IEEE P802.3cw D2.5 400 Gb/s over DWDM systems 5th Working Group recirculation ballot comments

Cl **116** *SC* **116.1.3** *P* **27** *L* **22** # 20419

Dawe, Piers
Nvidia

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

The manipulations described in this draft don't describe a BASE-R "native Ethernet"; rather, they are like 10GBASE-W. An Ethernet signal is packed into a telecoms wrapper (then, based on SONET, here, based on OTN).
The combination is clumsy and messy. Starting from Ethernet building blocks, one would not engineer it like this. I understand that the rationale is because those designs were already there, and the cost of a clean design was thought to outweigh the inefficiencies of this scheme. But that calls "broad market potential" into question.
800G coherent will affect the market for this.

SuggestedRemedy

I can think of three options:

Redo Clause 155, leaving out GMP and FAW and simplifying the training sequence and pilot sequence to make an Ethernet PHY;

Cancel this project, and encourage those interested to feed their learnings into OIF's "400ZR" maintenance;

Rename this PHY to 400GBASE-ZW, which is more honest and leaves the "400GBASE-ZR" name available to any future native Ethernet PHY, should the broad market potential be found.

Response *Response Status* **U**

REJECT.

No consensus within the CRG to change the name of the 400GBASE-ZR PHY

Cl **116** *SC* **116.1.3** *P* **33** *L* **12** # 21280

Dawe, Piers
Nvidia

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

As is made clear by the non-BASE-R Table 116-5a and 116.4.3 and 116.4.4, "400GBASE-ZR" is not BASE-R. However, the "R in the name implies that it is, which causes confusion. Clause 155 describes a "WAN PHY" like 10GBASE-W: an Ethernet signal is carried in a telecoms wrapper (then, based on SONET, here, based on OTN). Also, misnaming this spec blocks the way for a future native BASE-R 400G Z class PHY. The name "400GBASE-ZW", while correct, doesn't flow very easily, but "400GBASE-Z" avoids the misrepresentation and provides a cleaner name.

SuggestedRemedy

Change "400GBASE-ZR" to "400GBASE-Z" throughout.

Response *Response Status* **U**

REJECT.

Changing the name from 400GBASE-ZR was previously considered in D2.0 comment #419 (https://www.ieee802.org/3/cw/comments/D2p0/8023cw_D2p0_comments_final_by_clause.pdf) and there was no consensus to make a change.

The comment does not provide sufficient justification to support the suggested remedy.

There was no consensus to make a change.

Cl **155** *SC* **155** *P* **39** *L* **1** # 21278

Dawe, Piers Nvidia

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

This PCS/PMA is over-complicated and messy. We would not engineer it like this now (see nicholl_3dj_optx_01_230413 for a small step in the right direction, and maniloff_3dj_01a_2303 for an example of how to do coherent cleanly). OIF's so-called "400ZR" has had a draft since 2018, was issued in 2020 and revised last year. 800G coherent is coming in OIF and P802.3dj, which will take much of the market away. This P802.3cw project is on about its ninth draft and still the actual specifications are vague and incomplete, the previous draft was issued 8 months ago; not the usual two-monthly cadence we expect from an active project and an enthusiastic group. The moment for doing this spec in 802.3 has passed, it doesn't add significantly to 400ZR, and I observe there are not enough active participants in P802.3cw to justify it.

SuggestedRemedy

Cancel this project.
Encourage those interested to feed their learnings into OIF's "400ZR" maintenance.
Re-use relevant parts of the draft in P802.3dj when the time comes.

Response *Response Status* **U**

REJECT.

In the D2.0 review, 582 comments from 22 commentors were received which shows continued interest in the project.

In the D2.1 review, 290 comments from 13 commentors were received which shows continued interest in the project.

No consensus to cancel the project at this time.

Cl **155** *SC* **155** *P* **39** *L* **1** # 21281

Dawe, Piers Nvidia

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

This PCS/PMA is way too complicated for just a "directive" specification, and much more complicated than the mainstream 256/257/RS-FEC. We need examples, as in Annex 91A, RS-FEC codeword examples, or Annex 76A, FEC Encoding example.
If no-one is willing to provide them, we don't have a quorum to complete the project.

SuggestedRemedy

Create examples of e.g. FEC and other blocks before and after coding. Smallish ones can go in the document, all can be uploaded to the directory that IEEE provides for these things.
Alternatively, cancel the project.

Response *Response Status* **U**

REJECT.

No data was provided for the editors to be able to implement this change. Contributions of such material would be welcomed.

Regarding the project cancel proposal see response to comment #278.

Cl **155** *SC* **155** *P* **42** *L* **4** # 2317

Dawe, Piers Nvidia

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

D2.1 comment 278: this project is too slow, and has descended to only 25 comments from only four commenters when there is a lot to fix still. The moment for doing this spec in 802.3 has passed, it doesn't add significantly to 400ZR, it lacks momentum and there are not enough willing participants in P802.3cw to justify it.

SuggestedRemedy

Cancel this project.
Encourage those interested to feed their learnings into OIF's "400ZR" maintenance.
Re-use relevant parts of the draft in P802.3dj when the time comes.

Response *Response Status* **U**

REJECT.

As noted by commentor, this issue was previously raised in D2.1 comment #278 and there was no consensus to cancel the project.

Https://www.ieee802.org/3/cw/comments/D2p1/8023cw_D2p1_comments_final_by_ID_230619.pdf.

Per Motion #1 from https://www.ieee802.org/3/cw/public/23_06/minutes_3cw_2306_approved.pdf the modified project timeline was approved. See https://www.ieee802.org/3/cw/proj_doc/timeline_3cw_230608.pdf

This plan of action was presented to the 802.3 WG at the July 2023 Plenary. See Slide #3 of https://www.ieee802.org/3/minutes/jul23/0723_3cw_open_report.pdf

There is no consensus to change this plan of action at this time.

Cl **155** *SC* **155** *P* **42** *L* **4** # 2318

Dawe, Piers Nvidia

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

D2.1 comment 281: this PCS/PMA is way too complicated for just a "directive" specification. We need examples, as in Annex 91A, RS-FEC codeword examples, or Annex 76A, FEC Encoding example, or the OIF test vectors for 400ZR.

SuggestedRemedy

Publish examples of e.g. FEC and other blocks before and after coding. Smallish ones can go in the document, all can be uploaded to the directory that IEEE provides for these things.
If no-one does the work needed, cancel the project.

Response *Response Status* **U**

REJECT.

As noted by commentor, this issue was previously raised in D2.1 comment #281 which was rejected with the response "No data was provided for the editors to be able to implement this change. Contributions of such material would be welcomed."

Cl **155** *SC* **155** *P* **42** *L* **4** # 23

Dawe, Piers Nvidia

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

sluyski_3cw_01a_220328.pdf said
Other Standards Organizations that have specified and released 400G 16QAM specifications with demonstrated interoperability by:
...
Identifying a common set(s) of Test vectors and test methodologies.

agreeing with unsatisfied comments 20427, 21281 and 2318: this over-complicated PCS/PMA needs examples, as in Annex 91A, RS-FEC codeword examples, or Annex 76A, FEC Encoding example, or the OIF test vectors for 400ZR, or P802.3df Annex 172A.

SuggestedRemedy

Either:
add the codeword examples / test vectors as needed to get to a complete draft,
or
don't, and cancel the project.

Response *Response Status* **U**

REJECT.

This comment is restatement of previous comments 20427, 21281 and 2318, does not provide substantive additional rationale and does not provide the editors instructions on how to modify the draft. As noted in the comment, this issue has been raised and was rejected 3 previous times. See https://www.ieee802.org/3/cw/comments/D2p4/8023cw_D2p4_comments_final_unsatisfied_by_ID.pdf. Contributions were encouraged but none have been received.

Cl **155** *SC* **155.1.5** *P* **35** *L* **1** # 20427

Dawe, Piers Nvidia

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

This PCS is too complicated for just a "directive" specification. We need examples.

SuggestedRemedy

Create examples of e.g. FEC and other blocks before and after coding. Smallish ones can go in the document, all can be uploaded to the directory that IEEE provides for these things. They might need to cover some of the PMA.

Response *Response Status* **U**

REJECT.

A detailed suggested remedy containing an editor's instruction on how to modify the draft was not provided.

The following straw poll was taken:

I would support rejecting comment #427
Yes - 10

N- 2

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **36** # 20463

Dawe, Piers Nvidia

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

generic operation ... in ITU-T G.709.3 Annex D: but that contains undefined symbols and terms.

SuggestedRemedy

As it seems it is not very long, write it out cleanly here

Response *Response Status* **U**

REJECT.

No consensus to make a change.

Cl **155** *SC* **155.2.5.11** *P* **54** *L* **30** # 38

Dawe, Piers Nvidia

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

As in unsatisfied comments 20463 and 2338: this says "The generic operation of the Hamming encoder is specified in ITU-T G.709.3 Annex D". Generic is not adequate; we need a complete and unambiguous specification. G.709.3 Annex D is one page long. Unfortunately, it relies on undefined items that look like s, S, ^ V and overbar, so it does not specify. Also it is not clear what they mean by matrix multiplication, for example.

SuggestedRemedy

Write out the relevant material, similar to what 400ZR has done, defining all the terms and symbols in the usual way for equations, and correcting any mistakes. Of course, write it so that 119-bit message m (instead of b) is encoded to 128-bit codeword c.

Response *Response Status* **U**

REJECT.

This comment is restatement of previous comments 20463 and 2338, does not provide substantive additional rationale and does not provide the editors instructions on how to modify the draft. As noted in the comment, this issue has been raised and was rejected 2 previous times. See https://www.ieee802.org/3/cw/comments/D2p4/8023cw_D2p4_comments_final_unsatisfied_by_ID.pdf.

Cl **155** *SC* **155.2.5.11** *P* **54** *L* **30** # 2338

Dawe, Piers Nvidia

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

D2.0 comment 463: generic operation ... in ITU-T G.709.3 Annex D: but that contains undefined symbols and terms. As it seems it is not very long, write it out cleanly here This is supposed to be a spec, we need a specific definition, not "generic". G.709.3 Annex D describes GMP (as referenced in 155.2.5.3), not the Hamming SD-FEC scheme. Also, G.709.3 is in revision. 400ZR 10.5, Inner Hamming Code, which is about one page long, specifically addresses a systematic (128, 119) double-extended Hamming code.

SuggestedRemedy

Copy the material from 400ZR 10.5, changing some of the b to m if appropriate to match the usual FEC notation in 802.3, and replacing the undefined symbols that look like ^ and V with the ones usually used in 802.3. Whatever symbols are used, say what they mean.

Response *Response Status* **U**

REJECT.

As noted by commentor, this issue was previously raised in D2.0 comment #463 which was rejected with the response "No consensus to make a change."

https://www.ieee802.org/3/cw/comments/D2p0/8023cw_D2p0_comments_final_by_ID.pdf.

ITU G.709.3 has been amended in November 2022, but there were no changes to Annex D.

Cl **155** *SC* **155.2.5.11** *P* **54** *L* **34** # 39

Dawe, Piers Nvidia

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

Unsatisfied comments 20427, 21281 and 2318: this over-complicated PCS/PMA needs examples, as in Annex 91A, RS-FEC codeword examples, or Annex 76A, FEC Encoding example, or the OIF test vectors for 400ZR, or P802.3df Annex 172A. Even this comparatively simple systematic double-extended Hamming encoder has opportunities for ambiguity and misunderstanding.

SuggestedRemedy

Add tables for g, H, B, P and G, and an example of c and m.

Response *Response Status* **U**

REJECT.

This comment is restatement of previous comments 20427, 21281 and 2318, does not provide substantive additional rationale and does not provide the editors instructions on how to modify the draft. As noted in the comment, this issue has been raised and was rejected 3 previous times. See https://www.ieee802.org/3/cw/comments/D2p4/8023cw_D2p4_comments_final_unsatisfied_by_ID.pdf. Contributions were encouraged but none have been received.

Cl **156** *SC* **156.9** *P* **97** *L* **12** # 21285

Dawe, Piers
Nvidia

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

Multiple optical parameters are inadequately defined; some (or more) measurement methods are needed for some of them

SuggestedRemedy

Complete the definitions of the optical parameters, with measurement methods and references as necessary

Response *Response Status* **U**

REJECT.

Comment unclear and no suggested remedy provided.

Cl **156** *SC* **156.9** *P* **102** *L* **13** # 2320

Dawe, Piers
Nvidia

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

D2.1 comment 285, optical parameters are inadequately defined.

SuggestedRemedy

Review the 400ZR maintenance projects' activities for corrections and improvements and changes that would apply to this draft, including to EVM.

Response *Response Status* **U**

REJECT.

A detailed suggested remedy containing an editor's instruction on how to modify the draft was not provided.

Cl **156** *SC* **156.9.1** *P* **102** *L* **45** # 2331

Dawe, Piers
Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise. The header for this column is "Parameter" but "Laser frequency noise mask" is not an observable property of a signal, not even hypothetically. It's a mask, a property of the spec.

SuggestedRemedy

Change "Laser frequency noise mask" here, in Table 156-7 and in the title of 156.9.6. In 156.9.6, start by saying what frequency noise is before discussing the mask.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.4** *P* **105** *L* **5** # 32

Dawe, Piers
Nvidia

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

This says that f (DC to some tens of GHz) is the frequency. As this is an optical spectrum, it isn't, it's the frequency offset, as in the text on the previous page.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Change frequency to frequency offset

Response *Response Status* **U**

REJECT.

It might be improvement to change "frequency" to "frequency offset" as proposed.This is not critical to address at this time, however the commenter is encouraged to resubmit this comment during SA Ballot.

Cl **156** *SC* **156.9.5** *P* **105** *L* **46** # 249

Dawe, Piers Nvidia

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

This says "Laser frequency noise is measured using an unmodulated laser as specified in Table 156-11" but frequency noise is not measured directly, it is derived from a measurement of something else. This doesn't say what is measured, or how, or how what

SuggestedRemedy

Change this spec to power spectrum or phase noise, or add the missing information so that "frequency noise" is defined.

Response *Response Status* **U**

REJECT. There was no consensus to make a change.

Cl **156** *SC* **156.9.5** *P* **106** *L* **4** # 2410

Dawe, Piers Nvidia

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

The units of frequency noise are Hz^2/Hz. No watts or dB involved. Frequency noise is not a power spectral density.D2.1 comments 285, optical parameters are inadequately defined, and other comments specifically on frequency noise.

SuggestedRemedy

Change this spec to power spectrum or phase noise, or change Table 156-13--Frequency vs spectral power density to 156-13--Frequency noise mask Change "One-sided frequency noise power spectral density (Hz^2/Hz)" in the table and "One-sided frequency noi

Response *Response Status* **U**

REJECT. No consensus to make a change.

Cl **156** *SC* **156.9.5** *P* **106** *L* **5** # 10

Dawe, Piers Nvidia

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

This says "Laser frequency noise is measured using an unmodulated laser as specified in Table 156-11" but frequency noise is not measured directly, it is derived from a measurement of something else. This doesn't say what is measured, or how, or how what is measured (power spectrum or phase noise) is converted into frequency noise.
D2.1 comments 285, optical parameters are inadequately defined, D2.4 comment 9, and other comments on frequency noise.

SuggestedRemedy

Change this spec to power spectrum or phase noise, or:
Add the missing information so that "frequency noise" is defined, and indicate how it might be measured.

Response *Response Status* **U**

REJECT.

This topic was addressed in D2.4 comment #9 and was rejected with no consensus to make a change. See https://www.ieee802.org/3/cw/comments/D2p4/8023cw_D2p4_comments_final_by_ID.pdf.

The proposed change does not contain sufficient detail so that the CRG can understand the specific changes that satisfy the comment.

Cl **156** *SC* **156.9.5** *P* **106** *L* **6** # 2411

Dawe, Piers Nvidia

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

"One-sided" is ambiguous and does not appear in the text. It might mean that only one side is shown, and the other is the same, or it might mean that both sides are to be summed (presumably in an RMS way).D2.1 comments 285, optical parameters are inadeq

SuggestedRemedy

In the text, say which is meant.

Response *Response Status* **U**

REJECT. No consensus to make a change.

Cl **156** *SC* **156.9.5** *P* **106** *L* **12** # 11

Dawe, Piers Nvidia

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

The units of frequency noise are Hz^2/Hz. No watts or dB involved. So frequency noise, unlike a normal spectrum, is not a power spectral density.
The table and graph show the mask, not an actual noise frequency.
The figure has both "... power spectral density" and " spectral power density".
D2.1 comments 285, optical parameters are inadequately defined, D2.4 comment 10, and other comments specifically on frequency noise.

SuggestedRemedy

Change this spec to power spectrum or phase noise, or:
Change Table 156-13--Frequency vs spectral power density to 156-13--Frequency noise mask
Change "One-sided frequency noise power spectral density (Hz^2/Hz)" in the table and "One-sided frequency noise power spectral density [Hz^2/Hz]" in the figure, to "One-sided frequency noise (Hz2/Hz)
Change Figure 156-8--Frequency vs spectral power density to Figure 156-8--Frequency noise mask .

Response *Response Status* **U**

REJECT.

Frequency noise is defined as the power spectral density of the laser phase variations, in frequency units.

Cl **156** *SC* **156.9.5** *P* **106** *L* **50** # 21

Dawe, Piers Nvidia

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

This says "The mask frequencies are relative to the laser center frequency from *less than* 100 Hz to half the signaling rate". The table goes from 100 Hz to 1 GHz. The figure goes from 100 Hz to somewhere above 100 GHz.
A spec cannot have such vagueness and contradictions.

D2.1 comments 285, optical parameters are inadequately defined, and other comments specifically on frequency noise.

SuggestedRemedy

Delete "less than".
To make the spec simpler and clearer, change "half the signaling rate" (which is 59.84375/2) to "30 GHz".
In the table, add an extra row, 3 x 10^10 1.6 x 10^5.
Make the line in the figure end at 30 GHz.

Response *Response Status* **U**

REJECT.

It might be an improvement to make the changes proposed.This is not critical to address at this time, however the commenter is encouraged to resubmit this comment during SA Ballot.

Cl **156** *SC* **156.9.6** *P* **99** *L* **34** # 21286

Dawe, Piers Nvidia

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

"Frequency noise" is extremely arcane, and not defined here. Phase noise is much more commonplace (but ambiguous, so that would need definition too). Also, it is not clear how the "frequency noise" is to be measured if the transmitter is transmitting Pattern 5; there needs to be a method that can tell unwanted "frequency noise" from the intended modulation.

SuggestedRemedy

If there is a well-known metric that does the job, use that instead. Either way, define the parameter with the relevant text, equation(s) and/or references, and write down how it may be measured.

Response *Response Status* **U**

REJECT.

No suitable definitions were found and a contribution to recommend a definition would be welcome.

No consensus to make a change at this time.

Cl **156** *SC* **156.9.6** *P* **105** *L* **8** # 2325

Dawe, Piers Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise and write down how it may be measured. For example, it is not stated what is measured in Hz^2. It is not stated adequately what to do with the two sidebands. The table column header says one-sided, but that's the wrong place to attempt a definition, and does it mean one folds both sidebands together, explicitly or as in a self- homodyne measurement, or takes the worst of the two, or what? It is not stated whether +ve and -ve frequencies are taken into account or just +ve. It seems that this extremely arcane term is more of a concept, or at most a laser modeller's input parameter, than an observable output, so it is not clear that it is the right thing to be specifying, as it may not be measurable.

SuggestedRemedy

Define and specify something relevant and measurable, clearly and completely, with an explanation of how it may be measured and what instrument may be used, and references as necessary. Probably an example is needed. Phase noise is a better-known parameter with some literature, although it needs careful definition to avoid ambiguity. See e.g. IEC 61280-1-3, Fibre optic communication subsystem test procedures--Part 1-3: General communication subsystems--Central wavelength and spectral width measurement for an example of a measurement spec that can be referred to in a definition.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.6** *P* **105** *L* **8** # 2336

Dawe, Piers Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise. The method of interpolation for the laser frequency noise mask is not specified. Figure 156-7 implies log-log interpolation but that is illustrative not normative.

SuggestedRemedy

State that log-log interpolation is used to build the mask is not specified.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.6** *P* **105** *L* **9** # 2328

Dawe, Piers Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise and write down how it may be measured. The laser frequency noise is supposed to be controlled down to less than 100 Hz. That's too vague for a spec. No indication is given of how it might be measured, but instruments that can measure GHz often don't measure kHz and below.

SuggestedRemedy

Either don't say anything about frequencies lower than the spec range, or use a separate recommendation (not expected to be testable). Review whether 100 Hz is feasible or necessary, change the limit if appropriate.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.6** *P* **105** *L* **9** # 2326

Dawe, Piers Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise. This text says "The mask frequencies are relative to the laser center frequency from *less than* 100 Hz to half the signaling rate", Table 156-13 has 10^2 to 10^9 Hz, and Figure 156-7 shows 10^2 to something indeterminate above 10^10.

SuggestedRemedy

Reconcile the frequency range for this spec, with clear and consistent lower and upper frequencies. For example, 100 Hz to 59.84375/2 = 29.921875 GHz, or 100 Hz to 30 GHz, or 100 Hz to 30.8 GHz to match the transmit spectrum.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.6** *P* **105** *L* **15** # 2337

Dawe, Piers Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise. This says "The definition of maximum laser linewidth is provided in ITU-T G.698.2." G.698.2, 7.2.8 Maximum laser linewidth, says "The laser linewidth is defined as: The level of the white noise component of the power spectrum density of the instantaneous laser frequency multiplied by pi." We need a definition of linewidth, not maximum laser linewidth. A power spectrum density would be in the dimensions of power per frequency, which is not inverse time, so this definition is not satisfactory as it stands.

SuggestedRemedy

Use another reference with a dimensionally correct definition, or write one for laser linewidth (not "maximum laser linewidth" here.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.6** *P* **105** *L* **21** # 2330

Dawe, Piers Nvidia

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

D2.1 comments 285, optical parameters are inadequately defined, and 286, define frequency noise and write down how it may be measured. This says "One-sided frequency noise power spectral density (Hz^2/Hz)". I can see that a spectral density can be per hertz. Power has dimensions of energy per time, while Hz^2 is time^-2. These are incompatible.

SuggestedRemedy

If the units are not changed, delete "power" in the table row header and caption, and Figure 156-7, both y axis and caption.

Response *Response Status* **U**

REJECT.

No consensus to make a change.

The CRG expressed interest in contributions related to laser frequency noise.

Contributions are encouraged.

Cl **156** *SC* **156.9.9** *P* **107** *L* **16** # 27

Dawe, Piers Nvidia

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

156.9.9 says "The EVM calculation is defined in 156.10.1.2.7" and then says "EVMmax, is defined as a ratio of the root mean square (RMS) value of all the error vectors to the maximum magnitude of the *theoretical* constellation points" but 156.10.1.2.7, EVMmax calculation, says "The EVMmax calculations are defined in OIF-400ZR-02.0 ... section 20.4", which says "EVM_MAX, is defined as a ratio of the root mean square (RMS) value of all the error vectors (averaged over N symbols) to the maximum magnitude of all the *reference* constellation points" and provides formulae. There should not be two definitions of the same thing. Editorial: gratuitous comma.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Change this text "EVMmax, is defined as a ratio of the root mean square (RMS) value of all the error vectors to the maximum magnitude of the theoretical constellation points" to "NOTE--In this clause, EVM is defined by EVMmax, which is the ratio of the root mean square (RMS) value of all the error vectors to the maximum magnitude of all the reference constellation points."

Response *Response Status* **U**

REJECT.

It might be an improvement to make the changes proposed.This is not critical to address at this time, however the commenter is encouraged to resubmit this comment during SA Ballot.

Cl **156** *SC* **156.9.12** *P* **107** *L* **36** # 25

Dawe, Piers Nvidia

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

This says "I-Q amplitude imbalance (mean)" but there is no indication of what should be averaged, nor any reference to a definition.
Also it is not stated whether the I and Q amplitudes include the offsets found in 156.9.11.
The response to D2.4 comment 8 improved this text but not enough.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Write out clearly and completely what is meant by "I-Q amplitude imbalance (mean)", and indicate how it might be measured.

Response *Response Status* **U**

REJECT.

No suggested remedy instructing the editors how to implement a change was provided.

The text as written is accurate and sufficiently complete.

Cl **156** *SC* **156.9.13** *P* **107** *L* **43** # 8

Dawe, Piers Nvidia

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

It is not apparent what "the largest phase difference of the in-phase component I and quadrature component Q of the signal" means. It might be the phase difference of all the UI in the measurement, or it might be that I and Q phases are averaged somehow and the larger of the two is meant.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Write out clearly and completely what is meant by " I-Q phase error magnitude (max)", and indicate how it might be measured.

Response *Response Status* **U**

REJECT.

The proposed change does not contain sufficient detail so that the CRG can understand the specific changes that satisfy the comment.

Cl **156** *SC* **156.9.13** *P* **107** *L* **44** # 9

Dawe, Piers Nvidia

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

This says "measured relative to local oscillator" but no local oscillator has been introduced. There is one in EVM, but the draft does not make any connection between I-Q phase error magnitude and EVM.
Also, I would expect that I-Q phase error magnitude would be abs (I phase - Q phase - 90 degrees), and would not rely on a local oscillator, except as a smoothing or averaging method in the measurement (see another comment).
Or it could be defined as max (I phase - best fit), (Q phase - best fit - 90 degrees) which would be about half the first definition, but doesn't go well with the name "I-Q"...
It is too ambiguous.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Write out clearly and completely what is meant by " I-Q phase error magnitude (max)", and indicate how it might be measured.

Response *Response Status* **U**

REJECT.

The current text could be improved to indicate how the phase error and the local oscillator is defined.

This is not critical to address at this time, however the commenter is encouraged to resubmit this comment during SA Ballot.

Cl **156** *SC* **156.9.15** *P* **108** *L* **5** # 7

Dawe, Piers Nvidia

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

This and 156.9.16 say "in the range of the *central* frequency plus and minus the maximum spectral excursion as defined in OIF-400ZR-02.0, Implementation Agreement 400ZR section 13.4.2." 400ZR says "32 GHz ... Measured between the *nominal* central frequency of the channel and the -3.0dB points of the transmitter spectrum furthest from the nominal central frequency measured at point Ss.
Includes Laser frequency accuracy (13.1.200) error value from nominal center frequency."
156.9.2 has "Optical *center* frequency" (vs. central)
156.9.6 has "Offset between the *carrier* and the *nominal center frequency*
156.9.17 has within / outside of *the signal's* -20 dB spectral mask points
Figure 156-7 shows an upper mask -20 dB point at 40.4 GHz and the lower mask crosses -20 dB, at about 31 GHz which is much nearer the OIF number.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Use consistent names. Throughout 156.7 and 156.9, change "the carrier" and "central frequency" to "center frequency" (or "transmitter center frequency" if necessary to distinguish the signal from the black link).
Add or remove "nominal" as needed to make it explicit which one is being used in each case (including in 156A.3).
Change the two references to 400ZR section 13.4.2 and to the signal's -20 dB spectral mask points, to a new reference within this document:
Add a row in Table 156-7, Spectral half-width for OSNR, or some such name, and refer to that (one could put the number in GHz in 159.9.15, 16, 17 but that would make it harder to refer to this material in future). Use a consistent number for all three sections.

Response *Response Status* **U**

REJECT.

It might be an improvement to make the changes proposed.This is not critical to address at this time, however the commenter is encouraged to resubmit this comment during SA Ballot.

Cl **156** *SC* **156.9.26** *P* **110** *L* **44** # 5

Dawe, Piers Nvidia

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

The reference receiver for optical path OSNR penalty should be qualified as it is understood that the G.698.2 Annex A reference receiver is.
I believe that an EVM calculation for assessing a transmitter does not do chromatic dispersion and differential group delay compensation (because EVM would be measured at TP2), while a measurement at TP3 after the black link needs chromatic dispersion and differential group delay compensation. For consistency, that should be done at both ends of the black link.

SuggestedRemedy

Say that the reference receiver is as defined 156.10.1, with additional steps to compensate for chromatic dispersion and differential group delay. Two places in this subclause.

Response *Response Status* **U**

REJECT.

It might be an improvement to make the changes proposed.This is not critical to address at this time, however the commenter is encouraged to resubmit this comment during SA Ballot.

Cl **156** *SC* **156.10.1.2.2** *P* **94** *L* **36** # 20564

Dawe, Piers Nvidia

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

Need a bigger block size for at least one of these, to go with the jitter corner frequency

SuggestedRemedy

Response *Response Status* **U**

REJECT.

The CRG had no consensus to make a change at this, more study on a suitable solution is required.

Cl **156** *SC* **156.10.1.2.4** *P* **112** *L* **21** # 244

Dawe, Piers Nvidia

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

The measurement already has significant filtering: "The coherent receiver has a bandwidth of at least 30 GHz". Filtering it again without taking this into account would be too much.D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Say that the signal is further filtered so that the combined effect of the observation filter in 156.10.1.1 Calibrated coherent receiver and this filter is the RRC response.

Response *Response Status* **U**

REJECT. There is an understanding there are 2 stages of filtering. It is not clear if the RRC filter is adjusted based on the electricial bandwidth.There was no consensus to make a change at this time.

Cl **156** *SC* **156.10.1.2.7** *P* **112** *L* **36** # 28

Dawe, Piers Nvidia

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

This says "The EVMmax calculations are defined in OIF-400ZR-02.0, Implementation Agreement 400ZR section 20.4", which says EVM_MAX, is defined as a ratio of the root mean square (RMS) value of all the error vectors (averaged over N symbols) to the maximum magnitude of all the reference constellation points" but it doesn't define reference constellation points.
D2.1 comments 285, optical parameters are inadequately defined.

SuggestedRemedy

Define reference constellation points - or define the magnitude of the reference constellation, which may be simpler because it should contain the same 16 points over and over again, and it may be that all four corners are the same distance from the origin.

Response *Response Status* **U**

REJECT.

The proposed change does not contain sufficient detail so that the CRG can understand the specific changes that satisfy the comment.

This is not critical to address at this time, however a similar comment is encouraged to be resubmited during SA Ballot.