Cl **120** *SC* **120.5.11.2.5** *P* **199** *L* **36** # 20128

Dawe, Piers — Mellanox

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

This SSPRQ pattern will give inconsistent results when testing a range of transmitters.

SuggestedRemedy

If we can find a less extreme pattern that better achieves the objective of allowing TDEC measurements that correlate to the TDP we don't want to measure at line rate, change to that pattern.
If we can't, change to a pattern that is less extreme, and don't use it for TDEC testing.

Response *Response Status* **U**

REJECT.
No alternative test pattern proposed. If the optical track selects a different test pattern than SSPRQ, the PMA can generate it.

Cl **120** *SC* **120.5.11.2.5** *P* **200** *L* **43** # 152

Wertheim, Oded — Mellanox Technologie

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

The current SSPRQ test pattern is too stressful for transmitter (TDECQ) or stressed receiver testing.

SuggestedRemedy

The shortened test pattern structure of sections of PRBS31 is convenient from implementation perspective, we may modify the start values of the segments to produce the right penalty.

Response *Response Status* **U**

REJECT.
This pattern is called for in tests specified in the other clauses. Comment 95 could remove the use of SSPRQ from clauses 121, 122, 124 but several comments propose to use this pattern for additional tests. This pattern should only be used if comment 95 removes the current use for the pattern and no others are added.

Cl **120** *SC* **120.5.11.2.5** *P* **200** *L* **47** # 94

Dawe, Piers — Mellanox

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

This SSPRQ is not suitable for use in TDECQ or stressed receiver calibration because measurements with this pattern do not give the correct penalty.

SuggestedRemedy

Either adjust SSPRQ to a pattern that gives the correct penalty, e.g. by changing the first start sequence in Table 120-2, or remove SSPRQ (using PRBS13Q for TDECQ and stressed receiver calibration).

Response *Response Status* **U**

REJECT.
See comment #152

Cl **120D** *SC* **120D.3.2.1** *P* **355** *L* **19** # 118

Dudek, Mike — Cavium

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

With the change of Np from 13 to 200 in draft 2.1 the effect of reflections in the test system will not be captured and any reflections in the test system will over-stress the receiver.

SuggestedRemedy

Change "the measured value of SNDR" to "the measured value of SNDR with Np=13 in the waveform fit".

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Needs further investigation in light of the definition of SNR_ISI.

Cl **120E** *SC* **120E.3.1** *P* **365** *L* **21** # 135

Ghiasi, Ali — Ghiasi Quantum LLC

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

Based simulation to show feasibility 200GAUI-4/400GAUI-8 C2M were base on hypotitical connector haivng ~1/3 the connector crosstalk specified in 120E.4.1
http://www.ieee802.org/3/bs/public/adhoc/elect/24Aug_15/dallaire_01_082415_elect.pdf

SuggestedRemedy

Need to verify if current eye width and eye height are feasible with QSFP28 like connector having ~3x the crosstalk. Attach presentation provide background
http://www.ieee802.org/3/bs/public/16_09/ghiasi_3bs_01_0916.pdf

Response *Response Status* **U**

REJECT.
This comment does not apply to the substantive changes between IEEE P802.3bs/D2.1 and IEEE P802.3bs/D2.0 or the unsatisfied negative comments from the initial ballot. Hence it is not within the scope of the recirculation ballot.

This a duplicate of "T" comment #83 on D2.0.
No change to draft proposed.
No updated presentations were received.

Cl **120E** *SC* **120E.3.1.6** *P* **363** *L* **35** # 20126

Dawe, Piers — Mellanox

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

This crosstalk generator is intended to represent a module, and generate broadband energy. The spec allows an implementer to achieve the letter of the spec by using a lot of emphasis but miss the intention.

SuggestedRemedy

This transition time spec should be replaced by a slew time spec, e.g. 4.5 ps between +/- 0.1 V. Definition of slew time similar to transition time but with fixed thresholds instead of the signal-dependent 20% and 80%. Same for the counter propagating crosstalk channels during calibration of the module stressed input signal (120E.3.4.1.1).
We don't need to change the spec for the crosstalk generator in the opposite direction because that's a slower signal so an implementer won't be using emphasis.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
No change to the document on this draft due to lack of consensus. Further presentations solicited.
See response to comment #127

Cl **120E** *SC* **120E.3.2** *P* **366** *L* **32** # 20127

Dawe, Piers — Mellanox

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

The module output transition time min. spec is there to protect the module's input from too much crosstalk when connected to a host with more NEXT than the MCB. "Too much" doesn't depend on the module's output amplitude setting, so we should have an absolute spec here not a relative one.

SuggestedRemedy

This transition time spec should be replaced by a slew time spec, e.g. 3.5 ps between +/- 0.1 V. Definition of slew time similar to transition time but with fixed thresholds instead of the signal-dependent 20% and 80%.
There is less need to change the transition time spec for the host output because the connector is on the host board, so the NEXT is already in the measurement.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

No change to the document on this draft due to lack of consensus. Further presentations solicited.

Straw Poll
1)
Replace "Transition time (min, 20% to 80%)" with "Slew time (min) " in Table 120E-3, with units of ps and a value of 3.5
Add footnote "Measured between +/- 0.1V"
2)
Make no change

1): 4; 2): 4; No consensus

Cl **121** *SC* **121.7.1** *P* **218** *L* **16** # 20567

Dawe, Piers — Mellanox

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

The SMSR spec has been described variously as a diagnostic, a component level spec for buying lasers to make into PMDs, an early warning, a comfort blanket / included by default, or something that can be measured relatively easily in a component lab. Any SMSR problems will contribute to TDECQ - but we haven't quantified them. The effect of SMSR will depend strongly on the amount of dispersion which varies from one PMD to another and lane to lane, and on laser technology. We should not obstruct innovative implementations.

SuggestedRemedy

Make the SMSR limit a recommendation not a PICS requirement. All optical PMDs in this project.

Response *Response Status* **U**

REJECT.
In response to similar comments, #219 and #221, to draft 1.0, it was agreed not remove the SMSR limit with the following justification:
"Measuring SMSR is not required - it must pass if it is measured. The background of this spec is related to unstable laser performance, probably being very temperature sensitive. Even though measuring SMSR in a DWDM environment is less straightforward than in Clause 122, it is believed that this parameter should be specified.
30 dB value for SMSR is considered to be an appropriate value for this interface."

Cl **121** *SC* **121.7.1** *P* **218** *L* **31** # 20566

Dawe, Piers — Mellanox

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

Does the extinction ratio matter much in PAM4?

SuggestedRemedy

Unless it's important, reduce the limit to 3 dB, or as appropriate, for each optical PMD.

Response *Response Status* **U**

REJECT.
Commenter is invited to demonstrate that there is a need to relax the ER for this PMD and that this will not impact the ability of receivers to meet the sensitivity requirements.

Cl **121** *SC* **121.7.1** *P* **218** *L* **33** # 20130

Dawe, Piers — Mellanox

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

Now we have a TDECQ spec, we should look again at the RIN spec. The effect of RIN is included in TDECQ; the acceptable level of RIN depends strongly on other transmitter impairments. All we could *require* in a spec is the amount of RIN that would create substantially all of the TDECQ limit, which I don't think is this number. It would be hard to *recommend* any number without making assumptions on behalf of all future transmitter implementers that we can't justify.
As 52.9.6 says "This procedure describes a component test that may not be appropriate for a system level test depending on the implementation. If used..."
and "In order to measure the noise, the modulation to the DUT is turned off." A transmitter that's trying to deliver 4 well-spaced PAM4 levels can't be expected to do anything in particular if the modulation to the DUT is turned off!

SuggestedRemedy

As we no longer need a RIN spec and it would be difficult to choose a recommended value - delete the RIN22.8OMA row in Table 121-6, and in Table 121-10. Delete 121.8.7.
In 121.8.5.1 and 121.8.5.2, we could change "The state of polarization of the back reflection is adjusted to create the greatest RIN" to "The state of polarization of the back reflection is adjusted for the greatest TDECQ".
Similarly in clauses 122, 124.

Response *Response Status* **U**

REJECT.
Insufficient justification in the comment and incomplete Remedy proposal. The commenter is invited to bring in a presentation clarifying why a RINxOMA spec is no longer needed and why the current specification in draft 2.0 is broken. The transmitter RINxOMA spec is intended to screen out potentially bad transmitters even if the noise correction required by the TDECQ test is not very accurate.

Cl **121** *SC* **121.7.1** *P* **220** *L* **36** # 102

Dawe, Piers — Mellanox

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

Requiring an extinction ratio of 4.5 dB restricts the range of transmitter technologies but does not appear to benefit the link or the receiver significantly (they are protected by the TDECQ spec). Its effect is to push up cost.

SuggestedRemedy

Reduce the extinction ratio limit to a defensible amount, such as 3 dB.

Response *Response Status* **U**

REJECT.
This is an updated version of unsatisfied comment #566 against D2.0.
Commenter is invited to demonstrate that there is a need to relax the ER for this PMD and that this will not impact the ability of receivers to meet the sensitivity requirements.

Cl **121** *SC* **121.7.1** *P* **220** *L* **37** # 96

Dawe, Piers Mellanox

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

The purpose of the RIN spec has changed from something to ensure a good transmitter to something to ensure a good TDECQ measurement. The limit should be adjusted for the intended purpose.

SuggestedRemedy

Correct the RIN limits according to what is necessary for to enable a good TDECQ, all clauses that use TDECQ.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
This is an updated version of unsatisfied comment #130 against D2.0.
Commenter is invited to demonstrate that the current values are not those necessary for to enable a good TDECQ and to propose alternative values.
See response to comment #110

Cl **121** *SC* **121.8.1** *P* **222** *L* **19** # 98

Dawe, Piers Mellanox

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

In this draft, square wave is proposed for RIN measurement. But we can't use square wave because it isn't PAM4. CDRs, CRUs and any linearity control circuits may fail because two of the expected PAM4 levels are missing, CRUs with the special low PAM4 bandwidth (3 MHz nominal) won't hold lock properly because square wave has an unusually low transition density.

SuggestedRemedy

If a RIN spec is needed, define it based on PRS13Q. All PAM4 optical clauses. Remove square wave from the draft.

Response *Response Status* **U**

REJECT.
The use of a square wave to measure RIN was discussed during the resolution of comment #152 against D2.0 with the consensus being to continue to use a square wave.
The commenter is invited to provide the details of a measurement method for RIN which uses the PRBS13Q pattern.

Cl **121** *SC* **121.8.5** *P* **221** *L* **37** # 20129

Dawe, Piers Mellanox

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

This SSPRQ pattern will give inconsistent results when testing a range of transmitters.

SuggestedRemedy

If we can find a less extreme pattern that better achieves the objective of allowing TDEC measurements that correlate to the TDP we don't want to measure at line rate, change to that pattern.
If we can't, use PRBS13Q, which is much more representative, for TDECQ testing. Tell the implementer to be careful about low frequency effects.
Similarly in clauses 122, 124.

Response *Response Status* **U**

REJECT.
Incomplete remedy.

The commenter is invited to bring in a proposal for an alternative pattern that allows TDECQ measurements that correlate to the TDP.
One of the patterns for measurement of TDEC in Clause 95 is PRBS31 and the SSPR pattern is made up of segments of PRBS31.

Cl **121** *SC* **121.8.5.3** *P* **225** *L* **8** # 95

Dawe, Piers Mellanox

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

The draft says Pattern 6 (SSPRQ) should be used for TDECQ. But SSPRQ is a short, deliberately stressful pattern and therefore a TDECQ measurement does not give anything like the correct penalty for a range of reasonable transmitters.

SuggestedRemedy

Either adjust SSPRQ to a pattern that gives the correct penalty (e.g. by changing the first start sequence in Table 120-2); or use PRBS13Q for TDECQ (and stressed receiver calibration) with a separate requirement for low frequency performance as appropriate, similar to how the 200GAUI-4 etc. specifications handle this, choosing any limit according to the circumstances of the optical link. Apply to clauses 121, 122, 124.

Response *Response Status* **U**

REJECT.
This is an updated version of unsatisfied comment #129 against D2.0.
The commenter is invited to bring in a proposal for an alternative pattern that allows TDECQ measurements that correlate to the TDP.
One of the patterns for measurement of TDEC in Clause 95 or TDC in Clause 88 is PRBS31 and the SSPR pattern is made up of segments of PRBS31.
The transmitter eye mask or TDC/TDEC has not been allowed to be measured in previous clauses with a pattern as benign as PRBS13Q.

Cl **122** *SC* **122.1** *P* **239** *L* **1** # 20558

Booth, Brad — Microsoft

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

400GBASE-FR8 does not satisfy broad market potential or economic feasibility. It is well understood in the Ethernet industry that all solutions for 2 km optical PMDs are considered "client" or "grey" optics. These PMDs must be able to satisfy the faceplate density requirements (32 ports per 1 RU) to be considered economically feasible. The current power estimations for 400GBASE-FR8 does not permit the PMD to meet the power envelope or cost requirements needed to satisfy this requirement. Because the PMD will not be economically feasible, it is therefore unlikely to have broad market potential.

SuggestedRemedy

Two options:
1) Delete 400GBASE-FR8 from the draft and remove the objective from the project.
2) Consider other options that will result in a solution that satisfies the economic feasibility and broad market potential requirements.

As #2 is highly unlikely at this point in time, option #1 is the preferred suggested remedy.

Response *Response Status* **U**

REJECT.
Based on data presented that supported the development of the responses to the Broad Market Potential and Economic Feasibility Criteria, the Study Group and subsequently the 802.3 WG approved these responses. This data covered the solution that was eventually adopted by the Task Force and is specified in P802.3bs Draft 2.0.
The SMF objective for 2km was adopted based on data presenting its need across multiple applications. This need across multiple application areas is noted in the Broad Market Potential Response in the IEEE P802.3bs CSD (https://mentor.ieee.org/802-ec/dcn/16/ec-16-0057-00-ACSD-802-3bs.pdf). The commenter notes a specific implementation of faceplate density (32 ports per 1 RU) as a requirement that must be satisfied. However, the stated requirement is not supported by reference to an existing presentation or new data that demonstrates this requirement across the different application areas that have been noted in the Broad Market Potential Response.
Additionally, the commenter used the noted implementation for determining a power envelope and cost requirements for the optical solutions, and then continues with statements regarding "current power estimations." However, the commenter has not provided any reference to an existing presentation or new data regarding the power envelope, cost requirements, or "current power estimations" that can be considered.

Cl **122** *SC* **122.7.1** *P* **250** *L* **35** # 103

Dawe, Piers — Mellanox

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

Requiring an extinction ratio of 4.5 dB restricts the range of transmitter technologies but does not appear to benefit the link or the receiver significantly (they are protected by the TDECQ spec). Its effect is to push up cost.

SuggestedRemedy

Reduce the extinction ratio limit to a defensible amount, such as 3 dB (all 4 PMDs in this clause).

Response *Response Status* **U**

REJECT.
This is an updated version of unsatisfied comment #566 against D2.0.
Commenter is invited to demonstrate that there is a need to relax the ER for this PMD and that this will not impact the ability of receivers to meet the sensitivity requirements.

Cl **123** *SC* **123.1** *P* **269** *L* **1** # 20559

Booth, Brad — Microsoft

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

400GBASE-SR16 requires twice the number of fibers as two 200GBASE-SR4; therefore, it does not satisfy the balanced cost requirement of economic feasibility. Because the PMD does not meet the economically feasibility, it is unlikely to have broad market potential.

SuggestedRemedy

Two options:
1) Delete 400GBASE-SR16 from the draft and remove the objective from the project.
2) Modify the PMD to be 400GBASE-SR8 based on the same technology proposed for 200GBASE-SR4.

As #1 is highly unlikely at this point in time, option #2 is the preferred suggested remedy.

Response *Response Status* **U**

REJECT.

As noted in the Economic Feasibility response, "the project will examine alternatives that trade off between PMD complexity and the number of fibers in order to maintain a reasonable balance between these two costs." The selection examined these tradeoffs and concluded that the cost balance for this PMD is reasonable. The PMD specifications have been developed in the light of the state of technology for MMF optics. In addition the PMD specs potentially allow optical interface compatibility between individual lanes of 25GBASE-SR, 100GBASE-SR4 and 400GBASE-SR16.

Cl **123** *SC* **123.7** *P* **278** *L* **4** # 28

Swanson, Steve — Corning Incorporated

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

The decision to add wide band multiple mode fiber to the 400GBASE-SR16 PMD is a mistake that will lead at minimum to confusion in the market and is IMHO misleading the reader of the standard to believe that deploying a fiber designed for operation in SWDM systems in a parallel application, will lead to enhanced performance or a viable upgrade path when in fact it will not. It is not clear that 400GBASE-SR16 will reach broad market potential given the fact that the work in 802.3cd will likely obsolete 400GBASE-SR16 in favor of 400GBASE-SR8. In addition, there is no good rationale for deploying 32 wideband fibers in a parallel fiber solution as an upgrade path.

SuggestedRemedy

The suggestion is to reverse our decision in Fort Worth and remove wide band multimode fiber from 400GBASE-SR16 rather than mislead the reader of the standard. A user is always free to use a fiber that meets/exceeds the OM4 specification but if it provides no benefit at higher cost, it should not be recommended.

If this comment is not selected, several changes still must be made:

1. Replace "...type A1a.3 (OM4), or fiber compliant to TIA-492AAAE, according to the specifications defined in Table 123.6" with "...type A1a.4 (OM5)"

2. Replace "The fiber type and operating range shown in Table 123..5 are the same as 100GBASE-SR4 (See Clause 95)." with "The operating range shown in Table 123.5 is the same as 100GBASE-SR4 (See Clause 95).

3. 2.Consistent with Table 122-8 for single-mode fiber, there is no need to add a new row for WBMMF in Table 123-5 since the supportable link length is the same as OM4 and the fiber should only be used as an OM4 equivalent fiber, i.e., a single wavelength solution in this parallel application. Replace Table 123-5 with the following:
Table 123-5 - 400GBASE-SR16 operating range
PMD type Required operating range
400GBASE-SR16 0.5 m to 70 m for OM3
0.5 m to 100 m for OM4 or OM5 operating as OM4 fiber at 850nm

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
See also response to comment #28

Replace "The fiber type and operating range shown in Table 123-5 are the same as 100GBASE-SR4 (See Clause 95)." with "The operating range shown in Table 123-5 is the same as 100GBASE-SR4 (see Clause 95)."

The rows in Table 123-5 follow the structure of Table 68-2 which has several different fiber types with the same reach on separate rows.

There was a consensus that if a version of IEC 60793-2-10 containing fibre type A1a.4 is going to be available before the end of Sponsor ballot then a change should be made to replace "... type A1a.3 (OM4), or fiber compliant to TIA-492AAAE, ..." with "... type A1a.3 (OM4), or type A1a.4 (OM5), ..."

At this point do not make this change to the draft.

Cl **124** *SC* **124.7.1** *P* **296** *L* **31** # 104

Dawe, Piers — Mellanox

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

Requiring an extinction ratio of 5 dB restricts the range of transmitter technologies but does not appear to benefit the link or the receiver significantly (they are protected by the TDECQ spec). Its effect is to push up cost. Curious that the limit for 400GBASE-DR4 is higher than for 200GBASE-DR4 anyway.

SuggestedRemedy

Reduce the extinction ratio limit to a defensible amount, such as 3 dB.

Response *Response Status* **U**

REJECT.
This is an updated version of unsatisfied comment #566 against D2.0.
Commenter is invited to demonstrate that there is a need to relax the ER for this PMD and that this will not impact the ability of receivers to meet the sensitivity requirements.