Cl **78** *SC* **78.1.4** *P* **25** *L* **22** # 42

Dawe, Piers — Nvidia

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

Here, the order of 100GBASE-SRn PHY types is 4 2 10 1. In Table 80-1, it's 10 2 4 1. In Table 80-4, 10 4 and Table 80-5, 1 2. This seems inconsistent.

SuggestedRemedy

Consider what the order should be, bearing in mind that "100 m" doesn't mean exactly the same thing for the different PHYs, make changes to the order if appropriate.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review these tables in light of latest 802.3dc draft and reorder as appropriate.

Cl **167** *SC* **167.5.2** *P* **47** *L* **43** # 44

Bruckman, Leon — Huawei

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

It would be clearer to use "each signal stream" instead of "the signal stream". It will also make it consistent with the text in the following section. See also 802.3cu section 151.5.2

SuggestedRemedy

Replace: "The four optical power levels in the signal stream", with: "The four optical power levels in each signal stream"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Cl **167** *SC* **167.5.7** *P* **49** *L* **9** # 45

Bruckman, Leon — Huawei

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

PMD_global_transmit_disable disables all lane's transmitters.

SuggestedRemedy

In bullet b) Replace: "turning off the optical transmitter in each lane.", with: "turning off the optical transmitter in all lanes."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Cl **167** *SC* **167.7.1** *P* **51** *L* **15** # 1

Abbott, John — Corning Incorporated

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

In Table 167-7 Transmit Characteristics the goal for the VR option is to be a low cost option for connections to the server. This was fully summarized in the original CFI for the project. In order to optimize VR for this new market opportunity using existing OM3 and OM4 fiber (optimized for performance at 850nm) we need to balance all options. It makes sense to broaden the wavelength range for VR from 842 to 865 (wider than SR) to make the VR transmitters as low cost as possible, but it is not at all clear that using transmitters at 940nm which need to match a lower fiber BW can match those at 850nm. This comment agrees with basic point of comment 70 of D1.1 that the VR wavelength range should be centered around 850nm (the design wavelength for the fiber).

SuggestedRemedy

Change 842 to 948 to 824 to 865 (2nm wider than SR on both sides)

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The center wavelength (range) was discussed in the comment resolution against D1.1. The decision, after weighing the pros and cons, was to set the center wavelength range to 842 - 948 nm
for VR.

Cl **167** *SC* **167.7.1** *P* **51** *L* **15** # 68

Swanson, Steven — Corning Incorporated

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

There has been no contributions that prove that the inclusion of 940nm VCSELs will increase market potential and leverage the high volume manufacturing infrastructure currently supplyin 3D sensing applications. The VCSELs used for 3D sensing are not suitable for the IEEE 802.3db application and the added complexity of the receiver does not warrant the inclusion o another wavelength.

SuggestedRemedy

Change the center wavelength specification from 842-948 to 844-863.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The center wavelength (range) was discussed in the comment resolution against D1.1. The decision, after weighing the pros and cons, was to set the center wavelength range to 842 - 948 nm
for VR.

Cl **167** *SC* **167.7.1** *P* **51** *L* **16** # 2

Abbott, John — Corning Incorporated

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

Spectral Width of VR is specified as 0.65nm. If we are looking to make 940nm option as low cost as possible does it make sense to have a wider spectral width spec at 940nm? Or if we tighten the wavelength range back to 842-863nm can we make 850nm VCSELS easier to make with an even wider spectral width?

SuggestedRemedy

If line 15 is 842 to 948 increase spectral width at 948 to 0.70. If line 15 is 842 to 863, increas spectral width at 850nm to 0.70

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Max RMS spectral width specification is a balance: (a) Relax value to maximize VCSEL yield, and (b) Place more burden on the receiver by lowering fiber bandwidth.

A maximum of 0.65 nm for RMS spectral width is a good balance.

Cl **167** *SC* **167.7.1** *P* **51** *L* **16** # 69

Swanson, Steven — Corning Incorporated

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

In the transmitter specification, the only difference appears to be the spectral width of the source. This is offset by a more complex receiver.

In addition, in the CFI for this project, we identified two distinct market needs, one to support the shift from ToR to MoR/EoR architectures,requiring longer, low cost server-attachment links and another support 100G/optical lane to match to emerging 100G SerDes.

100GBASE-SR1, 200GBASE-SR2 and 400GBASE-SR4 variants seem to address the second requirement but it is not clear that the 100GBASE-VR1, 200GBASE-VR2 and 400GBASE-VR4 address the first.

Use cases included SFP112 connections to for next-generation servers, costs at 50% of DR and power consumption at 50% of DR.

I have seen no evidence that VR will support any of these use cases.

SuggestedRemedy

Consider eliminating the VR variants completely; the complexity of supporting two port types with little difference in the cost or power makes no sense. And the VR variant has no chance of competing for server-attachment links.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The VR link (50m OM4 reach) was voted in motions #3 and #4 in Jan 2020.

It was also supported by an end user,
shen_3db_01a_110520.pdf, during the
discussion for the SR link (100m OM4 reach).

Cl **167** *SC* **167.7.1** *P* **51** *L* **25** # 28

Dawe, Piers — Nvidia

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

In general, merging cells with the same content improves readability. Here, the limits for VR and SR look the same but they aren't, because TDECQ means two different things.

SuggestedRemedy

Spell out the entries for VR and SR separately for this row and the next three.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.
Make separate columns for TDECQ (max) and TECQ (max) for VR and SR links in Table 167 7.

Cl **167** *SC* **167.7.1** *P* **51** *L* **28** # 29

Dawe, Piers — Nvidia

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

There are two competing definitions for OMA (min) in this table. We need to explain what the reader is supposed to do with them.

SuggestedRemedy

One way would be to use max(TECQ, TDECQ). This applies in the text and Figure 167-3 too

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Combine the two Outer OMA, each lane (min) to one:

Outer OMA, each lane (min)
for max(TECQ, TDECQ) <= 1.8 dB -2.6 dBm
for 1.8 < max(TECQ,TDECQ) <= 4.4 dB -4.4 + max(TECQ,TDECQ)

Cl **167** *SC* **167.7.1** *P* **51** *L* **44** # 9

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

At 50G some end users had to use APC cable plants due to reflections and in the 802.3db we have now added the option of APC connectors. If reflections are becoming an issue why are we promoting 12 dB glass-air termination!

SuggestedRemedy

Suggest adding 20 dB transmitt reflectance to the table and suggest to change optical return loss tolerance to 15 dB

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Installations with PC fiber termination may not meet the maximum 15 dB return loss.

Cl **167** *SC* **167.7.2** *P* **52** *L* **40** # 3

Abbott, John — Corning Incorporated

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

To achieve orignal VR objections for a low cost high data rate connection to the server, restore the receive wavelength range to 842-863; if increasing the range to make VR 850nm transceivers more robust and cost effective for short distance, increase this to 842-865nm. Choose the wavelength range for VR transmitter and receiver based on end user requirements in the data center.

SuggestedRemedy

Change 842 to 948 to 824 to 865 (2nm wider than SR transmitter on both sides) for VR and SR

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The center wavelength (range) was discussed in the comment resolution against D1.1. The decision, weighing the pros and cons, was to set the center wavelength range to 842 - 948 nm for VR.

For SR, the center wavelength range is 844 - 863 nm.

Cl **167** *SC* **167.7.2** *P* **52** *L* **40** # 70

Swanson, Steven — Corning Incorporated

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

The requirement on the receiver to support a center wavelength range of 842-948 complicates the receiver design and adds cost. It will require an AR coating, and while some claim it will not add cost, it is not trivial.

SuggestedRemedy

Change the center wavelength specification from 842-948 to 844-863.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The center wavelength (range) was discussed in the comment resolution against D1.1. After weighing the pros and cons including the requirement of a wide band AR coating on the photodiode, the decision was to set the center wavelength range to 842 - 948 nm for VR.

Cl **167** *SC* **167.7.2** *P* **52** *L* **44** # 11

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

At 50G some end users had to use APC cable plants due to reflections and in the 802.3db we have now added the option of APC connectors. If reflections are becoming an issue why are we promoting 12 dB glass-air termination!

SuggestedRemedy

Suggest adding 20 dB receive reflectance to the table and suggest to change optical return loss tolerance to 15 dB

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Installations with PC fiber termination may not meet the maximum 15 dB return loss.

Cl **167** *SC* **167.7.2** *P* **53** *L* **16** # 34

Dawe, Piers — Nvidia

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

"Only applies to 200GBASE-VR2, 400GBASE-VR4, 200GBASE-SR2 and 400GBASE-SR4": it's not "applies" that should be qualified by "only". Also, consider "alien crosstalk" in a multilane module operating as single-lane PMDs.
Anyway, we have subclause 167.8.13 defining stressed receiver sensitivity, where the same point is made.

SuggestedRemedy

If making an editorial improvement, change to:
Applies to 200GBASE-VR2, 400GBASE-VR4, 200GBASE-SR2 and 400GBASE-SR4 only.
or much better and in preparation for 800GBASE-VR8 and 800GBASE-SR8,
Not applicable to 100GBASE-VR1 and 100GBASE-SR1.
Or, because the same module suffers the same crosstalk if used as 4 x 100GBASE-VR1 as when running as 1 x 400GBASE-VR4, remove the exception.
Anyway, because this topic is addressed in 167.8.13 and we should not be defining things piecemeal by table footnotes - delete the note. See another comment against 167.8.13.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Delete the note.

Cl **167** *SC* **167.7.3** *P* **53** *L* **14** # 4

Abbott, John — Corning Incorporated

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

In Table 167-9 Illustrative Power Budget if the VR wavelength range is 842-948 the power budget should be executed at 842 and 948nm. The table uses 850nm (which makes sense) but do we need a presentation with power budget at 948nm? Do we need a separate 948nm column?

SuggestedRemedy

Suggested remedy is to leave table 167-9 as is and change table 167.7.1 (transmitter) to 842 to 863nm. 2nd option is to modify table 167-9 to include subcolumns under OM3 and OM4 fo power budgets at 940 using IEC guidance EMBs and putting TBDs in the rest of the items

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Table 167-9 can be expanded for each wavelength band for VR.

Cl **167** *SC* **167.7.3** *P* **54** *L* **45** # 36

Dawe, Piers — Nvidia

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

As far as I can see, Figure 167-5 presents the same information as figure 167-3 and 167-4, but does it better because the information is on a single graph so one can see the relation between transmit and receive OMAs.

SuggestedRemedy

Delete 167-3 and 167-4, move 167-5 to become 167-3 and refer to it instead of the existing 167-3 and 167-4.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Keep Figure 167-5 and eliminate Figures 167-3 and 167-4. Update the references to the figures.

Implement with editorial license.

Cl **167** *SC* **167.8.1.1** *P* **56** *L* **28** # 37

Dawe, Piers — Nvidia

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

We specify that each lane has the min OMA and max TDECQ or better, and we specify SRS at min OMA and max TDECQ. The PCS distributes 10-bit symbols across the PAM4 lanes and MSB/LSB equally, so what matters is the aggregate of errors on all the lanes. Specifying this for the receiver, we will still exceed the spec in practice because of scatter on transmit parameters. Clauses 86 and 95 and the copper PMDs have this right.

SuggestedRemedy

Change from "Stressed receiver sensitivity is defined for each lane at the BER specified in 167.1.1." to "Stressed receiver sensitivity is defined for an interface at the BER specified in 167.1.1. The interface BER is
the average of the BERs of the receive lanes when they are stressed."
After "operated as specified.", insert "To find the interface BER, the BERs of all the lanes when stressed are averaged."
In 167.8.13, delete "The BER is required to be met for each lane under test on its own."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Discuss the case of breakout.

Cl **167** *SC* **167.8.5** *P* **57** *L* **20** # 43

Dawe, Piers — Nvidia

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

Problems with "The first filter represents the system receiver": there's no definition of "system receiver", we should not be implying that a product receiver has to be like the TDECQ reference receiver, and a filter is only a small part of a receiver.

SuggestedRemedy

Change to "The first filter represents a receiver front end frequency response", or similar.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Implement with editorial license.

Cl **167** *SC* **167.8.5** *P* **57** *L* **33** # 52

Lingle, Robert — OFS

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

Editor's note states: "Use of minimum mean squared error optimization in place of optimization of TDECQ has been proposed." While this is an intriuging suggetion, I hope that this topic can be addressed with both a comment & supporting contribution in this draft cycle. Otherwise, I think the Editor's Note has served its purpose and can be removed at this point. This topic can still be addressed in WG ballot cycle if further information becomes available.

SuggestedRemedy

Remove this editor's note

Proposed Response *Response Status* **W**

See comment #14

Cl **167** *SC* **167.8.5** *P* **57** *L* **33** # 14

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

To speed up TDECQ measurement and for better correlation with real DSP suggest to use MMSE optimization over full grid search

SuggestedRemedy

Use MMSE optimization to determine the TDECQ.
Use of MMSE may slighlty increase +0.1 dB the TDECQ, for exact amount see ghiasi_dB_01_0921

Proposed Response *Response Status* **W**

DISCUSS

Clause 121.8.5.3 defines the TDECQ measurement method using TDECQ minimization as the optimization metric.
Any change must consider impact on
PMDs outside P802.3db.

MMSE method is faster and likely to be used in practice, especially with a 9 tap reference equalizer.

Text proposed by Greg Le Cheminant:
Pth1, Pth2, and Pth3 are varied from their nominal values by up to +/-1% of OMAouter "in order to minimize the closure of each eye using a minimum mean squared error optimization.'
The same three thresholds are used for both the left and the right histogram.

When the larger of SERL and SERR is equal to the target SER of 4.8 x 10^4, and the value of sigma_G cannot be increased by "further reduction of eye closure through optimization" of the equalizer tap coefficients or the sub-eye threshold levels, then TDECQ is calculated.

Cl **167** SC **167.8.13** P **60** L **12** # 41

Dawe, Piers — Nvidia

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

Looking ahead to 800GBASE-VR8 and 800GBASE-SR8, this might be better stated as an exception. Anyway, what if a multilane module is running as multiple 100GBASE-VR1? Formally, it's "alien crosstalk" but it's just the same.

SuggestedRemedy

Proposed Response *Response Status* **W**

DISCUSS

Cl **167** SC **167.10.2.1** P **63** L **24** # 71

Swanson, Steven — Corning Incorporated

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

In Table 167-15, the chromatic dispersion specifications are specified differently for OM3/OM4 and OM5. There is NO difference in the chromatic dispersion of these fibers. In fact the study that led to the specification of OM5 used OM3 and OM4 chromatic dispersion values to set the value for OM5.

A contribution has been submitted to correct this inconsistency in IEC and will be complete long before this standard is published.

SuggestedRemedy

For OM3 and OM4, eplace 1295 </= lambda naught </= 1340 with 1297 </= lambda naught </= 1328

Replace 0.105 for 1295 </= lambda naught </= 1310 and 0.000375 Î (1590 û lambda naught) for 1310 </= lambda naught </= 1340 with û 412/(840(1 û (lambda naught/840)4))

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Cl **167** SC **167.10.3.3** P **65** L **4** # 72

Swanson, Steven — Corning Incorporated

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

The suggestion to support two options, Option A for angled physical contact fiber interface and Option B for flat physical contact fiber interface for the MDI requirement for 200GBASE-VR2,400GBASE-VR4, 200GBASE-SR2 and 200GBASE-SR4 is a bad idea and will cause problems in the market.

SuggestedRemedy

Pick one, either angled or non-angled but not both.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This comment is similar to comment #74 against Draft 1.1.

The response to that comment included, "Option B was included in case non-angled connectors are needed by large enterprise end users in the future."

Option A is included based on contributions xie_3db_01_051321, shen_3db_01a_110520, and parsons_3db_adhoc_01_062520