* **94.2.2** *P* **146** *L* **18** # 48

Anslow, Pete — Ciena

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

In Clause 94 there are several arrays of objects denoted by single letters. A useful feature of these arrays is to choose a letter that makes it easy to remember which array is which.
In draft D1.0:
T() for Termination blocks
G() for Grey-coded symbols
P() for Precoded symbols
are all easy to remember.

C() for FEC frame bits
F() for overhead frame bits
Q() for PAM4 symbols
are not very memorable - F() in particular would much more naturally stand for FEC frame bits.
For the overhead frame, O would be a possibility, but this could be confused with a zero.

SuggestedRemedy

Change the letters to:
F() for FEC frame bits
V() for oVerhead frame bits
M() for PAM4 symbols

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **94** *SC* **94.2.2.4** *P* **147** *L* **40** # 80

Moore, Charles — Avago Technologies

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

Termination bits complicate the coding and add 2.2% overhead. It is not clear that we receive real benefit in return. If a ML receiver is used it will allow us to correct a single bit error in a 45 bit block. Such errors are not likely to be what gets past FEC. Most likely multibit errors, which the termination block is less likely to correct, will be what cause FEC failures. Also if the receiver does not use ML, there is no value to the termination bits.

SuggestedRemedy

Remove termination bits and either use the reduced overhead to strengthen FEC or reduce line rate.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The termination bits have been included in this draft as a result of the consensus presentations brown_01_0312 and brown_01_0512. The benefits of the termination bits have been shown to outweigh the benefit of increasing the FEC stength or reducing the line rate in dabiri_01_0911, parthasarthy_01_0911, and dabiri_01_1111. The utility of termination bits is not limited to MLSD as explained in brown_01_0312 and dabiri_01b_0112. The termination bits enable a wide range of efficient implementations of enhanced performance receivers.

Cl **94** *SC* **94.2.4** *P* **50** *L* **24** # 236

Matthew, Brown — Applied Micro

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

Detailed descriptions of the PMA decoding process are required.

SuggestedRemedy

Write a de-coding section to complement sections 94.2.2.1 to 94.2.2.8.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Give the editor license to write the new sub-clauses as necessary.

Cl **94** *SC* **94.2.5** *P* **150** *L* **29** # 235

Matthew, Brown — Applied Micro

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

For EEE operation, a signal structure and framing mechanism for allowing the PMA/PMD to remain operational during the fast wake.

SuggestedRemedy

A proposal will be provided at the July meeting.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement the changes proposed in brown_01_0712.

Cl **94** *SC* **94.2.5** *P* **150** *L* **29** # 234

Matthew, Brown — Applied Micro

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

For EEE operation, a signal structure and framing mechanism for allowing the receiver to quickly lock to the PMA frame signal.

SuggestedRemedy

A proposal will be provided at the July meeting.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement the changes proposed in brown_01_0712.

Cl **94** *SC* **94.3.1 Table 94-4** *P* **160** *L* **8** # 107

Moore, Charles — Avago Technologies

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

Table 94-4 contains many TBDs making it technically incomplete.

SuggestedRemedy

Use values from moore_02a_0312.pdf page 18.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **94** *SC* **94.3.11.4** *P* **162** *L* **22** # 108

Moore, Charles — Avago Technologies

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

equation 94-3 is TBD, this is technically incomplete

SuggestedRemedy

use equation given in moore_02a_0312.pdf page 20

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **94** *SC* **94.3.11.4** *P* **162** *L* **22** # 57

Mellitz, Richard — Intel Corporation

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

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment #108 provides a specific remedy.

The suggested remedy does not provide sufficient guidance to implement any changes.

A presentation with detailed changes is expected from the commenter.

Cl **94** *SC* **94.3.12.2** *P* **167** *L* **52** # 109

Moore, Charles — Avago Technologies

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

Equation 94-14 is TBD, that is technically incomplete.

SuggestedRemedy

Use equation from moore_02a_0312.pdf page 20. Page 20 gives it a Tx differential return loss but the same equation can be used for Rx

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **94** *SC* **94.3.12.2** *P* **167** *L* **52** # 64

Mellitz, Richard — Intel Corporation

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

Resolve Return loss TBD

SuggestedRemedy

Tie return loss to channel specification proposal presentation by Mellitz, Moore, Dudek, Li, et al supported with a presentation for why the time domain method is better and how it works, by Moore, Ran, Mellitz, et al.
At time of this comments file names and requestor have not been finalized.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment #109 provides a specific remedy.

The suggested remedy does not provide sufficient guidance to implement any changes.

A presentation with detailed changes is expected from the commenter.

Cl **94** *SC* **94.3.12.3** *P* **168** *L* **43** # 62

Mellitz, Richard — Intel Corporation

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

Since FEC changes the minimum BER applied broad band noise should be constrained with an appropriate crest factor

SuggestedRemedy

Add entry in table after Applied RMS noise for "Applied Crest factor" are the like.
Suggested value for is erfcinv(2*minimum BER)*sqrt(2). This could go into Annex 69A.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The suggested remedy does not provide sufficient guidance to implement any changes.

A presentation with detailed changes is expected from the commenter.

Cl **94** *SC* **94.3.12.3 table 94-7** *P* **168** *L* **26** # 110

Moore, Charles — Avago Technologies

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

Technically incomplete: most values are TBD.

SuggestedRemedy

use values from moore_02a_0312.pdf page 31, using the valuse listed under "Test 3" for test 1 and values given for "Test 4" for test 2.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **94** *SC* **94.4** *P* **169** *L* **1** # 105

Moore, Charles — Avago Technologies

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

The specifications given are probably insuficient to give high confidence that a cahnnel will be usable.

SuggestedRemedy

use method defined is presentation which will be made at July meeting. Or use method defined in moore_01_0311.pdf and moore_01_0312.pdf

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Several proposals are on the table in addition to those in the commenter's suggested remedy.

Cl **94** *SC* **94.4.1** *P* **169** *L* **8** # 233

Matthew, Brown
Applied Micro

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

Equation 94-17 which is inherited from Clause 69 is based upon a second equation 94-18 which is no longer required separately for this Clause. Consolidate to a single equation set.

SuggestedRemedy

Change the top equation in 94-17 to:
a0+a1*sqrt(f)+a2*f+a3*f^2+a4*f^3

Change the bottom equation in 94-17 to:
a5+a6*(f-f2);

Delete line~17 starting with "Amax".

Delete lines 23 to 32.

Add the following:
a0 = 0.8
a1 = 1.7372e-4
a2 = 1.1554e-9
a3 = 2.7795e-19
a4 = -1.0423e-29
a5 = 33.467
a6 = 1e-8

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.