Cl **FM** *SC* **FM** *P* **3** *L* **21** # 29

Grow, Robert — RMG Consulting / KDPOF

Comment Type **ER** *Comment Status* **D**

I can't convince myself that the front matter is current as the accept to I#44 would require. What is here is not consistent with the Word document template on the IEEE SA web site, and I am not supposed to evaluate if the legalese at this point and others is substantively important. Three possibilities come to mind: 1) This draft used the 802.3 templates and they are not current with IEEE SA templates. 2) The Word and FrameMaker IEEE SA templates do not agree. 3) We failed to update front matter to the latest provided content.

SuggestedRemedy

Get all templates (IEEE SA FrameMaker, IEEE SA Word, 802.3 tools templates) to agree on front matter content. And update to the current mandatory content.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **44** *SC* **44.1.1** *P* **27** *L* **19** # 1

Ran, Adee — Cisco

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

Most other introduction clauses in the standard use a consistent phrasing: "<X> Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of <X> Gb/s, coupled with any IEEE 802.3 <X>GBASE Physical Layer implementation". The only exceptions are clauses 44 and 105. If the text is changed by this amendment, it would be better align all clauses.

My comment #261 against D2.0 suggested adding a reference to Table 44-1, and was accepted, but I now see that the result is inconsistent with other introductory clauses. Although table references may be helpful, adding them should be considered a maintenance activity.

SuggestedRemedy

Change "10 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer, connected through a 10 Gigabit Media Independent Interface (XGMII) to one of a number of 10 Gb/s Physical Layer devices (PHYs) specified in this standard (see Table 44–1)"
to "10 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of 10 Gb/s, coupled with any IEEE 802.3 10GBASE Physical Layer implementation".

Proposed Response *Response Status* **W**

PROPOSED REJECT.
There is an inconsistency in IEEE 802.3 in the introduction clauses that should be corrected. However, this inconsistency could be addressed and discussed in the maintenance group.

Cl **44** *SC* **44.1.3.4** *P* **29** *L* **24** # 56

Pérez-Aranda, Rubén — KDPOF

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

Add column for RS, XGMII and EEE, with values M, O, O, in consistency with 25 Gb/s, 50 Gb/s, and 2.5 and 5 Gb/s. See page 57.

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Out of scope.
Suggested remedy affects maintainance group tasks and it is odd with other 10 Gb/s PHYs included in the table.

Cl **45** *SC* **45.2.3.91.11** *P* **40** *L* **27** # 36

Pérez-Aranda, Rubén — KDPOF

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

Ability should be advertisement, to be consistent with Table 45-313d and comment 287 to D2.0.

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.91.12** *P* **40** *L* **35** # 37

Pérez-Aranda, Rubén — KDPOF

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

Ability should be advertisement, to be consistent with Table 45-313d and comment 288 to D2.0.

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.94** *P* **41** *L* **53** # 18

Ran, Adee Cisco

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

A 16-bit counter for bit errors can saturate quickly under typical conditions of operation with RS_FEC capable of correcting 11 symbol errors per codeword. I assume a pre-FEC BER of 1e-6 is acceptable (and perhaps far from worst case); with this performance, at 50 Gb/s, the counter will saturate in about 1 second, which isn't very useful.

SuggestedRemedy

Consider allocating a 32-bit counter and registers.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Out of scope.
During BER test mode operation the receiver checks the bit errors after RS-FEC decoder. The BER will be less than 1e-12 when link is stablished. In that case 16-bit counter would be saturated after 364 hours assuming 50 Gb/s.

Cl **105** *SC* **105.1.1** *P* **49** *L* **19** # 2

Ran, Adee Cisco

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

Most other introduction clauses in the standard use a consistent phrasing: "<X> Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of <X> Gb/s, coupled with any IEEE 802.3 <X>GBASE Physical Layer implementation". The only exceptions are clauses 44 and 105. If the text is changed by this amendment, it would be better align all clauses.

My comment #264 against D2.0 suggested adding a reference to Table 105-2, and was accepted, but I now see that the result is inconsistent with other introductory clauses. Although table references may be helpful, adding them should be considered a maintenance activity.

SuggestedRemedy

Change "25 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at data rate of 25 Gb/s, coupled with any IEEE 802.3 25GBASE Physical Layer devices specified in this standard (see Table 105–2)"
To "25 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at a data rate of 25 Gb/s, coupled with any IEEE 802.3 25GBASE Physical Layer implementation"."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
There is an inconsistency in IEEE 802.3 in the introduction clauses that could be corrected. However, this inconsistency should be addressed and discussed in the maintenance group.

Replace
"25 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer operating at data rate of 25 Gb/s, coupled with any IEEE 802.3 25GBASE Physical Layer devices specified in this standard (see Table 105–2)"
with
"25 Gigabit Ethernet uses the IEEE 802.3 MAC sublayer, connected through a 25 Gigabit Media Independent
Interface (25GMII) to one of a number of 25 Gb/s, coupled with any IEEE 802.3 25GBASE Physical Layer devices specified in this standard (see Table 105–2)"

Cl **105,2** *SC* **105,2** *P* **51** *L* **23** # 57

Pérez-Aranda, Rubén KDPOF

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

Add column for RS, 25GMII and EEE, with values M, O, O, in consistency with other 25 Gb/s PHYs. See page 57.

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166** *P* **62** *L* **1** # 17

Ran, Adee Cisco

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

There seem to be too many "shall" statements in this clause. "shall" is a normative requirement, and has to be accompanied by a PICS item. Preferably, the PICS should not be too long, and should not include statements that are merely definitions.

As a specific example, 166.5 has "The test modes and patterns shall be configured by setting the BASE-U PCS control register, operation mode bits defined in 45.2.3.90" - but there is no requirement to configure the test modes and patterns. This should say "The test modes and patterns are configured" instead.

SuggestedRemedy

With editorial license, change "shall" to "is/are" or other language as adequate, wherever the text defines something rather than making a normative requirement.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Out of scope. The commenter does not propose specific changes to the draft. The editor has thoroughly checked that there are no redundant shall statements, and that the number of shall statements is similar to other amendments. Precise recommendations would therefore be required to make any change.

Cl **166** *SC* **166.1.4** *P* **64** *L* **34** # 4

Ran, Adee Cisco

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

"The PMD Tx and PMD Rx compose the PMD sublayer"
The abbreviations "Tx" and "Rx" are conventionally not used in clause text for "transmitter" and "receiver". They are only used as parts of variable names, functions, registers, etc., or within expressions such as "Tx direction", "the "Rx reference point".

The full words should be used, as in the preceding sentence "The local PMD transmitter and PMD receiver are connected to the link partner using the fiber optic cabling".

This should be applied across clause 166.

SuggestedRemedy

Change independent instances of "Tx" (where it is used as abbreviation of "transmitter") to "transmitter", and change independent instances of "Rx" (where it is used as abbreviation of "receiver") to "receiver".

Independent instances exclude variable names, register names, etc., where abbreviations are conventionally used.

Implement across clause 166 with editorial license.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Don't change text inside Figure 166-2.

Cl **166** *SC* **166.1.4** *P* **65** *L* **36** # 5

Ran, Adee Cisco

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

The nominal signaling rate for 2.5GBASE-AU is still stated in MBd, while all other rates were changed to GBd. Units should be consistent.

Also, the word "nominal" is unnecessarily repeated multiple times and the phrase "over two optical fibers" is disconnected from the main sentence. The resulting sentence is difficult to parse, and could be simplified.

SuggestedRemedy

Change "The PMA provides full duplex communications at nominal 2656.25 MBd for 2.5GBASE-AU, nominal 5.3125 GBd for 5GBASE-AU, nominal 10.625 GBd for 10GBASE-AU, and nominal 26.5625 GBd for 25GBASE-AU and 50GBASE-AU over two optical fibers" to
"The PMA provides full duplex communication over two optical fibers, with nominal signaling rates of 2.65625 GBd for 2.5GBASE-AU, 5.3125 GBd for 5GBASE-AU, 10.625 GBd for 10GBASE-AU, and 26.5625 GBd for 25GBASE-AU and 50GBASE-AU".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.1.4** *P* **65** *L* **36** # 34

Pérez-Aranda, Rubén KDPOF

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

Baud rate for 2.5 Gb/s operation is specified using MBb. GBd unit is used for the other rates. Comment not fully implemented.

SuggestedRemedy

Use GBd for all the rates.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See #5

Cl **166** *SC* **166.2.2.1.1** *P* **69** *L* **27** # 6

Ran, Adee Cisco

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

"This field indicates the PHY supports EEE ability and has enabled the announcement of EEE ability. Therefore, the PHY is announcing that it is able to transmit and receive Low Power Idle (see 166.4)"

But It only indicates/announces that if the value is 1.

The second sentence starting with "Therefore" seems unnecessary in the description. The reference to 166.4 is enough.

Similarly for the PHD.CAP.OAM description.

SuggestedRemedy

Change the description of PHD.CAP.LPI to
"This field indicates whether the PHY supports EEE and has enabled the announcement of this ability (see 166.4)".

Change the description of PHD.CAP.OAM to
"This field indicates whether the PHY supports BASE-U OAM and has enabled the announcement of this ability (see 166.11)".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.2.2.5** *P* **75** *L* **28** # 39

Pérez-Aranda, Rubén KDPOF

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

It is not clear what is provided in Annex 166A. It is a sequence after xor operation or it is a the random sequence generated by the linear shift register. This is the same comment of 179 to D2.0. Annex provides the sequence produced by the linear shift register.

SuggestedRemedy

Replace “Annex 166A provides partial listings of BASE-U binary scrambler sequences for G = 1 and G = 2.” with “Annex 166A provides partial listings sequences produced by BASE-U binary scrambler for G = 1 and G = 2 previous to mod-2 operation.”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Replace “Annex 166A provides partial listings of BASE-U binary scrambler sequences for G = 1 and G = 2.” with “Annex 166A provides partial listings of sequences produced by BASE-U binary scrambler shift register for G = 1 and G = 2.”

Cl **166** *SC* **166.2.2.7.1** *P* **76** *L* # 8

Ran, Adee Cisco

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

The blocks and lines in figure 166-10 are not fully aligned; the differences are small but when viewed in full page view, probably due to aliasing, they stand out quite badly.

Blocks and lines should be positioned in exact locations, using the "Object properties" dialog, to prevent this issue. Visual inspection of the FrameMaker source may not always reveal it, and manual alignment of object does not work in general.

Also in figure 166-11 and maybe others.

SuggestedRemedy

Update the figures to correct these effects.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
SASB Operation Manuel 5.4.3.3: "It should be borne in mind that proposed standards are professionally edited prior to publication"

Cl **166** *SC* **166.2.3.1** *P* **87** *L* **16** # 3

Ran, Adee Cisco

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

Comment #254 against D2.0 asked to clarify how the descrambler lock is acquired. The response states that "Scrambler lock does not need to be adquired" but then explains in detail how it is actually supposed to be acquired (using correlation with the known sequence sent by the transmitter before the link is established) It also provides a reference presentation.

While I appreciate the response to the question in the comment, I think this is valuable information for readers of the standard, who may not all be experts in implementation. Having it written in the standard could help readers avoid searching through presentations and comments to find this answer.

SuggestedRemedy

Add the following note at the end of 166.2.3.1:

NOTE—The timing of descrambler initialization is established during link establishment, using knowledge of the sequence (LBLOCK_T) sent by the link partner.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Add the following note:
"NOTE—The timing of descrambler initialization is established during link establishment, using knowledge of the sequence (LBLOCK_T) sent by the link partner (see 166.3.4.3)."
166.3.4.3 -> PHY Rx control state diagram

Cl **166** *SC* **166.2.3.2** *P* **87** *L* **22** # 9

Ran, Adee Cisco

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

The error correction ability of the RS-FEC decoder is not specified. "a codeword contains errors that could not be corrected" might occur due to a wrong implementation choice, with fewer than the 11 symbol errors that the RS code enables correcting; such implementation should not be considered compliant.

The suggested remedy uses text borrowed from 91.5.3.3.

SuggestedRemedy

Insert the following sentence after the first sentence of this clause:
"RS-FEC decoder shall be capable of correcting any combination of up to t=11 symbol errors in a codeword".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
"RS-FEC decoder shall be capable of correcting any combination of up to t=11 symbol errors in a codeword and detecting any combination of up to 2t=22 symbol errors in a codeword.".

Cl **166** *SC* **166.3.2** *P* **96** *L* **3** # 14

Ran, Adee Cisco

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

It is not stated here (or anywhere) that the PMA converts the signal received from the PMD to a stream of symbols of the set {-1, +1} or {-1, -1/3, +1/3, +1}, and how these symbols are converted to bits, which are what the PCS expects.

SuggestedRemedy

Add text similar to 166.3.1 (PMA transmit function) that specifies that a stream of symbols is extracted from the PMD input signal (PMD_COMSIGNAL.indication(rx_signal) in 166.6.1.2) and converted to bits (per table 166-6) that are delivered to the PCS sublayer.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Add after second paragraph a new paragraph:
"A stream of symbols is extracted from the PMD input signal (PMD_COMSIGNAL.indication(rx_signal) in 166.6.1.2) and converted to bits (per table 166-6) that are delivered to the PCS sublayer"

Cl **166** *SC* **166.3.3** *P* **96** *L* **15** # 10

Ran, Adee Cisco

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

"The interface between the PMA and the PMD are signals for which no specific implementation is specified"

This sentence adds no value; the standard does not specify specific implementation of anything.

The interface signals are actually specified as an interface (not implementation) in 166.6.1. This subclause could state that "The interface between the PMA and the PMD is specified in an abstract manner in 166.6.1".

Alternatively, 166.3.3 can be deleted entirely, if its subclauses are deleted (subject of other comments).

SuggestedRemedy

Delete this subclause.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Replace
"The interface between the PMA and the PMD are signals for which no specific implementation is specified"
with
"The interface between the PMA and the PMD is specified in an abstract manner in 166.6.1".

Cl **166** *SC* **166.3.3.1** *P* **96** *L* **19** # 12

Ran, Adee Cisco

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

This subclause seems to add no value; it repeats information given in 166.3.1.

The subclause may be deleted.

SuggestedRemedy

Delete this subclause.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Remove subclause 166.3.3.1 as there is no additional tutorial information provided.

Cl **166** *SC* **166.3.3.2** *P* **96** *L* **26** # 13

Ran, Adee Cisco

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

This subclause seems like an excerpt from a textbook. It has no normative requirements and is not referred to by any other subclause. It does not help the reader in any way.

SuggestedRemedy

Delete this subclause, or move its content to an informative annex.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Implement change per comment.

Cl **166** *SC* **166.3.5** *P* **104** *L* **1** # 38

Pérez-Aranda, Rubén KDPOF

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

Decrease the hierarchy level of PHY quality monitor one step (inside PHY control) to be consistent with Figure 166-3 and comment 39 to D2.0.

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.3.5.1** *P* **104** *L* **5** # 15

Ran, Adee Cisco

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

"RS-FEC frame error ratio" is not defined here. RFER has a definition in 166.7.10.1 (Stressed receiver conformance test block diagram) which is probably the wrong place.

The term "frame" has a very specific meaning in Ethernet, the MAC frame. The RS-FEC blocks are referred to as codewords, not frames, in other places in this draft. This choice reduces the risk of confusion.

Note that most other clauses in the base standard also use the term codeword rather than frame in this context (the unfortunate exceptions are clauses 65, 97, 149 and 153).

SuggestedRemedy

Change to "RS-FEC codeword error ratio", and add a definition of this term here; either as a ratio of register values (as in 166.7.10.1) or in some other way.

Change the term "RFER" to "RS-FEC codeword error ratio" (no need for an abbreviation, as this term appears only four times in this draft).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Replace "65-bit blocks reception is reliable when the RS-FEC frame error ratio (RFER) is less than 4.5×10–10 after
RS-FEC decoding function."

with

"65-bit blocks reception is reliable when the RS-FEC codeword error ratio is less than 4.5×10–10 after RS-FEC decoding function. RS-FEC codeword error ratio is defined as the ratio of RS-FEC CW error counter (register 3.2353, see 45.2.3.95) and the number of RS-FEC CWs received from the last reset of RS-FEC CW error counter."

Replace item a) in (p.133 l.24) with

"RS-FEC codeword error ratio is over the limit specified in 166.3.5.1."

Replace "RFER" in note in (p.115 l.6) with "RS-FEC codeword error ratio"

Cl **166** *SC* **166.4** *P* **106** *L* **16** # 16

Ran, Adee Cisco

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

It is not stated clearly that EEE is an optional feature. The first subclause, 166.4.1, has a normative statement (shall) about EEE, which reads as the time of enablement (not a condition, if/otherwise).

Only 166.4.2 says it is optional, and still does not state what happens if it's not implemented.

SuggestedRemedy

Add text in 166.4 stating that EEE is optional and that subclauses 166.4.2, 166.4.3 and 166.4.4 apply only when EEE is implemented and enabled (as defined in 166.4.1).

Change the text in 166.4.1 to "EEE capability is enabled when the field PHD.CAP.LPI (see Table 166–2) is equal to one in both the transmitted
and received PHD. It is disabled otherwise".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Replace with
"The optional EEE capability is announced by setting the field PHD.CAP.LPI (see Table 166-2) of the transmitted PHD to one. EEE functionality shall be active when both the transmitted and received PHD are equal to one."

Cl **166** *SC* **166.5.1** *P* **110** *L* **36** # 19

Ran, Adee Cisco

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

What BER is considered acceptable when BER test is enabled?

What is the BER test actually used for? The receiver sensitivity in 166.6.10 is defined in terms of RS-FEC codeword errors (and it is appropriate). Any other receiver tests could also use this metric. BER is a poor metric for performance with RS-FEC, especially when errors are not only due to stationary white noise (e.g. DFE error correlation, low-frequency noise, etc.)

If BER test is not used for any normative testing, the implementation of BER test mode need not be specified.

SuggestedRemedy

Clarify what the BER test mode is used for and what result is considered acceptable.

Alternatively, remove the specification of BER test mode.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
BER test mode is not used for any normative testing however it is a debugging test mode required by the OEMs for dependability reasons.

Cl **166** *SC* **166.5.4** *P* **112** *L* **2** # 50

Pérez-Aranda, Rubén KDPOF

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

File name should be indicated.

SuggestedRemedy

Replace note as: “CSV file C166_SSPR-NRZ_pattern.csv containing the entire NRZ symbol sequence for the SSPR-NRZ test pattern is available …”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.5.5** *P* **112** *L* **15** # 20

Ran, Adee Cisco

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

The definition of SSPR-PAM4 seems similar to that of SSPRQ in 120.5.11.2.3, since both use the same generating polynomial. It is unclear whether the differences are a matter of language of the definition, or these are different patterns.

If the intent is to use the same pattern, consider replacing the definition in this subclause with a reference to 120.5.11.2.3, to remove the need to verify that these definitions are indeed equivalent.

If it was not the intent, consider changing the pattern to the one already defined, unless there is a good reason to define another one.

SuggestedRemedy

Per comment; If however the pattern is different and is not changed to be the same as in SSPRQ, add a note stating that this pattern is different from SSPRQ as defined in 120.5.11.2.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
Add text stating that this pattern is different from SSPRQ as defined in 120.5.11.2.3.

Technical arguments behind SSPR-PAM4:
SSPR-PAM4 reuses many parts of C/120 SSPRQ (polynomials, sequences combinations, etc). However, SSPR-PAM4 uses the PAM4 mapper that was adopted in P802.3cz D1.2, the sequence length is even, the max CID length for all the digits is the same, average is 0, the definition of shift registers is consistent with all the other shift registers in C/166, and seeds are consistently different.

Cl **166** *SC* **166.5.5** *P* **112** *L* **54** # 51

Pérez-Aranda, Rubén KDPOF

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

File name should be indicated.

SuggestedRemedy

Replace note as: “CSV file C166_SSPR-PAM4_pattern.csv containing the entire PAM4 symbol sequence for the SSPR-NRZ test pattern is available …”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.5.6** *P* **113** *L* **41** # 52

Pérez-Aranda, Rubén KDPOF

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

File names should be indicated

SuggestedRemedy

Replace note as: "Two CSV files, C166_G1_SRS_pattern.csv and C166_G2_SRS_pattern.csv, containing the entire symbol sequence for stressed receiver sensitivity pattern for G = 1 and G= 2 respectively are available …”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.6.1** *P* **113** *L* **52** # 11

Ran, Adee Cisco

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

"The PMD service interface supports the exchange of analog signals between PMA and PMD sublayers"

But this subclause has no specifications for these analog signals.

To enable a modular design where the PMD and PMA is implemented on different chips (possibly by different vendors), specification of analog parameters, such as signal levels, differential vs. single-ended, AC vs DC coupling, are required for transmitters, and tolerance specifications are required for receivers. For example, if the PMA has to recover PAM4 signals, the PMD output signal toward the PMA should not be so large that the PMA will saturate.

SuggestedRemedy

Add electrical specifications for the PMD input and output signals towards the PMA. Examples of such specifications can be found e.g. in annex 120E (which specifies the chip-to module interface for 50G PAM4 modules).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Comment is out of scope for the recirculation balllot.
Additionally, modular design where the different PHY sublayers are implemented in different chips supplied by different vendors is not expected (not accepted as competitive in cost, power consumption and EMC performance) for automotive applications. Single chip implementation with full integration of electronics, photonics and optics able to support standard pick and place and reflow assembly processes is a requirement. Because of that, interface between PMA and PMD is expected not to be exposed. Specification of electrical interface between PMA and PMD is not an identified need and is not aligned with the implementation required by the automotive market. Current specification of the PMD service interface does not prevent any particular electrical interface between PMA and PMD. Annex 120E includes very specific measurements and requirements for this interface (more than 20 pages). Electrical specifications of this point are beyond the scope and timeframe of this Task Force.

For improved clarity, do the following changes:

p. 113, l.52: replace “analog signals” with “signal amplitude”

p. 114, l.29: replace “analog signals” with “signal amplitude”

p. 114, l.41: replace “analog signal” with “signal amplitude”

Cl **166** *SC* **166.6.3.1** *P* **117** *L* **1** # 30

Murty, Ramana Broadcom

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

Is there any interoperability between the PHY for different PMDs defined in Tables 166-8, 9, and 10? If nothing is stated, it will be assumed that there is interoperability between transceivers designed for different data rates. As an example, when multiple reaches are defined in a project, frequently there is interoperability over the shorter reach. See 802.3cu or 802.3db.

SuggestedRemedy

If interoperability between transceivers designed for different speeds is not intended, state that in the draft.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Comment is out of scope for the recirculation balllot.
Additionally, interoperability between PHYs specified for different rates is not intended, as stated in p. 64 l. 36 and 37.
Vendors can implement multirate transceiver components with support of several BASE-AU PHY types. Operation in each of the rates should be compliant with this standard. However implementation details of how to implement multirate transceiver is out of scope of this standard.

Cl **166** *SC* **166.6.3.2** *P* **118** *L* **28** # 31

Murty, Ramana Broadcom

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

Table 166-9 suggests a 2.5G link can be made using a 2.5G transceiver on one end and a 25G transceiver at the other end. Consider the output of a 2.5G transceiver with lowest allowed OMA and worst case channel insertion loss. Does the receiver on the 25G transceiver have sufficient sensitivity?

SuggestedRemedy

Consider all combinations of different rate transceivers that are allowed and ensure operation in all corners of the link budget. Update Tables 166-9 and 166-10 as needed.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Comment is out of scope for the recirculation balllot.
Additionally, interoperability between PHYs specified for different rates is not intended, as stated in p. 64 l. 36 and 37.
Vendors can implement multirate transceiver components with support of several BASE-AU PHY types. Operation in each of the rates should be compliant with this standard. However implementation details of how to implement multirate transceiver is out of scope of this standard.

Cl **166** *SC* **166.6.3.2** *P* **118** *L* **40** # 32

Murty, Ramana Broadcom

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

The center wavelength range of 970 - 990 nm is too narrow. Virtually all data communication VCSELs operate in the 840 - 950 nm range. The automotive mission profile is not very different from conditions in which many datacom VCSELs operate. Expanding the VCSEL waveelngth range enables more VCSEL suppliers.

SuggestedRemedy

Expand the center wavelength range to 840 - 990 nm in Tables 166-9 and 166-10.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Comment is out of scope for the recirculation balllot.
Additionally, nominal center wavelength that has been adopted is 980 nm. Range of +/- 10 nm is consistent with other projects that use different nominal center wavelength.

The TX and RX characteristics have been derived with margin considering real 980nm device samples operating in a range of backside temperature between -40ºC and +125ºC and bias current of up to 8 mA. It was demonstrated during the project that required wear-out reliability cannot be achieved with 850nm VCSEL devices using similar current densities. It was also demonstrated that in order to marginally meet the wear-out reliability requirements, the bias current should be reduced < 5 mA in high temperature, therefore reducing the speed and optical power and increasing the RIN of the VCSEL devices, hence making much more difficult the PHY implementation. On top of that, it was also demonstrated that 980nm devices are much less dependent with temperature, so they present a much more uniform threshold current between -40 and 125ºC. 850nm devices could be optimized for high temperature, but degrading (or making impossible) operation at low temperature and viceversa.

Technology for manufacturing 980nm VCSEL devices is widely available. It was developed during last decade for sensor devices. Producing reliable, high speed, low noise, and efficient VCSELs at 980nm is much easier than at 850nm. This will allow to expand the availability of manufacturers that can supply photonics for BASE-AU PHYs in automotive industry.

Cl **166** *SC* **166.6.3.3** *P* **117** *L* **23** # 41

Pérez-Aranda, Rubén KDPOF

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

Change "BASE-AU receiver optical specifications" with “BASE-AU receiver optical characteristics”

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.5** *P* **124** *L* **5** # 42

Pérez-Aranda, Rubén KDPOF

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

Comment 150 to D2.0 not fully implemented.

SuggestedRemedy

Replace “166.7.8.2.4” with “166.7.8.4”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.8** *P* **124** *L* **46** # 21

Ran, Adee Cisco

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

"Transmitter and distortion figure of merit" is an odd term; transmitter is a device and distortion is an effect.

"Transmitter distortion figure of merit" seems to make more sense.

SuggestedRemedy

Change "Transmitter and distortion figure of merit" to "Transmitter distortion figure of merit".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Seek all ocurrences to replace.

Cl **166** *SC* **166.7.8.1** *P* **125** *L* **32** # 43

Pérez-Aranda, Rubén KDPOF

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

Comment 158 to D2.0 not correctly implemented. Low pass response was intended to be added where the filter is defined, not in the sentence where the compensation is stated.

SuggestedRemedy

“The combination of the O/E converter and the oscilloscope has a -3 dB bandwidth of 16.4 GHz with a fourth- order Bessel-Thomson low-pass response ... “

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.8.2** *P* **126** *L* **21** # 45

Pérez-Aranda, Rubén KDPOF

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

Replace low pass Butterworth filter with 3-dB bandwidth" with "low pass Butterworth filter with -3 dB bandwidth"
Same for lines 24 and 27.

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.8.2** *P* **126** *L* **34** # 48

Pérez-Aranda, Rubén KDPOF

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

sn is not used for BER calculation.

SuggestedRemedy

Replace "The BER calculation block calculates the BER from the equalized sequences s and sn as specified in 34 166.7.8.2.2." with "The BER calculation block calculates the BER from the equalized sequence s, the standard deviation sigma_nin, and the equalizer filter G(z) as specified in 34 166.7.8.2.2.". Change figure 166–40 consistently.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Replace G(z) with F(z) according to comment #24

Cl **166** *SC* **166.7.8.2** *P* **126** *L* **36** # 23

Ran, Adee Cisco

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

According to the style manual, multiplication sign should be used instead of central dot.
Also, negative numbers should be written with end-dash rather than a hyphen.

SuggestedRemedy

Change per comment, across the draft as necessary.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Style manual is refering to multiplication in equations (see 15.3).
(166-9)(remove dots),
(166-10)(remove dots),
(166-12)(remove dots),
(166-13)(remove dots),
(166-15)(remove dots),
(166-17)(remove dots),
(166-18)(use multiplication sign),
(166-20)(use multiplication sign),
(166-21)(use multiplication sign),
(166-23)(remove dots),
(166-24)(use multiplication sign).
Negative numbers shall be written with end-dash rather than a hyphen.

Cl **166** *SC* **166.7.8.2** *P* **126** *L* **36** # 26

Ran, Adee Cisco

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

I assume that a bit error rate of 1.757e-4 used in TDFOM measurement means that with a minimally compliant transmitter and channel, a receiver with the reference equalizer can achieve this BER.

With a bit error rate of 1.757e-4, and with only uncorrelated errors, I calculated the RS(544,522) FEC codeword error ratio as 5e-10, and the MAC frame loss ratio as 5.6e-10; This is very close to 6.2e-10, the frame loss ratio equivalent of BER=1e-12 in the project objective.

Although the reference equalizer is defined as having decision feedback equalization with no error propagation (since it uses the transmitted pattern), implementations with DFEs will have error propagation, in addition to other implementation-specific impairments. The effect of error propagation (especially with PAM4) and other non-stationary error processes can severely degrade the performance of RS-FEC and increase the frame loss ratio; in other PHYs, an order of magnitude improvement in BER is typically required to mitigate these effects. So, real receivers based on the reference equalizer will likely be unable to achieve the FLR objective with minimally compliant transmitters. It is uncertain that specific improvements over the reference equalizer (such as longer filters) will always mitigate this difference.

SuggestedRemedy

Consider tightening the TDFOM spec by requiring a BER of 1e-5 with the reference receiver.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
As stated in 166.7.8.2, the first step of TDFOM signal processing is signal averaging. This eliminates the noise uncorrelated with the signal. Therefore, transmitter noise is not considered in TDFOM vs. TDECQ (it is considered separately with RIN and random jitter specs). The 802.3cz link is not limited by RIN, MN or MPN, but limited by RX sensitivity, which depends of RX noise (fundamentally TIA noise). This means that a compliant TX connected through a compliant channel to a receiver will produce different level of FLR in the output of the RX depending on the signal strength in the PMD RX input.
The RS-FEC codeword error ratio is 4.5e-10 for RS(544,522), according to https://www.ieee802.org/3/cz/public/jan_2022/perezaranda_3cz_01_0122_RFER.pdf. In that reference, assumptions of uncorrelated received PAM symbols, additive and white noise (e.g. ISI may be fully compensated and noise whiten by a suitable equalizer), Gray mapping, hard detection, and RS-FEC decoder architecture are stated for elaboration of equations that support the calculation. Because these assumptions used to derive RS-FEC codeword error ratio can differ of real implementations, it is also stated that the RS-FEC codeword error ratio criterion shall be fulfilled by a compliant 802.3cz PHY to establish a reliable link, regardless the implementation. This PHY quality criterion is defined in 166.3.5.1 and shall statement to meet it is stated in 166.3.5.4.
DFE equalizer is used in the reference receiver of TDFOM because it is the most expected implementation. However, the number of feedback taps is limited to 2 for rates using NRZ modulation and to 1 feedback tap for the rate using PAM4. This is intentional in order to take into account the limitations of reference equalizer in compensating the inter-symbol interference when TDFOM is calculated. Therefore, even if ideal (no error propagation) DFE is used in TDFOM, limited length feedback filter is considered, consistent with a real implementation that would use DFE. It is important to note that other implementations of receiver equalizer may be possible, depending of TIA and front-end technology node (e.g. only FFE, CTLE, CTLE + DFE, CTLE + MLSE, FFE + MLSE, no EQ). But, in any case RX stressed sensitivity and PHY quality criterion must be met.
MMSE criterion is used in TDFOM. Unbiased MMSE-DFE is the canonical equalization topology able to approach the capacity of a ISI channel with colored noise. This was demonstrated by David Forney (MIT) and John Cioffi (Standford), about 30 years ago. Difference between MMSE and unbiased MMSE is negligible for the SNR regime considered in P802.3cz. MMSE-DFE provides no-ISI output and performs noise whitening. This is achieved because both feed-forward and feed-back filters are simultaneously calculated under the same MMSE optimization process. This is not equivalent to MMSE feed-forward filter (or CTLE) followed by a MMSE feed-back filter, because no spectral factorization would be obtained. MMSE-DFE limits the size of feed-back taps, reducing them when noise levels increase.
The RS-FEC decoder error correction capability is t = 11 RS symbols per codeword of 10 bits each. When only random errors happen (Poisson distribution of errors arrival time caused by pure additive white noise), the most likely situation is that only 1 bit per erroneous RS symbol will be affected (last equation of slide 3 of contribution referenced above) . However, in case DFE, error bursts can be produced, affecting more than 1 bit per RS symbol. Always that DFE bursts are under 10 bits, the RS-FEC decoder performance will not be affected (DFE w/o RS-FEC would not technically feasible in real implementation approaching low levels of sensitivity).
Galois field size of RS-FEC and number of taps of DFE for NRZ and PAM4 have been selected consistently to be feasible to meet target RS-FEC codeword error ratio.

Cl **166** *SC* **166.7.8.2.1** *P* **126** *L* **43** # 46

Pérez-Aranda, Rubén KDPOF

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

Replace "The noise sequence nin is added to y generating the noisy sequence yn." with "The noise sequence nin is added to y' generating the noisy sequence y'n." Add the prima / accent.

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.8.2.1** *P* **126** *L* **126** # 22

Ran, Adee Cisco

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

The reference equalizer definition is rather cryptic.

It would help readers if the equalizer is described using the well-known terms, feed forward equalizer (FFE) and decision feedback equalizer (DFE) or alternatively feedback filter (FBF) if this term is preferred.

SuggestedRemedy

Change the text, tables and figures to use the terms listed in the comment, with editorial license.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
Out of scope.
The mathematical expresion and block diagrams in the figures are correct and unequivocal.
No alternative text proposed.

Cl **166** *SC* **166.7.8.2.2** *P* **128** *L* **43** # 47

Pérez-Aranda, Rubén KDPOF

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

Nh is the number of bins of the histogram.

SuggestedRemedy

Replace "is the number of samples of the sequence s" with “is the number of bins of the histogram of sequence s”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.8.2.2** *P* **128** *L* **45** # 24

Ran, Adee Cisco

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

The term SER (symbol error ratio) is used in many places in the base standard to denote RS-FEC symbol error ratio. The error ratio related to PAM4 symbols is denoted as DER (detector error ratio) in annex 93A and many clauses that refer to it.

It is suggested to avoid using the same term and acronym for different things, to reduce confusion.

SuggestedRemedy

Change SER to DER and make any changes necessary to the text, variable names etc.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
(p. 128 l.46) replace "SER_th" with "BER_th"
(p. 128 l.47) replace "SER" with "BER" and "SER_th" with "BER_th"
(p. 128 l.49-50, last two steps) remove.
(p. 128 l.52) replace "SER_th" with "BER_th"
(Equation 166-15) replace "SER_th" with "BER_th" and replace "1/2" with "1/(2G)".
Rename filter G(z) as F(z), and respective coefficients (rename g[i] as f[i]) in every occurence.

Cl **166** *SC* **166.7.8.2.3** *P* **129** *L* **29** # 49

Pérez-Aranda, Rubén KDPOF

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

Replace "continuous samples of s with value < 2/3.” with “continuous samples of s with value < -2/3.”

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.10.1** *P* **133** *L* **17** # 25

Ran, Adee Cisco

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

A list of steps with a specific order should use a lettered list instead of a dashed list.
The inner list, which lists conditions that have no specific order, should be a dashed list.
Also, make the margins correct (using the predefined paragraph formats should work).
Also, correct the text size in the cross-reference to 166.3.5.1.

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.10.1** *P* **133** *L* **1** # 58

Pérez-Aranda, Rubén KDPOF

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

Corner frequency should be 100 kHz in order to be consistent with the CRU and jitter specifications.

SuggestedRemedy

Change 200 with 100.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.

Cl **166** *SC* **166.7.10.1** *P* **133** *L* **19** # 44

Pérez-Aranda, Rubén KDPOF

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

Too space between steps

SuggestedRemedy

Reduce spaces.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166** *SC* **166.7.10.4** *P* **135** *L* **23** # 28

Ran, Adee Cisco

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

For a PHY that operates with a signaling rate of multiple GHz, it seems odd that jitter tolerance is specified only up to 100 kHz. This assumes very low CDR bandwidth, far lower than what is achievable in other PHYs (4 to 10 MHz, see clause 110 for 25 Gb/s and clause 136 for 50 Gb/s).

Having this low bandwidth requires measuring transmitter jitter with very low CRU corner frequency (0.1 MHz in 166.7.4.1), which will likely introduce oscillator jitter with strong components at hundreds of kHz (e.g. due to power supply switching noises), especially in a noisy environment such as automotive. It may be unfeasible to build such transmitters.

I do not see a reason to have jitter and CDR specifications that are so different from other PHYs with similar modulation and signaling rates.

SuggestedRemedy

Consider changing the CRU bandwidth to 4 MHz and changing the jitter tolerance conditions accordingly.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope.
In https://www.ieee802.org/3/cz/public/8_feb_2022/perezaranda_3cz_03b_080222_test_methods.pdf was explained the rational behind the CRU low frequency corner.

This frequency corner is fundamentally affected by the LPI operation mode. After LPI is detected, while receiving Refresh codewords, the receiver only needs to sample, equalize and detect a small portion of symbols of each CW (last n 65-bit blocks plus the first m repeated 20-bit PHD sub-blocks for Wake detection and robust decoding of PHD). Both clocks, TX and RX, should experience small deviation during Refresh CW transmission. The minimum clock recovery actuation period is equivalent to a CW (5440 bits) transmission time. For 50 Gb/s CW time is 108.8 ns. For 2.5 Gb/s CW transmission time is 2176 ns.

A CRU corner frequency of less than 1/4 the CW transmission rate is considered (Nyquist frequency of OJTF of RX CDR will be 1/2 CW transmission rate, so 1/4 is in the middle of the band of the control filter loop, so it is doable). Under this consideration, the CRU corner frequency would be 2 MHz for 50 Gb/s, and 100 kHz for 2.5 Gb/s operation.

If we consider that multi-rate PHY components are expected in the market, then it is desirable to use the same PLL for all of them to simplify the implementation. Therefore, a single corner was adopted, i.e. 100 kHz.

There are reference oscillators of 156.25 MHz available in the market capable to be used in automotive range with < 0.5 ps RMS integrated jitter between 12kHz and 20 MHz. When this level of reference jitter is considered in the PLL design it can be observed that TX jitter is fundamentally defined by the VCO and PLL loop for frequencies over 20 kHz.

Power supply noise is a topic that can affect to many performance aspects in a real implementation: jitter, TX RIN, EMC, etc. It is up to the implementer of the IC and ECU to provide the power supply filtering and decoupling necessary to meet the specifications.

TDFOM has been successfully evaluated with prototype transmitters with and sampling

oscilloscope and real CRU configured at 100 kHz as corner frequency. Therefore, the test method has been experimentally validated.
Proposed changes:
Multi-rate consideration for CRU specification can be considered in two rate ranges. With this consideration we can make easier to meet the specifications in high rate modes, .i.e. easier TX PLL design without penalizing the RX CDR. This does not prevent implementation of multi-rate components support from 2.5 to 50 Gb/s, because different PLL/VCO technology is expected for rates of <= 10 Gb/s and >= 25 Gb/s.
First range: 2.5, 5, and 10Gb/s. CRU corner freq = 100 kHz
Second range: 25 and 50 Gb/s. CRU corner freq = 1 MHz.
Replace p. 122, l. 52, "The clock recovery unit (CRU) has a corner frequency of 0.1 MHz and a slope of 20 dB/decade." with "The clock recovery unit (CRU) has a corner frequency of 0.1 MHz and a slope of 20 dB/decade for 2.5GBASE-AU, 5GBASE-AU and 10GBASE-AU. The clock recovery unit (CRU) has a corner frequency of 1 MHz and a slope of 20 dB/decade for 25GBASE-AU and 50GBASE-AU."
Similar replace in p.125, l. 38.
Change table 166-18 such that:
For 2.5, 5, 10GBASE-AU: f < kHz, not specified. 1 kHz <= f <= 100 kHz, 15 kHz/f.
For 25BGASE-AU: f < kHz, not specified. 1 kHz <= f <= 1 MHz, 150 kHz /f.
For 50BGASE-AU: f < kHz, not specified. 1 kHz <= f <= 1 MHz, 60 kHz/f.

Cl **166** *SC* **166.7.10.4** *P* **135** *L* **23** # 27

Ran, Adee Cisco

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

f has a dimension of frequency, so 15000/f and 6000/f have dimensions of time, not a dimensionless number (as listed in the table, a number of UI). For example, 15000/(100 kHz) is 0.15 seconds, not 0.15 UI.

This has been corrected across the base standard by writing the numerator with frequency units.

SuggestedRemedy

Change "15000/f" to "15 kHz/f" and "6000/f" to "6 kHz/f".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope. Implement changes per comment.

Cl **166** *SC* **166.7.10.4** *P* **135** *L* **25** # 59

Pérez-Aranda, Rubén KDPOF

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

Remove last row. Jitter over 100 kHz is not compatible with CRU corner frequency specification, which according to https://www.ieee802.org/3/cz/public/8_feb_2022/perezaranda_3cz_03b_080222_test_methods.pdf slide 3, has been selected to make possible clock recovery implementation in LPI operation.

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Out of scope. Implement changes per comment.

Cl **166** *SC* **166.11** *P* **137** *L* **25** # 7

Ran, Adee Cisco

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

In the first sentence, OAM (as a channel?) is stated as optional, but other than that this subclause has normative statements that are unconditional.

It is unclear that the requirements hold only when OAM is enabled.

The OAM bits are defined in the PHD (table 166-2), so my understanding is that the channel is always there - it is unused if OAM is not enabled.

SuggestedRemedy

Change the first paragraph to the following two paragraphs:

"OAM is optional. If supported and enabled, the OAM channel provides a mechanism to reliably exchange messages between station management entity (STA) peers attached to link partners, with the specifications in this subclause. If OAM is not supported or not enabled, all OAM fields shall be set to zero in the transmitted PHD, and ignored in the received PHD.

The BASE-U OAM message exchange occurs in the PCS, as part of the PHD, and does not impact the normal xMII to xMII data transmission. Moreover, the
BASE-U OAM message exchange is not affected by EEE operation."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.
Out of scope. Implement changes per comment.

Cl **166** *SC* **Table 166-19** *P* **136** *L* **20** # 33

Ferretti, Vince Corning

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

Based on literature for cabled attenuation in extreme environments, i.e., aviation, aging needs to be taken into account for this application

SuggestedRemedy

Suggest adding 0.4dB cable attenuation aging penalty as a placeholder until more data can be generated to verify for 40 meter length

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Implement changes suggested in perezaranda_3cz_01_0722_fiber_aging.pdf

Cl **166** *SC* **166.11** *P* **137** *L* **29** # 35

Pérez-Aranda, Rubén KDPOF

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

Similar text as in EEE should be added: EEE capability shall be enabled when the field PHD.CAP.LPI (see Table 166–2) of both, the transmitted and received PHD, are equal to one.
Comment #285 to D2.0 not fully implemented.

SuggestedRemedy

BASE-U OAM capability shall be enabled when the field PHD.CAP.OAM (see Table 166–2) of both, the transmitted and received PHD, are equal to one. Add PICS accordingly

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166A** *SC* **166A.1** *P* **157** *L* **16** # 40

Pérez-Aranda, Rubén KDPOF

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

Change “Table 166A–1 and Table 166A–2 contain hexadecimal presentations of the sequence tx_scrambler<0:195839>” with “Table 166A–1 and Table 166A–2 contain hexadecimal presentations of the binary sequence tx_scrambler<0:195839> previous to mod-2 operation with RS-FEC encoder output”

SuggestedRemedy

Per comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change “Table 166A–1 and Table 166A–2 contain hexadecimal presentations of the sequence tx_scrambler<0:195839>” with “Table 166A–1 and Table 166A–2 contain hexadecimal presentations of the binary sequence tx_scrambler<0:195839> produced by BASE-U binary scrambler shift register”

Cl **166A** *SC* **166A.2** *P* **158** *L* **23** # 53

Pérez-Aranda, Rubén KDPOF

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

File name should be indicated.

SuggestedRemedy

Replace note as: “CSV file C166_G1_binary_scrambler_sequence.csv containing the entire 2.5GBASE-U, 5GBASE-U, 10GBASE-U, and 25GBASE-U binary scrambler is available …”

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166A** *SC* **166A.3** *P* **159** *L* **22** # 54

Pérez-Aranda, Rubén KDPOF

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

File name should be indicated.

SuggestedRemedy

Replace note as: "CSV file C166_G2_binary_scrambler_sequence.csv containing the entire 50GBASE-U binary scrambler is available … “

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **166B** *SC* **166B.1** *P* **160** *L* **14** # 55

Pérez-Aranda, Rubén KDPOF

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

For consistency replace “Reed-Solomon encoding” with “RS-FEC encoder”

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.