Cl **1** *SC* **1** *P* **1** *L* **1** # r02-1

Rannow, R K — Self Employed

Comment Type **G** *Comment Status* **D**

Still appears to be some confusing run-on sentences.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The comment does not cite specific text that is found to be confusing or propose any changes that would improve clarity. It is not clear what specific changes would satsify the commenter.

Cl **1** *SC* **1.4.300** *P* **92** *L* **94** # r02-2

Nikolich, Paul — INDEPENDENT

Comment Type **GR** *Comment Status* **D**

Firstly, I disagree with the rejection of my earlier comments, as I believe the definition of "lane" should provide greater clarity, accuracy and precision.

Secondly, The term "lane" is used in the standard that is not consistent with the proposed definition. For example, later on in the definitions section the following definition is offered: 1.4.386 PCS lane (PCSL): In 40GBASE-R, 100GBASE-R, 200GBASE-R, and 400GBASE-R, the PCS distributes encoded data to multiple logical lanes, these logical lanes are called PCS lanes. One or more PCS lanes can be multiplexed and carried on a physical lane together at the PMA service interface. (See IEEE Std 802.3, Clause 83 and Clause 120.)

Note the use of the qualifiers "logical lane" and "physical lane". This implies there are at least two types of "lane", while the proposed definition appears to address "logical lane" and not "physical lane". At a minimum a definition for "physical lane" should be added to the standard.

SuggestedRemedy

1) Change the label on 1.4.300 to Logical Lane.
2) Add a definition for a Physical Lane.
3) Add illustrations to (1) and (2) above to improve the ability of a reader to correctly understand the definitions similar to what is used in 802.16-2017 definition of "protocol data unit" Figure 3-1

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The definition of "lane" in 1.4.300 is correct for "logical lane", "physical lane", and "PCS lane". It is generic and addresses abstract/logical transfers of data "from one sublayer to an adjacent sublayer" and physical transfers of data across "the transmission medium (e.g., optical fiber, optical wavelength, wire pair)". The phrase "logical subset of the data and control information" does not limit the definition to "logical lanes" as physical lanes also convey "logical subsets" of the data.

As the definition of "PCS lane (PCSL)" states, it is a specific construct used "in 40GBASE-R, 100GBASE-R, 200GBASE-R, and 400GBASE-R" and it is fully consistent with the definition of lane in 1.4.300. It is a further qualification of the specific usage of lanes for those PHY families and introduces the term "physical lane" to distinguish bit-multiplexed PCS lanes from the PCS lanes themselves. The references to Clauses 83 and 120 can be followed for further details on these constructions.

Other PHYs specifications use "lanes" that are consistent with the definition 1.4.300 but are not handled (e.g., multiplexed) in the same way that "PCS lanes" as defined in 1.4.386 may be.

Therefore, it is too limiting to change the label of 1.4.300 from "lane" to "logical lane" and it

is not necessary to add a separate definition for "physical lane".

The comment provides no other indication as to where the current definition of "lane" lacks clarity, accuracy, or precision. The suggested remedy includes no other proposals other than to include a figure "similar to what is used in 802.16-2017". As stated in the response to comment r01-24 against P802.3/D3.1, "it is believed that the definition is clear as it is written and does not require a figure." In addition, it is unclear what relationship the Figure 3-1 from IEEE Std 802.16-2017 has to the definition of "lane". Therefore it is not clear what figure would satsify the commenter.

Cl **93** *SC* **93.8.2.3** *P* **476** *L* **43** # r02-3

Brown, Matthew MACOM

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

In Table 93-6, there are are two numbers that wrap in the columns for the a4 maximum coefficient values for Test 1 and Test 4.

SuggestedRemedy

Fix the wrap using editorial magic.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment does not apply to the substantive changes between IEEE P802.3/D3.2 and IEEE P802.3/D3.1 or the unsatisfied negative comments from the previous ballots. Hence it is not within the scope of the recirculation ballot.

Note that the draft is professionally edited prior to publication.

Cl **120D** *SC* **120D.3.1** *P* **370** *L* **25** # r02-4

Rysin, Alexander Mellanox Technologies

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

Requirements for Transmitter output residual ISI SNR_ISI (min) of 34.3 dB in 120D is too high - can barely measure the IC through the test fixture. The warning NOTE in 120D.3.1.7 shows the issue, but doesn't solve it. COM packages were shown to generate worse SNR_ISI. See presentation rysin_3cd_01_0318.pdf. 802.3bs D3.2 comment 43, 802.3bs D3.3 comment 31, 802.3cd D2.0 comment 140, 802.3cd D2.1 comment 49, 802.3cd D2.2 comment 22, 802.3cd D3.0 comment 48, 802.3cd D3.1 comments 23, 28.

SuggestedRemedy

Change the value for Transmitter Output residual ISI SNRISI (min) in Table 120D-1 to 30.5 dB

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a re-statement of the first part of unsatisfied negative comment r01-23 against D3.1 but with a different suggested remedy.

There was no consensus to make the change.

Two claims are made in the comment. The first claim is that the current specification limit is below the noise floor of the measurement. For any measurement, it is a requirement that the test fixturing and equipment be of sufficient quality to achieve the accuracy required to verify the specification limit. The measurement of SNR_ISI is particularly sensitive to the measurement setup and calibration hence the note advising users of the standard of this fact. It is the responsibility of the tester to ensure measurements have sufficient accuracy. No convincing evidence has been provided that demonstrates it is not possible to achieve the required accuracy for this particular measurement and specification limit.

The second claim is that the COM reference transmitter produces worse SNR_ISI values than the current specification limit. While <http://www.ieee802.org/3/cd/public/Mar18/rysin_3cd_01_0318.pdf> is offered as evidence of this claim, it should be pointed out that the results in <http://www.ieee802.org/3/bs/public/17_05/dudek_3bs_01a_0517.pdf> contradict this evidence. The latter presentation indicates the COM reference transmitter meets the current SNR_ISI limit with margin. While the source of this discrepancy is unclear, it casts doubt that 30.5 dB is the correct specification limit. It is also unclear whether or not the relaxation of this limit would enable transmitters with undesirable properties to claim compliance to the standard yet not be interoperable with compliant channels and receivers.

Finally, note that the results in the Rysin presentation are based on Nb=12 as it was prepared for a different project (IEEE P802.3cd). The correct value for Annex 120D would be Nb=10 and this would impact the results of the study.

Cl **120E** *SC* **120E.4.2** *P* **401** *L* **29** # r02-5

Dawe, Piers J G — Mellanox Technologies

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

to construct CDF

SuggestedRemedy

to construct the CDF
Or possibly: to construct a CDF
Compare item 4, and 83E.4.2 Eye width and eye height measurement method, item 3

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment does not apply to the substantive changes between IEEE P802.3/D3.2 and IEEE P802.3/D3.1 or the unsatisfied negative comments from the previous ballots. Hence it is not within the scope of the recirculation ballot.

Note that the draft is professionally edited prior to publication.

Cl **120E** *SC* **120E.5.4.1** *P* **406** *L* **33** # r02-6

Dawe, Piers J G — Mellanox Technologies

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

It would be good if the value/comment contents were more consistent representations of the limits.

SuggestedRemedy

If some items call out min or max or "less than" or similar, so should 17.5 mV, 32 mV, 12 dB, possibly 0.22 UI. This may apply to 120E.5.4.2, Module output, and eye heights in 83E.5.4 (where the limit for vertical eye closure is marked "(max)".

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment does not apply to the substantive changes between IEEE P802.3/D3.2 and IEEE P802.3/D3.1 or the unsatisfied negative comments from the previous ballots. Hence it is not within the scope of the recirculation ballot.

Any ambiguity in the meaning of the "Value/Comment" field is resolved by reference to the full specification in the "Subclause" column.

Cl **121** *SC* **121.8.5.4** *P* **136** *L* **20** # r02-7

Dawe, Piers J G — Mellanox Technologies

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

A much wider range of signals are allowed to be transmitted than are covered by SRS (required to be received).
At present it is allowed to make a transmitter with a noisy or distorted signal, use heavy emphasis to get it to pass the TDECQ test, yet a compliant receiver that passes SRS would not need to receive it. The range needs to be bounded on the left hand side of the maps in dawe_3cd_01a_0318 and dawe_032118_3cd_adhoc so that the receiver design can be bounded in terms of having to "invert" heavily over-emphasised signals, and the gap between possible signals and SRS closed or narrowed.
The remedy doen't directly outlaw over-emphasised signals, but gives them worse TDECQ scores.
D3.1 comment 35

SuggestedRemedy

This remedy lets the transmitter designer use reasonable amounts of emphasis, balancing his own transmitter bandwidth and the reference receiver front-end bandwidth.
After saying where the largest magnitude tap coefficient is, add "The tap coefficients are constrained so that the sum of the other four tap coefficients is less than zero."
Similarly in clauses 122, 124.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a re-statement of unsatisfied negative comment r01-35 against D3.1 with a different suggested remedy.
The need for additonal restrictions on the equalizer tap coefficients in the TDECQ measurement for these approved SMF PMDs has not been established, and insufficient evidence has been provided that the proposed restriction fixes the claimed problem.
To date no contribution has been made that that demonstrates the problem described by unsatisfied negative comment r01-35 against D3.1 (a waveform that passes TDECQ but cannot be decoded by a reasonable receiver implementation) and that restricting the sum of the four smallest magnitude tap coefficients to be less than zero prevents this issue from occurring.

The stressed receiver sensitivity (SRS) requirement is not intended to cover all possible transmitter waveforms and power levels. The argument used in the comment could be used to suggest that any transmitter with a waveform that does not match the SRS conformance test signal should be excluded. This would disallow a "good" transmitter with a much lower TDECQ than the maximum (and therefore with a lower minimum power).

Cl **121** *SC* **121.8.5.3** *P* **136** *L* **14** # r02-8

Dawe, Piers J G
Mellanox Technologies

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

A much wider range of signals are allowed to be transmitted than are covered by SRS (required to be received).
At present it is allowed to make a transmitter with a noisy or distorted signal and use emphasis to get a "noise enhancement credit" to pass the TDECQ test, yet the eye closure is more than the TDECQ limit and a compliant receiver that passes SRS would not need to receive it. The range needs to be bounded on the top side of the maps in dawe_3cd_01a_0318 and dawe_032118_3cd_adhoc so that the receiver design can be bounded in terms of resolution and patterning, and the gap between possible signals and SRS closed or narrowed.
The first remedy has the disadvantage that errors in OMA measurement degrade its accuracy.
D3.1 comment 35

SuggestedRemedy

Either:
1. Limit TDECQ -10*log10(Ceq) to <=2.8 dB.
or:
2. Define TDECQrms = 10*log10(A_RMS/(s*3*Qt*R)) where A_RMS is the standard deviation of the measured signal after the 13.28125 GHz filter response (before the FFE), Qt and R are as already in Eq 121-12. s is the standard deviation of a fast clean signal with OMA=2 and without emphasis, observed through the filter response (0.6254 for 13.28125 GHz).
Limit 3 dB.
Either remedy to apply to all PMDs that use TDECQ in Section 8, although it would not matter much for 400GBASE-FR8 if the over-emphasis limit (see another comment) is in force.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a re-statement of unsatisfied negative comment r01-35 against D3.1 with changes to the options in the suggested remedy.
The need for additonal transmitter specs for these approved SMF PMDs has not been established, and insufficient evidence has been provided that the proposed alternative remedies fix the claimed problem.
To date no contribution has been made that that demonstrates the problem (a waveform that passes TDECQ but cannot be decoded by a reasonable receiver implementation) and that one of the proposed additional requirements prevents this issue from occurring.
A similar proposal to create a TDECQrms spec was suggested in comments i-140 against P802.3bs D3.0, r02-35 against P802.3bs D3.2, r03-27 against P802.3bs D3.3, and r01-35 against P802.3 (IEEE 802.3cj) D3.1 which were similarly rejected.

Cl **121** *SC* **121.8.5.4** *P* **136** *L* **20** # r02-9

Dawe, Piers J G
Mellanox Technologies

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

The TDECQ method allows signals that are slower than 100GBASE-LR4, probably slower than the original T/2-spaced TDECQ allowed, and slower than the SRS test range: see right hand corner of the maps in dawe_032118_3cd_adhoc. If this hole is not plugged, there could be interoperability issues, and/or some product receivers with more tap strength than is needed to receive the range of reasonable signals, degrading their cost/power/performance trade-off.
This issue is less severe than the lack of a limit on the left hand side, but should be considered nevertheless.
These remedies don't by themselves outlaw slower signals, but give them worse TDECQ scores.
D3.1 comment 36.

SuggestedRemedy

Either:
1. Set a maximum cursor strength limit,1.59
or:
2. Set a maximum limit for 10*log10(Ceq), 2.2 dB
Similarly in clauses 122, 124, although because the signalling rate for 124 is higher, the limit there might be higher or absent.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a re-statement of unsatisfied negative comment r01-36 against D3.1, which proposed to "Set a maximum cursor strength limit, which might be around 1.3".
The need for a limit to cursor strength or set a maximum limit for 10*log10(Ceq) has not been established (a waveform that passes TDECQ but cannot be decoded by a reasonable receiver implementation) and that the proposed limit of 1.59 for cursor weight or 2.2 dB for 10*log10(Ceq) removes the demonstrated issue while not disallowing "reasonable" transmitters.

Cl **121** *SC* **121.8.5.4** *P* **136** *L* **20** # r02-10

Dawe, Piers J G — Mellanox Technologies

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

dawe_3cd_01a_0318 showed that for the slowest, cleanest, most symmetrical allowed signal, putting the cursor at tap 3 has a negligible "benefit" vs. tap 2. This signal should probably not be allowed anyway (see another comment), and the reference receiver in TDECQ isn't meant to fully represent a real receiver. Rougher, noisier, faster, or less symmetric signals would see even less difference. Yet the option adds cost to real receivers (depending on implementation) and time to TDECQ measurements. In the last meeting, the effect of chromatic dispersion was mentioned. I have not yet found a chromatic dispersion effect that creates a slow leading edge, slower than trailing, for enough of the edges that it can be equalised. If it doesn't exist...
D3.1 comment 37

SuggestedRemedy

Change "Tap 1, tap 2, or tap 3, has the largest magnitude tap coefficient" to "Tap 1 or tap 2 has the largest magnitude tap coefficient".

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment is a re-statement of part of unsatisfied negative comment r01-37 against D3.1.
It has not been demonstrated that disallowing tap 3 as having the largest magnitude tap coefficient is an improvement to the draft. (Indeed, several of the contributed measurements have shown tap 3 as the largest magnitude tap coefficient for the optimum tap setting.)

Cl **116** *SC* **116** *P* **19** *L* **1** # r02-11

Dawe, Piers J G — Mellanox Technologies

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

802.3cd has made and may make changes to material similar to clauses 116 to 124 and their annexes that should be applied here too. In particular, the 1% TDECQ threshold adjust should be common to all SMF clauses that use TDECQ, or absent from all.

SuggestedRemedy

Apply the changes as appropriate.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment does not apply to the substantive changes between IEEE P802.3/D3.2 and IEEE P802.3/D3.1 or the unsatisfied negative comments from the previous ballots. Hence it is not within the scope of the recirculation ballot.

For "changes to material similar to clauses 116 to 124 and their annexes that should be applied here", the proposed change in the comment does not contain sufficient detail to enable the specific changes that satisfy the commenter to be understood.

For the "the 1% TDECQ threshold adjust", making this change this would place an extra burden on 200 Gb/s and 400 Gb/s receivers in the field and this change in the P802.3cd draft is expected to lead to changes in other parameters (such as the maximum TDECQ value) in future versions of the draft P802.3cd specifications that would not be included here.

Cl **121** *SC* **121.8.5.4** *P* **136** *L* **19** # r02-12

Dawe, Piers J G
Mellanox Technologies

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

Two apparent causes of inaccuracy in TDECQ:
1. Somewhat arbitrary, pattern-dependent measurement of OMA directly affects TDECQ;
2. The rule that the sum of the equalizer tap coefficients is equal to 1 seems to force the TDECQ algorithm to miss the optimum, at least sometimes. This appears to be not the same as the 1% threshold adjust issue.
D3.1 comment 35.

SuggestedRemedy

Issue 1 is cancelled out in (OMA-TDECQ) but not in OMA, so the issue is controlling the signal quality (as opposed to its useful amplitude). Use of TDECQrms as in another comment partially addresses this.

For issue 2: could delete "The sum of the equalizer tap coefficients is equal to 1." The reference receiver could be described as having an offset so that the average power is mapped to zero at the FFE input. Then the thresholds are simply -OMAouter/3, 0, OMAouter/3.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This comment does not apply to the substantive changes between IEEE P802.3/D3.2 and IEEE P802.3/D3.1 or the unsatisfied negative comments from the previous ballots. Hence it is not within the scope of the recirculation ballot.

Unsatisfied negative comment r01-35 against D3.1 concerns "bad" transmitters that pass the TDECQ test but should be excluded because they "leave a realistic, compliant receiver with an unreasonable challenge". This is not related to claimed inaccuracy in the TDECQ measurement.

No evidence has been presented that supports the view that the measurement method specified for OMAouter is inaccurate and that this causes inaccuracy in TDECQ.

The method used for optimising the equalizer tap coefficients is not specified in the standard. Any method for finding the optimum can be used. The statement "The rule that the sum of the equalizer tap coefficients is equal to 1 seems to force the TDECQ algorithm to miss the optimum, at least sometimes" is contradictory. If the rule forces the "algorithm" to miss the optimum, then this will always happen. If the "algorithm" can sometimes find the optimum and sometimes not, then setting the sum of the equalizer tap coefficients to 1 does not force the TDECQ "algorithm" to miss the optimum and a better method for optimising the equalizer tap coefficients should be used.