Cl **000** *SC* **0** *P* **-** *L* **-** # 50

Nowell, Mark — Cisco

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

A number of the specification values that were adopted in the original baselines were colored magenta (or additionally marked with TBC) to represent that they were values which should be considered as TBCs but the current value used was a good starting point unless further analysis suggested changing it. D1.3 represents the 4 review cycle for these values.

If, after the completion of D1.3 Task Force Review, any of these values remaining in magenta font or marked with a "TBC" have not been commented on or modified, then suggest to convert them to black font and/or remove the TBC marking.

The next phase of the process is Working Group ballot and the magenta font has no meaning in this process. If there is a comfort level with having some marking associated with these values, an editors note or footnate could be added but I do not think it is necessary. This will not limit the ability to comment or adjust these values during further reviews or ballots. They will be dealt with consistently with all other specification values in the document.

If an editor's footnote is prefered, I suggest something like: " ** Further work to substantiate these values is anticipated"

SuggestedRemedy

Change all values in magenta fonts that have not been modified at the close of D1.3 comment review to black font. Remove TBC markings. Add editor's footnote to values if deemed necessary.

Proposed Response *Response Status* **O**

Cl **000** *SC* **0** *P* **261** *L* **22** # 30

Maguire, Valerie — Siemon

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

OM5 has been adopted as the named for the "wideband MMF" optical fiber defined in TIA-492AAAE.

SuggestedRemedy

Change all occurances of "wideband MMF (TIA-492AAAE)" to "OM5".

Do a selective search to update all other references that may lack or use other terminology. For example, on line 23 of page 261, replace,

"A compliant PMD operates on 50/125 um multimode fibers, type A1a.2 (OM3), type A1a.3,(OM4), or fiber compliant to TIA-492AAAE,"

with,

"A compliant PMD operates on 50/125 um multimode fibers, type A1a.2 (OM3), type A1a.3,(OM4), or fiber compliant to TIA-492AAAE (OM5),"

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.108** *P* **57** *L* **26** # 1

Anslow, Pete — Ciena

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

"Clause 91" should be a cross-reference and "91.5.2.4" and "91.6.3" should have character tag External applied.

SuggestedRemedy

Make "Clause 91" a cross-reference and apply character tag External to "91.5.2.4" and "91.6.3".

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.116m** *P* **66** *L* **9** # 55

Brown, Matt MACOM

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

Register bits 1.605.1 and 1.605.0 are status bits indicating a request from the Rx inputs on lane 0 and lane 1 for the connected transmitter. They are currently described as being inputs.

SuggestedRemedy

Change these bits to RO and changed the decription appropriately.

Proposed Response *Response Status* **O**

Cl **045** *SC* **45.2.1.116n** *P* **66** *L* **36** # 56

Brown, Matt MACOM

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

Register bits 1.606.1 and 1.606.0 are status bits indicating a request from the Tx inputs on lane 0 and lane 1 for the connected transmitter. They are currently described as being inputs.

SuggestedRemedy

Change these bits to RO and changed the decription appropriately.

Proposed Response *Response Status* **O**

Cl **069** *SC* **69.2.3** *P* **81** *L* **34** # 26

Slavick, Jeff Broadcom Limited

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

Each PHY type has it's own paragraph in 69, but the 3 new ones have been lumped into a single paragraph.

SuggestedRemedy

Separate the 1 paragaph into 3, starting each paragraph with Backplane Ethernet also specifies <PHY>.
Backplane Ethernet also specifies 50GBASE-KR. The 50GBASE-KR embodiment employs the PCS defined in Clause133, the RS-FEC defined in Clause134, the PMA defined in Clause135, and the PMD defined in Clause137, and specifies 50Gb/s operation using 4-level PAM over one differential path in each direction.

Backplane Ethernet also specifies 100GBASE-KR2. The 100GBASE-KR2 embodiment employs the PCS
defined in Clause82, the RS-FEC defined in Clause91, the PMA defined in Clause135, and the PMD defined in Clause137, and specifies 100Gb/s operation using 4-level PAM over two differential paths in each direction.

Backplane Ethernet also specifies 200GBASE-KR4. The 200GBASE-KR4 embodiment employs the PCS defined in Clause 119, the PMA defined in Clause 120, and the PMD defined in Clause137, and specifies 200Gb/s operation using 4-level PAM over four differential paths in each direction.

Proposed Response *Response Status* **O**

Cl **073** *SC* **73.10.2** *P* **89** *L* **21** # 27

Slavick, Jeff Broadcom Limited

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

I might be best in Table 73-7 to list the link_fail_inhibit_timer in the same units for all 3 durations.

SuggestedRemedy

Change link_fail_inihibit_timer values for the row with 1.6, 1.7, s to 1600, 1700, ms

Proposed Response *Response Status* **O**

Cl **131** *SC* **131.5** *P* **126** *L* **27** # 40

Dawe, Piers — Mellanox

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

All 50G PMDs are serial. So the Skew and Skew Variation at SP3 (transmitter MDI), SP4 (receiver MDI) and SP5 (PMD output) can't be different to those at SP2 (PMD input) because there is only one lane from SP2 to SP5. Rebuttal to D1.2 147 did not give a reason (dud reference?) so here is a similar comment again.

SuggestedRemedy

Correct the Skew and Skew Variation limits for 50GBASE-CR, 50GBASE-KR, 50GBASE-SR, 50GBASE-FR and 50GBASE-LR.
If appropriate, list optional skew values that would apply if there were an 2-lane 50G PMD. But they should not be required - almost all NICs would never see such a PMD even if it existed.
In Table 131-5, provide columns for serial PHYs and for multi-lane PHYs.

Proposed Response *Response Status* **O**

Cl **134** *SC* **134.5.3.3** *P* **151** *L* **49** # 15

Ran, Adee — Intel

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

As shown in a contribution to 802.3bs (see http://www.ieee802.org/3/bs/public/16_09/ran_3bs_01a_0916.pdf), predicting the link performance by the binary event of the average symbol error ratio exceeding some threshold is error prone and would result in problems setting the threshold correctly.

In mass deployment of 802.3cd links, as expected in future data centers, this may result in multiple false alerts or perceived degradations in links that have ample margin for practically error-free operation. The only way to avoid these false alarms is to have a very high margin in all links, but that would increase the cost.

An alternative solution, outlined in http://www.ieee802.org/3/bs/public/16_09/ran_3bs_02a_0916.pdf, is to count codewords with a specific number of symbol errors in separate counters. This information is available from the RS-FEC decoder and would be much more useful for predicting uncorrectable errors and identifying links that have insufficient margin (and the desired margin can be defined after the data is collected).

The proposal above was not accepted, mainly claiming that it is tightly coupled with the PCS FEC which might only be used in an XS while the actual PMD-PMD link would use another FEC. But in 802.3cd there are no XS's and no other FEC is expected, so this method is perfectly adequate.

If information on degradation or prediction of uncorrectable errors is desirable, it should use the relevant information. At the minimum, that information should be available through standard registers. These registers may be queried by management and reported to the partner through higher layer protocols, outside of the scope of 802.3 (or we can add LLDP message in clause 79 later).

SuggestedRemedy

Based on slide 17 of http://www.ieee802.org/3/bs/public/16_09/ran_3bs_02a_0916.pdf:

Define a variable array (16 integers, 12 bits each) for counting received codewords with 1 to 15 symbol errors and uncorrectable codewords. Map these variables to MDIO registers, non-rollover, clear on read.

Add similar variables mapped to the same registers also in clause 91 for the 100G RS-FEC and in clause 119 for the 200G PCS FEC. These should be optional.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.1** *P* **188** *L* **48** # 37

Dawe, Piers — Mellanox

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

These paragraphs imply a requirement for a receiver to give the right BER (FLR) with any compliant transmitter and channel, which usurps the receiver interference tolerance spec and is too vague. We moved off this years ago in favour of clear and specific stressed sensitivity or RITT specs. 136.9.4.1 and 136.9.4.2.5 are now clearer in D1.3 so we don't need this vague double jeopardy any more.

SuggestedRemedy

Create a new subclause 136.1.1 Bit error ratio, as in 138.1.1, 139.1.1, 140.1.1 and 802.3bs; refer to it from 136.9.4.1 and 136.9.4.2.5. Delete "from a compliant input signal" twice. Delete "A compliant input signal is a transmitter output of a compliant PHY that has passed through a compliant cable assembly." Possible other changes for consistency with 138.1.1 and 802.3bs. Similarly in Clause 137.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.3** *P* **190** *L* **50** # 51

Nowell, Mark — Cisco

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

Typo on Symbol rate 26.6525 should be 26.5625
Two instances: Pg 190, line 50 & pg 191 line 3

SuggestedRemedy

fix typo

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.6.1** *P* **192** *L* **16** # 41

Dawe, Piers — Mellanox

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

For 50GBASE-KR, 50GBASE-CR, 50GBASE-SR, 50GBASE-FR and 50GBASE-LR, the Skew at SP3 (transmitter MDI), SP4 (receiver MDI) and SP5 (PMD output) can't be different to those at SP2 (PMD input) because there is only one lane from SP2 to SP5. The draft correctly says there is no Skew Variation at these points.

SuggestedRemedy

Correct the Skew limits for 50GBASE-CR and 50GBASE-KR.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.8.11.5** *P* **206** *L* **9** # 36

Zvi, Rechtman — Mellanox

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

The Coefficient update state machine in figure 136-9 defines the transmitter behavior upon peer receiver requests. While the requestor flow is not explicitly defined in the clause.

SuggestedRemedy

Add a new first paragraph to "136.8.11.5" with explicitly definition of receiver request flow (based on 72.6.10.2.3.3 text):

"A coefficient update request is assigned to a 2-bit field describing a requested update. Four request encodings are defined: no-equalization, increment, decrement, and hold. The default state for a given tap is hold, which corresponds to no change in the coefficient. The no-equalization, increment or decrement encodings are transmitted to request that the corresponding coefficient be reset, increased or decreased. The amount of change implemented by the transmitter in response to the coefficient update request shall meet the requirements as define in the algorithm below. An no-equalization, increment or decrement request shall continue to be transmitted until the update status for that coefficient, indicates: updated, coefficient at limit, coefficient not supported, equalization limit or coefficient limit and equalization limit . At that point, the outgoing requests for that tap shall be set to hold.

A new request to no-equalization, increment or increment any coefficient or a new request for Initial condition request , shall not be sent before the incoming status message revert to not_updated."

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9** *P* **218** *L* **30** # 57

Hegde, Raj — Broadcom Ltd.

Comment Type **T** *Comment Status* **X** *<late>*

The transmit equalizer coefficient values corresponding to the 'preset 2' and 'preset 3' settings of the variable ic_req in Table 136-12 provide -6dB of de-emphasis and +6dB of pre-shoot respectively. This level of de-emphasis and pre-shoot is a lot higher than the average de-emphasis/pre-shoot values needed over the range of Clause 136 channels.

SuggestedRemedy

Reduce the initial coefficient de-emphasis/pre-shoot settings to -/+ 2dB.
Change c(1) corresponding to preset 2 in Table 136-12 to -0.1 +/- 0.05
Change c(-1) corresponding to preset 3 in Table 136-12 to -0.1 +/- 0.05

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the task force review closed.]

Cl **136** *SC* **136.9.3** *P* **215** *L* **33** # 43

Dawe, Piers — Mellanox

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

Align with 802.3bs 120D. Clause 94 should be deprecated and we should not refer to it in new clauses. The same definitions and figure as in 94.3.12.3 are in 93.8.1.3.

SuggestedRemedy

Change the references to 94.3.12.3 (five here, one in PICS 136.14.4.3, one in PICS 137.12.4.3) to 93.8.1.3.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3** *P* **216** *L* **6** # 16

Ran, Adee — Intel

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

SNDR is set to 30.5 dB in magenta. This is close to the SNR_ISI (30 dB) and their RSS would create a transmitter noise equivalent to SNR_TX=27 dB. However SNR_TX is 32.5 in COM. So channel spec assumes better than transmitter spec, and the budget is broken.

I have submitted a comment to 802.3bs asking to change SNDR to 31.8 dB, SNR_ISI to 35.3 dB, and measure only in unequalized state, with 2 dB allocated to signal loss due to equalization.

The SNR_TX in COM in annex 120D is 31 dB. The proposal is to "dial back" 1.5 dB from both SNDR and SNR_ISI, in order to get SNR_TX of 32.5 dB in COM.

These may not be the final values for clause 136 but they would at least result in a closed budget.

SuggestedRemedy

Change SNDR to 33.3 dB.
Change SNR_ISI to 36.8 dB, measured only in unequalized setting.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3** *P* **216** *L* **11** # 38

Dawe, Piers — Mellanox

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

J4 (all but 1e-4 of the edges, or 1e-4*0.75 of the number of UI, divided between early and late, so 3.75e-5 per UI or 1.875e-5 per bit) is overkill for the spec BER of 2.4e-4, and J3 (1.875e-4 per bit) is a good match to the spec BER - just as J4 is a good match to the BER of 1e-5 for 120D. Also, not all edges cause errors. We can make the spec better (more accurate, less performance left on the table) and reduce test time.

SuggestedRemedy

Change J4 to J3, adjusting the limit by use of eq 136-6 and 7 (dual-Dirac theory). In Eq 136-6 change Q4=3.8906 to Q3=3.2905, Q(Q3) = 5 x10^-4.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.9.3** *P* **216** *L* **11** # 39

Dawe, Piers — Mellanox

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

Is it reasonable to expect the same jitter at TP2 (this clause) as at TP0a (Cl.137)? Won't the connector crosstalk make them different.

SuggestedRemedy

Ensure that the jitter limits in 137.9.2 / Table 120D-1, the mated CB crosstalk specs, and the jitter limits here, are compatible.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11** *P* **223** *L* **18** # 28

Tracy, Nathan — TE Connectivity

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

This paragraph is outdated due to the additional MDI added at the Vancouver meeting. Replace lines 18 through 22 with the suggested remedy

SuggestedRemedy

replace with "50GBASE-CR, 100GBASE-CR2 and 200GBASE-CR4 cable assemblies are defined in Annex 136C. There are five possible MDIs which are defined in Annex 136D including the single lane SFP MDI, the four lane QSFP and microQSFP MDIs and the eight lane OSFP and QSFP-DD MDIs. This results in multiple possible implementations including the opportunity to have multiple 50GBASE-CR types in a multi-lane MDI such as QSFP, microQSFP, OSFP and QSFP-DD, multiple 100GBASE-CR2 types in a multi-lane MDI such as QSFP, microQSFP, OSFP and QSFP-DD and multiple 200GBASE-CR4 types in a multi-lane MDI such as OSFP and QSFP-DD.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7** *P* **224** *L* **38** # 33

Hidaka, Yasuo — Fujitsu Lab of America

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

As the result of resolution for comment #i-34 against P802.3bs D3.0, the package impedance Z_c was added to Table 93A-1 as a COM parameter, because the package Z_c was not a COM parameter.

Similarly, we should add the host PCB trace impedance Z_c (=109.8 ohm) in Table 92-12 refered from 136.11.7.1, the channel PCB signal path length z_p (=151mm) in 136.11.7.1.1, and channel PCB crosstalk path length z_p (=72mm) in 136.11.7.1.2 should be added to the COM parameter table for the copper cable PMD such as Table 136-15. It is very inconvenient and error prone to scatter these parameters in various locations, because they are important parameters for signal integrity.

Alternatively, we may just take out the host PCB trace impedance Z_c from Table 92-12 and add it to Table 93A-1, and leave the channel PCB signal/crosstalk path length z_p as descriptions in 136.11.7.1.1 and 136.11.7.1.2.

SuggestedRemedy

Add the host PCB trace impedance Z_c, channel PCB signal path length z_p, and channel PCB crosstalk path length z_p to Table 93A-1 as COM parameters which are valid only for copper cable PMDs.

Define default values for those new COM parameters in Annex 93A.

Add those new COM parameters to Table 136-15.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7** *P* **224** *L* **47** # 17

Ran, Adee — Intel

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

Capacitance and impedance values are in magenta.

The existing values (from the baseline proposal) have persisted for three drafts, with no claims that they are not feasible nor a specific proposal to change them to other values. Such proposals can still be brought forward, but there is no need to "remind us that there is no consensus".

Note that these values are now also aligned with annex 120D.

SuggestedRemedy

Apply normal text format for C_d, C_p and Z_c.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7** *P* **224** *L* **51** # 11

Ran, Adee Intel

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

The value for spectral density is in magenta.

The values (from the baseline proposal) has persisted for three drafts, with no claims that it is not feasible nor a specific proposal to change it to another value. Such proposals can still be brought forward, but there is no need to "remind us that there is no consensus".

Just for information, calculation shows that the PSD of 1.64e-8 V^2/GHz is equivalent to 0.54 mV RMS of noise at a flat bandwidth of 16 GHz. This is 7.5 dB above the thermal noise floor.

SuggestedRemedy

Apply normal text format for eta_0.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.11.7.2** *P* **227** *L* **41** # 2

Anslow, Pete Ciena

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

The format of Table 136-16 is not according to the 802.3 template:
The heading row is not bold.
The internal ruling is not according to the template (the heading row should have a thicker line at t5he bottom than it does).
The font used in the table is incorrect.

SuggestedRemedy

Re-create the table using the "IEEE" table format.

Proposed Response *Response Status* **O**

Cl **136** *SC* **136.14.3** *P* **231** *L* **14** # 3

Anslow, Pete Ciena

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

Item FFQS has a subclause entry of "136.11 and 136.11"

SuggestedRemedy

Change to "136.11"

Proposed Response *Response Status* **O**

Cl **136B** *SC* **136B.1.1.6** *P* **373** *L* **14** # 49

Dawe, Piers Mellanox

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

Just as for the QSFP connector, we will need better crosstalk to support PAM4 with the SFP connector.

SuggestedRemedy

Tighten NEXT from 1.8 mV rms towards 1.5 as feasible, by changing "shall meet the specification in Table 110B-1." to "shall be less than 1.6 mV."

Proposed Response *Response Status* **O**

Cl **136B** *SC* **136B.1.1.6** *P* **373** *L* **33** # 9

Anslow, Pete Ciena

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

Extra space before the "." in "in Table 136B–2 ."

SuggestedRemedy

Delete the space.

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.1** *P* **377** *L* **15** # 34

Hidaka, Yasuo Fujitsu Lab of America

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

Here, references for SFP28 and QSFP28 are 110.11.1 and 92.12.1.1, respectively, but there are 136D.2.1 and 136D.2.2 in this same annex 136C. References within the same annex 136C are better, because 136D.2.1 and 136D.2.2 have reference to 110.11.1 and 92.12.1.1.

SuggestedRemedy

Change the reference for SFP28 to 136D.2.1 and the reference for QSFP28 to 136D.2.2.

Proposed Response *Response Status* **O**

Cl **136C** *SC* **136C.2.3** *P* **377** *L* **54** # 29

Tracy, Nathan — TE Connectivity

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

Suggest to include the description of a breakout cable as is provided for the QSFP host form factor (136C2.2)

SuggestedRemedy

Additional text: "A microQSFP form factor host can also form up to four 50 Gb/s links to either another microQSFP form factor host, using a microQSFP to microQSFP form factor cable assembly (see 136C.3.2), or four separate SFP28 form factor hosts (see 136C.2.1) using a microQSFP to 4xSFP28 form factor cable assembly (see 136C.3.3)."

Proposed Response *Response Status* **O**

Cl **136D** *SC* **136D.2.3** *P* **386** *L* **54** # 10

Anslow, Pete — Ciena

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

The footnotes at the foot of pages 386, 387, and 300 should be formatted more helpfully.

SuggestedRemedy

Change the footnote on page 386 to: "microQSFP specifications are available at http://www.microqsfp.com"
Change the footnote on page 387 to: "QSFP-DD specifications are available at http://www.qsfp-dd.com"
Change the footnote on page 388 to: "OSFP specifications are available at http://www.osfpmsa.org"

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.1** *P* **243** *L* **2** # 4

Anslow, Pete — Ciena

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

"." missing at the end of the sentence

SuggestedRemedy

Add the "."

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.2** *P* **244** *L* **22** # 12

Ran, Adee — Intel

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

SNDR is set to 32.5 dB and SNR_ISI is set to an unmeasurably high value (43 dB) so that their RSS would create a transmitter noise equivalent to SNR_TX=32.5 dB used in COM.

I have submitted a comment to 802.3bs asking to change SNDR to 31.8 dB, SNR_ISI to 35.3 dB, and measure only in unequalized state, with 2 dB allocated to signal loss due to equalization.

The SNR_TX in COM in annex 120D is 31 dB. The proposal is to "dial back" 1.5 dB from both SNDR and SNR_ISI, in order to get SNR_TX of 32.5 dB in COM.

These may not be the final values for clause 137 but they would at least result in a closed budget.

SuggestedRemedy

Change SNDR to 33.3 dB.
Change SNR_ISI to 36.8 dB, measured only in unequalized setting.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.3** *P* **241** *L* **30** # 31

Mellitz, Richard — Samtec

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

Clause 93 in Table 93-6 includes a set of test values for no-FEC even though FEC is required in the PMD. There is not a corresponding test in clause 137.

SuggestedRemedy

And items to list in 137.9.3
o. Add columns for Test 3 (NO-FEC, low loss)
.. PCS FEC Symbol error ratio max = 1e-11
.. Insertion loss at 13.2813 GHz min=11.5 dB and max=12dB
.. RSS_DFE4 min=0.5
.. COM including effects of broadband noise target=3dB
In addition the COM parameter DER0 is set to 1e-12

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.9.3.1** *P* **241** *L* **46** # 48

Dawe, Piers — Mellanox

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

I doubt that the low frequency RL at 14.25 dB is significant for signal integrity compared with the 8.7 dB at 6 GHz. This RL is much tighter than CEI-56G-MR at low (and high) frequency but looser between 4 and 9 GHz. I've made a similar comment against 802.3bs 120D.

SuggestedRemedy

Change 14.25 - f to 12 -0.625f

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **243** *L* **20** # 13

Ran, Adee — Intel

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

Capacitance and impedance values are in magenta.

The existing values (from the baseline proposal) have persisted for three drafts, with no claims that they are not feasible nor a specific proposal to change them to other values. Such proposals can still be brought forward, but there is no need to "remind us that there is no consensus".

Note that these values are now also aligned with annex 120D.

SuggestedRemedy

Apply normal text format for C_d, C_p and Z_c.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10** *P* **244** *L* **24** # 14

Ran, Adee — Intel

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

The value for spectral density is in magenta.

The values (from the baseline proposal) has persisted for three drafts, with no claims that it is not feasible nor a specific proposal to change it to another value. Such proposals can still be brought forward, but there is no need to "remind us that there is no consensus".

Just for information, calculation shows that the PSD of 1.64e-8 V^2/GHz is equivalent to 0.54 mV RMS of noise at a flat bandwidth of 16 GHz. This is 7.5 dB above the thermal noise floor.

SuggestedRemedy

Apply normal text format for eta_0.

Proposed Response *Response Status* **O**

Cl **137** *SC* **137.10.** *P* **243** *L* **23** # 32

Hidaka, Yasuo — Fujitsu Lab of America

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

This is a comment to follow-up comment #145 aginst D1.2.

As explained in hidaka_3cd_01a_0317, the current COM spec has a hole between channel test and Rx ITT. Suppose some chip vendor designed Rx using the Rd and Zc values of the COM parameter as their nominal target value. For Rx ITT, the chip vender may choose a test channel that shows bad matching with their Rx. Suppose they barely passes Rx ITT with this bad-matching test channel. If they chose a good matching channel, they would likely have failed Rx ITT, because more broadband noise would have to be injected to push higher COM (due to good matching) down to 3dB by calibration of test channel. On the other hand, suppose some system vendor may have some channel that shows good matching with the reference Rd and Zc of the COM parameter, but just barely passes the 3dB COM criteria. Although this channel and the above Rx are both compliant to the nominal spec of the standard, they will not operate with each other.

In other words, the current standard has zero tolerance for variation of the device impedance. The size of the hole is about 0.9dB COM for 30dB loss channels when the device impedance has +/- 10% variation as shown in hidaka_3cd_01a_0317.

The straw poll indicated that the concern of low yield due to pessimistic spec assuming the worst case is greater than the concern of low interoperability due to optimistic spec of zero tolerance for variation. On the other hand, the concern of low interoperability is not that negligible small as well. A practical solution may be some compromise between the current zero tolerance for variation and the worst-case scenario of variation.

A problem of option 1 in hidaka_3cd_01a_0317 was how to make this compromise, because the method in hidaka_3cd_01a_0317 was merely based on option 2 by allowing overlap of distriution. There was no good justification to make a compromise for option 1 in this way. Besides, option 2 did not get a good support.

A better and more straight forward way to make a compromise for option 1 is to re-use the same framework as option 1 but reduce the amount of variation from +/- 10% down to +/- 5% (or maybe to +/- 7%).

Note that this amount of variation does not represent the amount of variation of real devices. It is OK for real devices to have larger variation. Also, it may be actually possible to achieve +/- 5% variation with real devices using leading-edge technologies.

In a sense, this is in direction of option 1 in hidaka_3cd_01a_0317 which had more objection (15 people) than support (11 people) in straw poll #2. However, this is also a new method that was not clearly covered in hidaka_3cd_01a_0317. Hopefuly, this new method to make a compromise may get more support than option 1 in hidaka_3cd_01a_0317.

SuggestedRemedy

Implement option 1 in hidaka_3cd_01a_0317 to clause 137 with the following parameters:

Rd : 50 ohm +/- 5%
Package Zc : 93 ohm +/- 5%
Av : 0.415 V +/- 5% (same variation as Tx Rd)
Afe : 0.415 V +/- 5% (same variation as Tx Rd)
Ane : 0.611 V +/- 5% (same variation as Tx Rd)

Apply similar changes to clause 136 with the following additional parameter:

Host PCB trace Zc : 100 ohm +/- 5% (override the value in Table 92-12 in 136.11.7.1.)

I will prepare a presentation for discussion.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138** *P* **252** *L* **1** # 42

Dawe, Piers — Mellanox

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

This -SRn draft is still a baseline, no presentations at the last meeting - where is the indication that these numbers, or others, actually work with technical and economic feasibility?

SuggestedRemedy

While in Task Force review, show some evidence: eyes, receiver waterfall plots, TDECQ measurements and so on. Adjust the draft as appropriate.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.2** *P* **255** *L* **41** # 52

Nowell, Mark — Cisco

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

Typo on Symbol rate 26.6525 should be 26.5625
Two instances: Pg 255, line 41 & line 46

SuggestedRemedy

fix typo

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7** *P* **261** *L* **23** # 20

Kolesar, Paul CommScope

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

The IEC specification containing the equivalent of TIA-492AAAE was approved for publication during the week of 24 April 2017 by SC86A WG1. The equivalent fiber is called A1a.4.

SuggestedRemedy

Consider replacing "or fiber compliant to TIA-492AAAE" with "or type A1a.4". Note that while approval of the IEC CDV ballot allowed OM5 content to remain in ISO 11801-1, the approval of the OM5 term is pending completion of ISO's FDIS ballot. Then "(OM5)" can be added to the description as well.

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7** *P* **261** *L* **35** # 21

Kolesar, Paul CommScope

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

The IEC specification containing the equivalent of TIA-492AAAE was approved for publication during the week of 24 April 2017 by SC86A WG1. The equivalent fiber is called A1a.4.

SuggestedRemedy

Consider replacing "(TIA-492AAAE)" with "(type A1a.4)". Note that the OM5 cabling name is very likely to be approved with the FDIS ballot of 11801-1. Then the cell entry can be simplified to "0.5 m to 100 m for OM5".

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7** *P* **261** *L* **39** # 60

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X** *<late>*

In Table 138-8, 138-9, and 138-10, the values for OMAouter, OMAouter minus TDECQ, and TDECQ, the values for SRS, receiver sensitivity and SEC, and the values for link budget and link penalties, are all marked TBC. There have been no contributions to confirm or counter these values.

SuggestedRemedy

Replace the TBC's within the tables 138-8, 138-9 and 138-10 with editors notes below each table which say 'The values for OMAouter, OMAouter minus TDECQ, and TDECQ, require confirmation and may change' and 'The values for SRS, receiver sensitivity and SEC, require confirmation and may change' and 'The values for link budget and allocation for penalties require confirmation and may change'.

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the task force review closed.]

Cl **138** *SC* **138.7.2** *P* **262** *L* **48** # 5

Anslow, Pete Ciena

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

Minus signs should be an en-dash (Ctrl-q Shft-p)

SuggestedRemedy

in "-7", change the minus sign to an en-dash (Ctrl-q Shft-p)

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.7.3** *P* **263** *L* **9** # 59

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X** *<late>*

In Table 138-10, the OM3 column, reach insertion loss and additional insertion loss are in magenta text. The OM3 reach of 70m and channel insertyion loss of 1.8 dB is entirely consistent with the 100 m OM4 reach and insertion loss. These values are consistent with previous 100m OM4 capable PMDs e.g. clause 95, and do not need to be in magenta text

SuggestedRemedy

Change the magenta text in the OM3 column of Table 138-10 .

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the task force review closed.]

Cl **138** *SC* **138.7.3** *P* **263** *L* **9** # 19

King, Jonathan Finisar

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

In Table 138-10, the OM3 column, reach insertion loss and additional insertion loss are in magenta text. The OM3 reach of 70m and channel insertyion loss of 1.8 dB is entirely consistent with the 100 m OM4 reach and insertion loss. These values are consistent with previous 100m OM4 capable PMDs e.g. clause 95, and do not need to be in magenta text

SuggestedRemedy

Change the magenta text in the OM3 column of Table 138-10 .

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.8.1.1** *P* **265** *L* **4** # 45

Dawe, Piers Mellanox

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

Instead of just giving an arbitrary (usually excessive) requirement on the test, give the reason, as in 121.8.5.1 and 122.8.5.1, so that implementers can't easily evade the spirit of the spec but can use their common sense to make affordable test rigs.
The 1 ns (about 27 UI) of Skew that is called out in footnote a to Table 116-7 is mostly Skew that the host might make, not Skew between module input and PMD circuitry.
giannakopoulos_01_0508 said:
'PMA to PMD connection
- Traces should in any case be carefully laid out
- Should be less than 1" (per direction), which is 0.45 ns (RX and TX)'
When testing from the optical side, there could be mismatch between optical paths, but 1 ns = 20 cm is not likely.
The point is that the lanes should not be correlated in the module, and as both the input and output signals are available, the tester can find out what is really needed if he wishes.

SuggestedRemedy

After "there is at least 31 UI delay between the test pattern on one lane and the pattern on any other lane", add "so that the symbols on each lane are not correlated within the PMD".

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.9.2** *P* **267** *L* **44** # 18

King, Jonathan Finisar

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

Hazard level is TBD

Analysis shows the max average launch power per lane specs for 50GBASE-SR 100GBASE-SR2 and 200GBASE-SR4 can be consistent with Hazard level 1M requirements.

SuggestedRemedy

In 138.9.2 and 138.9.7, change 'TBD' to '1M', similarly for the PICS ES2 .

Proposed Response *Response Status* **O**

Cl **138** *SC* **138.9.2** *P* **267** *L* **44** # 58

King, Jonathan Finisar

Comment Type **TR** *Comment Status* **X** *<late>*

Hazard level is TBD

Analysis shows the max average launch power per lane specs for 50GBASE-SR 100GBASE-SR2 and 200GBASE-SR4 can be consistent with Hazard level 1M requirements.

SuggestedRemedy

In 138.9.2 and 138.9.7, change 'TBD' to '1M', similarly for the PICS ES2 .

Proposed Response *Response Status* **W**

[Editor's note: This comment was received after the task force review closed.]

Cl **138** *SC* **138.10.1** *P* **268** *L* **28** # 23

Kolesar, Paul CommScope

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

The IEC specification containing the equivalent of TIA-492AAAE was approved for publication during the week of 24 April 2017 by SC86A WG1. The equivalent fiber is called A1a.4.

SuggestedRemedy

Consider replacing "(TIA-492AAAE)" with "(IEC type A1a.4)" in three instances within the paragraph. Note that while approval of the IEC CDV ballot allowed OM5 content to remain in ISO 11801-1, the approval of the OM5 term is pending completion of ISO's FDIS ballot. When the FDIS is approved, the phrase "wideband MMF (TIA-492-AAAE)" can be replaced with "OM5".

Proposed Response *Response Status* **O**

Cl **138** *SC* **Table 138-10** *P* **263** *L* **13** # 22

Kolesar, Paul CommScope

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

The IEC specification containing the equivalent of TIA-492AAAE was approved for publication during the week of 24 April 2017 by SC86A WG1. The equivalent fiber is called A1a.4.

SuggestedRemedy

Consider replacing "(TIA-492AAAE)" with "(IEC type A1a.4)". Note that while approval of the IEC CDV ballot allowed OM5 content to remain in ISO 11801-1, the approval of the OM5 term is pending completion of ISO's FDIS ballot. Then the heading can be simplified to "OM5" to match the others.

Proposed Response *Response Status* **O**

Cl **138** *SC* **Table 138-14** *P* **268** *L* **38** # 24

Kolesar, Paul CommScope

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

The IEC specification containing the equivalent of TIA-492AAAE was approved for publication during the week of 24 April 2017 by SC86A WG1. The equivalent fiber is called A1a.4.

SuggestedRemedy

Consider replacing "(TIA-492AAAE)" with "(IEC type A1a.4)". The name "OM5" is likely to approved with the FDIS ballot of 11801-1. Then the complete heading can be simplified to "OM5" to match the other headings.

Proposed Response *Response Status* **O**

Cl **138** *SC* **Table 138-15** *P* **269** *L* **31** # 25

Kolesar, Paul CommScope

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

The IEC specification containing the equivalent of TIA-492AAAE was approved for publication during the week of 24 April 2017 by SC86A WG1. The equivalent fiber is called A1a.4.

SuggestedRemedy

Consider replacing "TIA-492AAAE" with "IEC 60793-2-10 type A1a.4". Note that the OM5 name is likely to approved with the FDIS ballot of 11801-1. Then the heading in the table at line 16 that currently says "Wideband MMF" can be simplified to "OM5".

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.2** *P* **279** *L* **11** # 53

Nowell, Mark Cisco

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

Typo on Symbol rate 26.6525 should be 26.5625
Two instances: Pg 279, line 11 & line 16

SuggestedRemedy

fix typo

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.6.1** *P* **283** *L* **45** # 44

Dawe, Piers Mellanox

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

Following up on D1.2 comments 138 and 200. Requiring an extinction ratio of 4.5 dB restricts the range of transmitter technologies, pushing up cost and, depending on technology, worsening distortion.

SuggestedRemedy

Reduce the extinction ratio limit from 4.5 dB to 3.5 dB. Add requirements:
FR OMA-TDECQ+0.15*ER>=2.3
LR OMA-TDECQ+0.2*ER>=-1.1
(quantities in dBm or dB).
In Table 139-8, change (for maximum TDECQ) to (for maximum TDECQ and 4.5 dB extinction ratio), twice.

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.4** *P* **286** *L* **36** # 6

Anslow, Pete Ciena

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

Comment i-20 against P802.3bs D3.0 made changes to the equivalent text to this in the P802.3bs draft.
See http://www.ieee802.org/3/bs/comments/P802d3bs_D3p0_comments_final_a_ID.pdf#page=7
This comment therefore proposes to make the equivalent change in the P802.3cd draft.
Also, the draft says a "test pattern specified for extinction ratio" rather than "test pattern specified for OMAouter".
Same issues in 140.7.4

SuggestedRemedy

In 139.7.4, change:
"The OMAouter shall be within the limits given in Table 139–6 for 50GBASE-FR and 50GBASE-LR if measured using a test pattern specified for extinction ratio in Table 139–10. The OMAouter is defined as the difference between …" to:
"The OMAouter shall be within the limits given in Table 139–6 for 50GBASE-FR and 50GBASE-LR. The OMAouter is measured using a test pattern specified for OMAouter in Table 139–10 as the difference between …"
In 140.7.4, change:
"The OMAouter shall be within the limits given in Table 140–6 if measured using a test pattern specified for extinction ratio in Table 140–10. The OMAouter is defined as the difference between …" to:
"The OMAouter shall be within the limits given in Table 140–6. The OMAouter is measured using a test pattern specified for OMAouter in Table 140–10 as the difference between …"

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.9.1** *P* **290** *L* **3** # 7

Anslow, Pete Ciena

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

Prompted by the Pre-ballot Mandatory Editorial Coordination (MEC) review of the P802.3bs draft, comment i-39 against P802.3bs D3.0 made changes to the equivalent text to this in the P802.3bs draft.
See http://www.ieee802.org/3/bs/comments/P802d3bs_D3p0_comments_final_a_ID.pdf#page=14
This comment therefore proposes to make the equivalent change in the P802.3cd draft.

SuggestedRemedy

Change: "Baseline wander and overshoot and undershoot should be minimized." to:
"Baseline wander, overshoot, and undershoot should be negligible."

Proposed Response *Response Status* **O**

Cl **139** *SC* **139.7.9.3** *P* **291** *L* **12** # 8

Anslow, Pete Ciena

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

Prompted by the Pre-ballot Mandatory Editorial Coordination (MEC) review of the P802.3bs draft, comment i-40 against P802.3bs D3.0 made changes to the equivalent text to this in the P802.3bs draft.
See http://www.ieee802.org/3/bs/comments/P802d3bs_D3p0_comments_final_a_ID.pdf#page=14
This comment therefore proposes to make the equivalent change in the P802.3cd draft.

SuggestedRemedy

Change:
"Care should be taken to minimize the noise/jitter introduced by the O/E, filters, and oscilloscope and/or to correct for this noise." to:
"The noise/jitter introduced by the O/E, filters, and oscilloscope should be negligible or the results should be corrected for its effects."

Proposed Response *Response Status* **O**

Cl **140** *SC* **140** *P* **300** *L* **1** # 46

Dawe, Piers Mellanox

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

This is a "cutting edge" proposal.

SuggestedRemedy

Show technical and economic feasibility for these draft numbers, or change them (e.g. if better receiver sensitivity is possible).

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.2** *P* **302** *L* **11** # 54

Nowell, Mark Cisco

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

Typo on Symbol rate 26.6525 should be 26.5625
Two instances: Pg 302, line 11 & line 16

SuggestedRemedy

fix typo

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.6.1** *P* **306** *L* **40** # 47

Dawe, Piers Mellanox

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

Following up on D1.2 comments 139 and 211. Requiring an extinction ratio of 5 dB restricts the range of transmitter technologies, pushing up cost and, depending on technology, worsening distortion.

SuggestedRemedy

Reduce the extinction ratio limit from 5 dB to 3.5 dB. Add a requirement that OMA-TDECQ+0.25*ER>=-0.1 (quantities in dBm or dB).
In Table 140-8, change (for max TDECQ) to (for maximum TDECQ and 5 dB extinction ratio), twice.

Proposed Response *Response Status* **O**

Cl **140** *SC* **140.7.5** *P* **309** *L* **38** # 35

David Lewis Lumentum

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

Data will be presented at the next interim meeting in support of changing the TDECQ reference equalizer for 100GBASE-DR transmitters.

Although the TDECQ reference equalizer does not imply any particular receiver equalizer implementation, there will be unecessary margin in the link budget if the penalty based on TDECQ is overstated. Feedback from those developing 53 GBd PAM4 receiver ICs is that for the forseeable future, the receiver's ADC will acquire 1 sample per symbol and the equalizer will have a minimum of 7 T-spaced FFE taps. It is therefore reasonable to specify a TDECQ/SECQ reference equalizer with 5 T-spaced FFE taps for 100GBASE-DR.

TDECQ testing of high quality 53 GBd PAM4 transmitters is failing the 2.5 dB limit in Table 140-6.

Experimental results show that increasing the reference equalizer length from 5*T/2 to 7*T or longer reduces TDECQ to below 2.5 dB.

Short equalizers such as 5*T/2 or 3*T result in higher TDECQ compared to longer equalizers such as 5*T or 7*T. See 802.3bs smf ad hoc presentations lecheminant_01_1016_smf page 4 and mazzini_01a_0317_smf page 8.

SuggestedRemedy

Change from:
The TDECQ shall be within the limits given in Table 140-6 if measured using the methods specified in 121.8.5.1, 121.8.5.2, and 121.8.5.3 using a reference equalizer as described in 121.8.5.4, with the following exceptions:
The optical return loss of the transmitter compliance channel is 15.5 dB
-- The signaling rate of the test pattern generator is as given in Table 140–6.
-- There are no interfering lanes and therefore the delay requirement of at least 31 UI between test pattern on one lane and any other lane, as specified in 121.8.5.1, is redundant.
The combination of the O/E converter and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of 38.68 GHz.

Change to:
The TDECQ shall be within the limits given in Table 140-6 if measured using the methods specified in 121.8.5.1, 121.8.5.2, and 121.8.5.3, with the following exceptions:
The optical return loss of the transmitter compliance channel is 15.5 dB.
-- The signaling rate of the test pattern generator is as given in Table 140–6.
-- There are no interfering lanes and therefore the delay requirement of at least 31 UI between test pattern on one lane and any other lane, as specified in 121.8.5.1, is redundant.
The combination of the O/E converter and the oscilloscope has a fourth-order Bessel-Thomson filter response with a bandwidth of 38.68 GHz.

The reference equalizer is a 5 tap, T spaced, feed-forward equalizer (FFE), where T is the symbol period.

NOTE -- This reference equalizer is part of the TDECQ test and does not imply any particular receiver equalizer implementation.

Proposed Response *Response Status* **O**