Cl **00** *SC* **0** *P* *L* # 72

Grow, Robert RMG Consulting

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

I have been slow to realize this, but I now think ME (Management Entity) should be STA (station management entity) for consistency with Std 802.3. We shouldn't be defining a new term.

SuggestedRemedy

Replace Management Entity and ME with station management entity and STA respecitively, and modify surrounding text if required.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **00** *SC* **0** *P* **1** *L* **1** # 65

Grow, Robert RMG Consulting

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

Fix bad draft numbers on title page.

SuggestedRemedy

Make sure draft number in lines 1, 4, and 27 are all the FrameMaker draft number variable rather than text.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **00** *SC* **0** *P* **116** *L* **1** # 50

Remein, Duane Huawei

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

I count about 119 PICS statements between Cl 114 & 115. However a search reveals 136 shall statements, each requireing a PICS statement.

SuggestedRemedy

Review the PICS for completeness and added PICS statements for any shall statement without a PIC entry.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **00** *SC* **0** *P* **46** *L* **3** # 31

Remein, Duane Huawei

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

Several instances of number exceeding 3 digits exist without the proper separtor ",". For example in this para there is 705 600 in 2 places which should apprear as 705,600

SuggestedRemedy

Review the entire draft for large numbers and insert the comma as appropriate.

Proposed Response *Response Status* **Z**

PROPOSED REJECT.

This comment was WITHDRAWN by the commenter.

Proper separator is " " according to the IEEE Standards Style Manual, 13.3.2.

Cl **114** *SC* *P* *L* # 27

Remein, Duane — Huawei

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

"[-2k0, 2k0)" right paren should probably be a bracket

SuggestedRemedy

per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

")" indicates open range, as established by international standard ISO 31-11, superseded in 2009 by ISO 80000-2.
Per ISO 80000-2 item 2-6.9:
[a, b) = {x belongs to R | a <= x < b}

Modulo operator and feedback filter embedded within THP process generate an output with continuous uniform distribution that take values in a right-half open interval that is symetric respect to 0. However, the input to THP takes values from a finite set (see 114.2.3.5).
The scaling factor for every part composing the transmit block (i.e. S1, S2, PHS, Data) is established so that the signals of every of them are adjusted to be contained in the same interval/range.

Place a reference to ISO 80000-2 in conventions sections that will be added in reponse to comment #37 indicating that this international standard is used for mathematical notation in Clause 114.

Also place an entry in subclause 1.3 as:
ISO 80000-2:2009, Quantities and units -- Part2: Mathematical signs and symbols to be used in the natural sciences and technology

Cl **114** *SC* *P* *L* # 60

Grow, Robert — RMG Consulting

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

I think we still have the specifications of TX PHD fields getting set by the state diagrams. As I understand it, we don't want TX PHD fields changes any point in Transmit Block transmission, but rather only at start of a Transmit Block. For example, at that commit point, LOCPHD.RX.HDRSTATUS <- loc_rcvr_hdr_lock would occur, not at the same time the state diagram variable changes.

SuggestedRemedy

Clarify all text describing variable to PHD field mapping to indicate the PHD field is only updated at Transmit Block start.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add text for that clarification at the end of sentence in P62,L41 as:

"LOCPHD fields cannot be modified in any point of the Transmit Block transmission, only at the start of transmission of the Transmit Block. Therefore, fields determined by the state diagrams also take effect at the start of a Transmit Block. At that commit point the PHD information is sampled by the Header Builder and encoded to generated a PHS to be transmitted in the Transmit Block.
In the reception path, the PHY provides the new values of received REMPHD fields after reception, decoding, and validation of a complete PHS (PHS0 to PHS13)."

Cl **114** *SC* *P* **70** *L* **48** # 44

Remein, Duane Huawei

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

rcvr_clock_lock is set/reset when "the clock has been properly recovered". Yet I see no quantitative statements to indicate when this has been acomplished. I would expect some jitter specificaition or at least some reference to the receive clock and how to determine it is properly aligned.

SuggestedRemedy

Add the necessary text and figures or point to where this specificaiton lives.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Qulity of recovered clock is implementation dependent. Implementer should synthetize a clock suitable to provide BER objective specified in 114.1.1 after equalization and FEC decoding, which is assessed by the PHY quality monitor SD.

As indicated in 114.3.2.3, the noise variance at the MLCC decoder may be used to determine the quality of the link and can be estimated either by measuring the Modulation Error Ratio (MER) or on the rate of corrected bits per codeword of the BCH decoder of MLCC level 1.
For a BCH decoder the rate of corrected bits per codeword provides an accurate estimate of expected BER after decoding because the high BER at the input of the BCH decoder. See presentation "perezaranda_3bv_4a_0115.pdf" pg.6.

Change P75,L40:
"The variable loc_rcvr_status, which indicates if the local PHY is reliably receiving payload data shall be determined by the PHY quality monitor state diagram of Figure 114-42. This function may be based on an . . ."
to:
"The variable loc_rcvr_status, which indicates if the local PHY is reliably receiving payload data shall be determined by the PHY quality monitor state diagram of Figure 114–42. Payload data reception is reliable when BER objective specified in 114.1.1 is provided after MLCC decoding. The PHY quality assessment may be based on an . . ."

In P63,L33, add cross reference to 114.3.2.3 after:
"fine timing recovery shall be carried out in order to provide a stable clock that samples the received signal with a suitable phase for reliable reception"

Cl **114** *SC* **114** *P* **37** *L* **11** # 37

Remein, Duane Huawei

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

SD precedence and conventions is not clearly stated.

SuggestedRemedy

Add Conventions subclause to 114.1 Overview
"Conventions
The notation used in the state diagrams in this clause follows the conventions in 21.5. Should there be a discrepancy between a state diagram and descriptive text, the state diagram prevails."

Add additional statements describing other conventions used in this clause (i.e, matlab conventions, etc.)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.1.1** *P* **37** *L* **33** # 39

Remein, Duane Huawei

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

Three letter acronym (TLA) not defined; "THP"

SuggestedRemedy

Ensure that every TLA used is defined once in the first instance in each clause (or use words, they never misconstrue and are all well defined).
TLAs that are rarely use (like ISI) need not be defined, they especially need to be defined twice and not used.
Use of TLAs should also make grammatical sense if they are expanded in a sentence.
Use of partial TLA, such as "TP" pg 30 ln 14 "received with TH precoding" should be avoided, TP could mean "Toilet Paper" as it has not been defined, I hate to think what TP precoding means :-)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

P37,L33: replace THP with "Tomlinson Harashima Precoding"

P61,L36; P71,L51; P72,L45; P73,L10,L25,L42,L48;P74,L51;P75,L19;P76,L12;P112,L11;:
Replace "TH precoded" with "THP processed", and "TH precoding" with "THP processing".

Eliminate "(ISI)" in P63,L37 and P71,L33.

Cl **114** *SC* **114.2.1** *P* **40** *L* **15** # 23

Remein, Duane Huawei

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

"Transmit Blocks shall be transmitted continuously" but the material in 114.5 implies that this is not always the case.

SuggestedRemedy

Add "except when operting is low power mode as described in 114.5"

Update PICS accordingly

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In LPI mode, the Transmit Blocks are also continuously transmitted. In LPI mode, some component parts of the Transmit Block are partially switched off (i.e. Data sub-blocks) and other parts remain without modifications. Despite that fact, in LPI Transmit Block structure is essentially preserved, therefore the receiver is able to keep aligned (timing, equalization, …).

Proposed remedy:
After sentence in L21 add: "Payload data sub-blocks are modified in LPI mode of operation as described in 114.5."

Cl **114** *SC* **114.2.1** *P* **40** *L* **44** # 24

Remein, Duane Huawei

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

Text describing this figure indicates "28 payload data sub-blocks (numbered 0 through 27)". I must assume these are the CW blocks labled 0 to 223 in the figure?
Is the lower part of the figure (CW193-CW223) a continuation of the upper part? If so there is no indication of this in the text or figure.
The meaning of the large "PHS12", "S212" and "S1" blocks at the bottom of the figure escapes me, why are they here? If this is to indicate the prefix claimed to be shown (see pg 42 lin 48 "As shown at the bottom of Figure 114–4, the pilot S1 has a prefix and postfix" these should be labled.

SuggestedRemedy

Align text and figure.
Add key to figure indication the meaning of "S#", "CW#", "PHS#"
Add prefix/postfix lables.

I would reccommend taking a more hierachal approach to this figure (either top down or bottom up) and modifying the text accordingly. As is it is very confusing.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Q1: No. As stated in P40,L48: "Each payload data sub-block is composed of 7904 symbols that span eight MLCC codewords (CW) of 988 symbols each". This is aligned to figure.

Q2: Bottom indicates the end of the transmit block.

Q3: P40, L47:"For pilot and header sub-blocks the first 16 symbols (prefix) and the last 16 symbols (postfix) are zeros (see 114.6.1)" explained just below the figure.

+ Add prefix/postfix labels in figure 114-4
+Replace the dotted arrows on right with a very visible ellipsis. Optionally add ellipsis to beginning of bottom to better highlight the discontinuity.
+ Add a sentence to end of paragraph L.21: (The top of the figure provides detail on the beginning of a Transmit Block and the bottom part of the figure the end of a Transmit Block.)

Cl **114** *SC* **114.2.1** *P* **40** *L* **47** # 25

Remein, Duane Huawei

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

"Each pilot or header sub-block is composed of 160 symbols"

SuggestedRemedy

should be "and" not "or"
Each pilot and header sub-block is composed of 160 symbols

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.2.1** *P* **41** *L* **6** # 26

Remein, Duane Huawei

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

Stray words "Pilots data path:

SuggestedRemedy

Strike

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Editorial bug.
It should be heading H3:
"114.2.2 Pilots data path"

Cl **114** *SC* **114.2.1.2** *P* **43** *L* **10** # 28

Remein, Duane Huawei

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

"An MLS generator is used ..." This para can be greatly simplified

SuggestedRemedy

Change to read:
"A separate instantiation of the MLS generator illustrated in Figure 114-7 is used to generate a binary pseudo-random sequence of 13,312 bits length, which is then mapped into PAM256 symbols as shown in Figure 114–8. See 114.2.3.3.3 for a definition of S/P and B2D blocks. The symbols at the input of the power scaling block belong to the set {-255, -253, …, 253, 255}."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

"Separate instantiation" can indicate details related to an specific implementation. In fact, the same MLS circuit may be used for S1 and S2 generation. Other implementor may prefer to store the symbols composing S1 and S2 in a ROM.
When is initialized specs should remain in the text.

Accept with modifications:
"An MLS generator as illustrated in Figure 114-7 is used to generate a binary pseudo-random sequence of 13 312 bits length, which is then mapped into PAM256 symbols as shown in Figure 114-8. See 114.2.3.3.3 for a definition of S/P and B2D blocks. The symbols at the input of the power scaling block belong to the set {-255, -253, …, 253, 255}. The shift register is initialized before S2 signal generation for each new Transmit Block with a hexadecimal value of 0x0 AC 2B 4B. MLS initialization and operation are as described in 114.2.1.1."

Cl **114** *SC* **114.2.2.1** *P* **44** *L* **3** # 29

Remein, Duane Huawei

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

Is there some really good reason not to use the CRC16 generator already defined in 55.4.2.5.13?

Also not typicall we refer to this as CRC16 not CRC-16 (fix in 21 places)

SuggestedRemedy

Reuse the CRC16 of 55.4.2.5.13. Strike most of the text here and include by reference.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In principle CRC16 generator defined in 114.2.2.1 provides better Hamming distance properties for the codeword length of 720 bits, assumed BSC channel and input BER < 10^-4.

However, taking into account the BCH code used for error correction is t = 16 and n = 720, and that both CRC polynomials are multiple of (1+x), we can conclude that the two CRC16 codes provide similar undetected error probability for >= 18 errored bits per CW and both behaves pretty well as "proper" codes for high input BER.

Accept to use polynomial of C/55, but not reference to C/55 for sake of clarity.
Editor actions:
+ P44, L6, change polynomial
"1+x2+x5+x6+x8+x10+x11+x12+x13+x16"
to
" (x+1)(x15+x+1)".
+ Modify figure 114-10 accroding to new polynomial.

Cl **114** *SC* **114.2.2.3** *P* **44** *L* **48** # 30

Remein, Duane Huawei

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

Why are we imposing a requirement on a figure?
"The BCH encoder in Figure 114–9 shall systematically ..."
Not that the requirement to use BCH encoding is in 114.2.2.4

SuggestedRemedy

Change to:
"The BCH encoder in Figure 114–9 systematically encodes 720 information bits into 896 coded bits.
Update PICS accordingly.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The suggested remedy eliminates a "shall" and the corresponding PICS item. However, a PICS item is needed for BCH encoder, as for the other blocks composing the physical header data path.

Change:
"The BCH encoder in Figure 114-9 shall systematically encode 720 information bits into 896 coded bits."
to:
"The scrambled 720 information bits shall be systematically encoded into 896 bits length codeword by means of a BCH encoder."

Cl **114** *SC* **114.2.3.1.1** *P* **46** *L* **42** # 32

Remein, Duane Huawei

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

Physical Data Block (PDB) or physical data block (PDB) as in 1.4.x. Pick one

SuggestedRemedy

per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Replace 1.4.x with "physical data block".
Also change any "Physical Data Block" to
"physical data block" in C/114.

Cl **114** *SC* **114.2.3.3.7** *P* **59** *L* **52** # 62

Grow, Robert — RMG Consulting

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

Typo

SuggestedRemedy

Change "is" to "as".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.3** *P* **66** *L* **1** # 75

Pérez-Aranda, Rubén — KDPOF

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

Move subclause "PHY TX control state diagram" ahead of the "PHY RX control state diagram" to improve clarity. TX should be described before RX.

SuggestedRemedy

per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.3** *P* **70** *L* **52** # 76

Pérez-Aranda, Rubén — KDPOF

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

State variable link_control is not well defined: variable that controls the connection between PCS and PMD sublayers.
It is an state variable that enables and disables all the PMA functionalities and as a consequence, the functionalities of PCS and PMD.

SuggestedRemedy

Change definition to:
"link_control
Variable that controls the PMA functional operation
Values: DISABLE: prevent operation of PMA sublayer
ENABLE: permit operation of PMA sublayer"

Also modify accordingly the text regarding to link_control in description of state diagrams:
P62,L51
P66,L31
P66,L50
P67,L40
P68,L50
P69,L26
P72,L44
P73,L24
P76,L6
P80,L45
P82,L49

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.3.1** *P* **62** *L* **21** # 58

Grow, Robert — RMG Consulting

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

PHD.RX.REQ.THP.COEF transmission order is confusing. The field is described as 108 bits, so all 9 coefficients are in the same field. OAM is broken up into multiple 16 bit fields for the message, but placing 9 coefficients into a single field leads to confusion and it seems the index order of OAM registers and coefficient b(i) are different. In text the field is described as PHD.RX.REQ.THP.COEF[0:8] to me that says the first coefficient is b(0) and the ninth is b(8). But in the second paragraph of 114.3.1, the implied order in the field is b(8) first and b(0) last, when harmonizing the field transmission order specified in the sixth paragraph.

Table 114.2 uses a b(i) in indication 114.3.1 sixth paragraph indicates bit order for PHD transmission. It is lsb to msb of each field from top to bottom of Table 114-2

SuggestedRemedy

The first option and perhaps the cleanest is to split the coefficients into nine fields with b(8) first and b(0) ninth. The bit order description of page 62, line 21 could then be deleted.

If this isn't done, the description should be retained, but perhaps the line 21 COEF description should be moved to the sixth paragraph.

With either option, if line 21 properly describes transmission order, the collective name for coefficients or the field name if it remains a 108 bit field should be PHD.RX.REQ.THP.COEF[8:0] (not [0:8] as b(8) is in the MSBs of the field) to harmonize the bit orders in line 21 and line 36.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change in C/114:
"PHD.RX.REQ.THP.COEF[0:8]"
to
"PHD.RX.REQ.THP.COEF[8:0]"

Eliminate sentence of P62,L21, because is redundant to paragraph in P62,L36.

Modify Table 114-2 to split PHD.RX.REQ.THP.COEF in 9 different fields, ordered top to bottom:
PHD.RX.REQ.THP.COEF[0]
PHD.RX.REQ.THP.COEF[1]
...
PHD.RX.REQ.THP.COEF[8]
of 12 bits length each.

Modifiy description and valid values of PHD.RX.REQ.THP.COEF[] fields accordingly.

Cl **114** *SC* **114.3.1** *P* **64** *L* **23** # 63

Grow, Robert — RMG Consulting

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

Table 114.2 uses a b(i) in Description but b(k) in Valid values column for coefficient number. b(i) is used throughout text in the clause

SuggestedRemedy

Change "b(k)" in Valid values to "b(i)".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.3.1** *P* **64** *L* **4** # 71

Grow, Robert — RMG Consulting

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

PHD description could use some clarification. 114.3.1 talks about PHD fields and as does Table 114-2, yet column 1 of Table 114-2 has a heading of symbol.

SuggestedRemedy

Change heading of column 1 heading of Table 114-2 to Field Name.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.3.1** *P* **65** *L* **18** # 59

Grow, Robert — RMG Consulting

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

To a member of the IEEE RAC, the OAM type field and registers look like a potentially confusing identifier. No values are specified in P802.3bv, nor is any reference provided where they are (or will be) defined. It isn't clear if values are to be standardized, vendor specified or locally administered. If standardized, at least a footnote indicating where things will be standardized should be added. If locally administered, that should be stated. If though it is vendor specified (e.g., by an auto manufacturer), the field should include a vendor identifier from a registry (i.e., OUI/CID).

SuggestedRemedy

Better define the field. The best approach for vendor assignment would be to use Std 802 protocol identifier format which uses (OUI/CID) to allow a vendor to create a unique protocol identifier.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

As stated in P27,L14: (TXO_TYPE(3.500.11:0)) "These bits contain the data type of the OAM message that will be transmitted by the 1000BASE-H PHY. These bits are not changed or interpreted by the local or remote PHY and together with the TXO_DATAx bits are the OAM message payload."

802 OUI is 24 bits that does not fit in OAM TYPE 12 bits field.

The OAM TYPE field is user-defined but was conceived to be used to indicate the meaning of the message that follows. The definition of this field should be outside the scope of this standard and it should be properly indicated, for example, in P78, L20, after last sentence.

"user-defined"=perhaps a set of users (OEMs) decide to agree in doing a future standard who knows where.
See "perezaranda_3bv_4_0315.pdf", slide 3, for the rational behind OAM channel in C/114.
See "Matheus_3bp_01_1114.pdf" for proposal/requirements from OEMs.

Cl **114** *SC* **114.3.2.1.1** *P* **63** *L* **27** # 34

Remein, Duane — Huawei

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

Variables in SD should be defined before presentation of the SD.

SuggestedRemedy

Add/move the formal definitions of all variables, conters, constants, etc. used in Fig 114-34 before the SD. Subsequent usage should reference the origional definition.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

This comment seems to be ER, but not TR.

Move 114.3.2.1.5 to 114.3.2.1.1
Move 114.3.2.2.3 to 114.3.2.2.1
Move PHY quality monitor state variable to the beginning of 114.3.2.3.
Move 114.4.4.2 to 114.4.4.1 and merge with 114.4.4.4. OAM state diagrams after varibles definitions.
Same criteria for 114.5
Same criteria in C/115 for signal detect state diagram.

Cl **114** *SC* **114.3.2.1.1** *P* **63** *L* **27** # 33

Remein, Duane — Huawei

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

Cl 1.2 indicates SD states exit to the right, while many SD's also show exit conditions to the bottom. This SD, Figure 114–34, has exit to top, right & bottom and state entrance from left, top and bottom.
We should strive for consistency.
This problem also applies to:
Figure 114–37

SuggestedRemedy

Change all SD's so state entry is from top or left and exit is from right or bottom only (preferrably use one, such as enter from top & exit from bottom, not both). Add a BEGIN state and and INITIAL state (with exit pma_reset = ON + link_control neq ENABLE

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Although Figure 1-2 exemplifies the terms to enter the state in the left of state box, and qualifiers to exit in the right, C/1.2.1 does not specify any constraint regarding to that.

Open arrow (an arrow with no source block) represents a global transition and it is permited by C/1.2.1 and C/21.5.3. Therefore, BEGIN and INITIAL states are not needed. 802.3 is rife of examples on that.

Cl **114** *SC* **114.3.2.1.1** *P* **63** *L* **29** # 35

Remein, Duane Huawei

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

There appear to be a number of requirements (i.e., "shall " statements) that cannot be verified or confirmed. FOr example:
"The first stage is coarse timing recovery in PMARX_TIMING_COARSE, where symbol synchronization shall be performed using the a priori known pilot signal contained in the S1 sub-block at the beginning of each received Transmit Block (see Figure 114–4)."
Generally requirements can be confirmed via some arbitrary testing. I don't see how this requirement can be tested.

SuggestedRemedy

Review all requriements for testability and remove any (i.e, convert to factual statements) that cannot be tested in a device offered for sale.
Update PICS accordingly.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Some but not all of the shalls are verifiable with test modes. While it is desirable that each shall be externally testable (those wanting to use the PICS as the basis for a conformance test suite), it also isn't desirable to have a single shall for huge blocks of functionality (e.g., one shall for the complete payload data path). The stated purpose of the PICS is to allow an implementer to claim compliance (e.g., 114.12.1). It is for this stated PICS purpose that some PICS items are included even though not independently externally testable.

Cl **114** *SC* **114.3.2.1.1** *P* **63** *L* **47** # 36

Remein, Duane Huawei

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

Variable names should not be hyphenated as in:
"the link partner (rcvr_th-
p_lock = OK)"

SuggestedRemedy

Change all variable names to non-hyphenating (place curser in variable name and type <esc> n s in framemaker)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.3.2.1.5** *P* **69** *L* **41** # 38

Remein, Duane Huawei

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

SD variables should have a declared type. Examples of declared type include Boolean, signed integer, Unsigned n-bit integer, n-bit counter, n-bit binary, array, ... (n is some positive integer).

SuggestedRemedy

Add TYPE: statement to all varaible definitions

Proposed Response *Response Status* **W**

PROPOSED REJECT.

In many other 802.3 PHYs state variables do not include TYPE statement.
For most part of the state variables the valid values that can take are specified. In that case, add TYPE statement does not provide any further specification.
For a small number of state variables, the value comes from a register defined in C/45, therefore set of values that can take the variable is well defined.

Cl **114** *SC* **114.4** *P* **78** *L* **16** # 41

Remein, Duane Huawei

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

I believe all register in Cl 45 are accessable through MDIO not just those in clauses 45.2.3.48 and 45.2.3.49.

SuggestedRemedy

Strike the sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Replace:
"All MDIO accessible registers are specified in clauses 45.2.3.48 and 45.2.3.49"
with
"All MDIO accessible registers for OAM operation are specified in clauses 45.2.3.48 and 45.2.3.49"

Cl **114** *SC* **114.4** *P* **78** *L* **4** # 40

Remein, Duane Huawei

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

What is the relationship between this OAM channel and Clause 57 Operations, Administration, and Maintenance (OAM)? Given the similar terminology I would naturally assume they are somehow related but this is not clear.

SuggestedRemedy

Add text clarifyin gthe relationship. If not related find some other term than OAM which already carries a specific meaning in 802.3 as defined in Cl 57.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

114.4 defines an OAM channel.

While OAM is most extensively defined in Clause 57 and related Clause 30 specifications, OAM is not exclusively Clause 57 (e.g., Clauses 66 and 97). That is one reason why the definition of OAM in 1.4.296 (P802.3/D3.2) is not specific to Clause 57.

1000BASE-H defines a channel for OAM message exchange. The OAM channel is strictly between two 1000BASE-H PHYs on the physical layer and the related STA attached to each PHY. In that sense 114.4 is more analogous to Annex 57A (Slow Protocols to transport OAMPDUs), not an OAM protocol as is done in Clause 57.
The 1000BASE-H OAM runs in parallel to the Gigabit data stream without impacting the normal data transmission GMII to GMII. The OAM channel utilizes OAM transmit and receive registers accessible via the MDIO.

1000BASE-H OAM messages can be exchanged by the STAs attached to PHYs although the link is not established GMII to GMII, because they are transmitted embedded within the PHD that uses much more robust modulation/coding (10dB margin, see "perezaranda_3bv_3b_0315.pdf", pg.4-7) than payload data transmission.

Cl **114** *SC* **114.4.2** *P* **79** *L* **9** # 42

Remein, Duane Huawei

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

802.3 has a long standing logical not operator and it is !~.

SuggestedRemedy

Change "the symbol ~ denotes logical not operator" to "the symbol "!" denotes logical not operator" and replace all "~" with "!"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.8** *P* **90** *L* **47** # 43

Remein, Duane Huawei

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

Clause 45 is optional and cannot be made mandatory by any other clause.

SuggestedRemedy

Change:
"Any PHY type using 1000BASE-H shall provide the management capabilities referenced in this clause and further defined in Clause 45."
to
"The 1000GBASE-H PHY shall provide managment capabilities described in this clause. The optional MDIO capability described in Clause 45 defines several variables that provide control and status information for and about the PHY. If MDIO is implemented, it shall map MDIO control variables to PHY control and status variables as shown in Table 114-x."
Provide a cross reference to all managable variables between Cl 114 variable name and Cl 45 register name/bits (for example see 82.3.1 Table 82–10, 83.6 Table 83–3, 84.6 Table 84-2&3 and others).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change all the text of subclause 114.8 to:
"The 1000BASE-H PHY shall provide management capabilities described in this clause and functionality provided by the referenced Clause 45 registers and bits (optionally by implementation of the Clause 45 MDIO). The optional MDIO capability described in Clause 45 defines several variables that provide control and status information for and about the PHY. If MDIO is implemented, it shall map MDIO control variables to PHY control variables as shown in Table 114-x.

Table 114-x
MDIO variable/value | PMA/PMD register | Register/bit number | PMA control variable/value
Reset = 1 | PMA/PMD control 1 | 1.0.15 | pma_reset = ON
Reset = 0 | PMA/PMD control 1 | 1.0.15 | pma_reset = OFF
Low Power = 1 | PMA/PMD control 1 | 1.0.11 | link_control = DISABLE
Low Power = 0 | PMA/PMD control 1 | 1.0.11 | link_control = ENABLE

The 1000BASE-H PCS uses registers specific to 1000BASE-H (registers 3.500 through 3.522). In addition to the normal operation capabilities specified elsewhere in this clause, the management interface controls special test modes and loopback modes to facilitate testing."

Cl **114** *SC* **114.9.2** *P* **92** *L* **1** # 52

Pérez-Aranda, Rubén KDPOF

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

For test modes 2 and 3, values of symbols should be 256 and -256, instead of 255 and -255 to be precise, because the TX signal in normal operation (no test) will take -256 and will be able to approach very close 256 depending on the implementation.
The ER optical measurement will be more precise considering 256 instead of 255.
Please, pay attention that the error produced in ER measurement with definition in D1.2 (i.e. 255) is 0.1 dB that probably will be below the accuracy of any experimental setup.

SuggestedRemedy

Replace 255 with 256 in test modes 2 and 3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **114** *SC* **114.9.4** *P* **92** *L* **19** # 51

Pérez-Aranda, Rubén KDPOF

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

Round operation should be eliminated from eq. 114-24 because it can imply any kind of DAC resolution specification that should be up to the implementer.

SuggestedRemedy

Eliminate rounding from equation to avoid misunderstanding / confusion because it is not necessary.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **115** *SC* *P* *L* # 2

Stassar, Peter Huawei Technologies

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

In Clause 115 no required BER has been specified, so the required performance for the optics is not specified.

SuggestedRemedy

specify required BER performance

Proposed Response *Response Status* **W**

PROPOSED REJECT.

BER is not a valid PMD measurement for PAM16 THP signaling. PMD RX requires to operate together with PCS/PMA to get recovering the information embedded within the analog signal received from MDI (like copper based PHY).

This is very different to e.g. 1000BASE-X PCS/PMA and 1000BASE-LX/SX PMD. In the last case, the PMD RX is responsible for amplification and clock and data recovery. C/38 devices may be implemented by simple TIA and LA circuits w/o integrating more advanced CDR, providing detected binary information to PCS RX with BER < 10^-12 and the PCS implementing the clock recovery based on the specific properties of 8b/10b line coding.

1000BASE-RH PHY is conceived to operate in different way because the specific characteristics of the communication channel. In this case PMD RX provides full "soft-information" from the channel in such a way the PCS is able to compensate ISI by digital equalization (THP) and correct errors by FEC. It is the only practical way for approaching the channel capacity in high SNR regime channel (high spectral efficiency). High spectral efficiency is required for GEPOF as demonstrated in SG.

As stated in 115.4.3, P110, L49: "It is assumed that a 1000BASE-RH PMD is not tested standalone, but is always considered as part of a complete PHY (i.e. 1000BASE-H PCS and PMA sublayers are also included). Therefore, a complete 1000BASE-RH PHY shall be able to establish a reliable link throughout the average optical power (AOP) range between the minimum and maximum defined in Table 115–4."

Operation BER objective is specified in 114.1.1.

Cl **115** *SC* *P* *L* # 21

Stassar, Peter — Huawei Technologies

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

Kind of conclusion on the assessment of Clause 115: The general state of Clause 115 for the optical spec appears underspecified to enable the development of multi-vendor interoperable devices. It probably will require a significant rewrite to bring it to a significantly more complete level comparable to the 1G bi-directional specs in Clause 59.

SuggestedRemedy

rewrite Clause 115 to make it appropriate to support multi-vendor compatibility, similar to Clause 59. Furthermore show test results that specification methodology is sufficient to support multi-vendor compatibility.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See comments #2 to #20.

Cl **115** *SC* *P* *L* # 7

Stassar, Peter — Huawei Technologies

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

How many optical levels are there? In some places there seem to be 512 (-256 through 255) and others 513 (-256 through +256)?

SuggestedRemedy

resolve ambiguity by appropriate definitions and specifications

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

114.6.1, P90, L15: "For any part of the Transmit Block, the transmitter output signal x(n) fits -256 ≤ x(n) < 256."

In general, the signal of data payload sub-blocks take real numbers in the above interval because both, the feedback filter b and the modulo operation of the TH precoder (see eq. 114-17). Signal of S1 and PHS sub-blocks only take values -255 and 255, and signal of S2 sub-blocks take values of the set {-255, -253, . . .,+253, +255}. Therefore, the above sentence is correct and it should no be assumed that x(n) is integer (Z). x(n) is real (R). It is not stated in any part of the text that x(n) is integer.

The number of optical levels shall finally depends on the THP and DAC resolution in an specific implementation.

In 115.3.3, it is stated that PCS symbols, passed to PMD TX function via prameter tx_signal, take values from the interval [-256, 256) (P 107, L 46), that is consistent with 114.6.1.

According to that, tx_signal can take any value (inifinite set of values) from -256 (included) to +256 (not included, but as close as needed). See response to comment #27.

To avoid misunderstanding: replace the normalized range used for relative scaling from [-256, 256) to [-1, 1) in C/114. Change the scaling factors of S1, S2, PHS and payload accordingly. Change the 114.6, 114.9 and 115.3.3 accordingly. Modify PICS of C/114 and C/115 accordingly.

Cl **115** *SC* *P* *L* # 20

Stassar, Peter — Huawei Technologies

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

It's totally unclear if this optical configuration is not sensitive to reflections from the POF link or whether it's very sensitive to reflections (as one would expect from the kind of multi-level signals used) and then how to limit penalties by appropriate specifications of maximum discrete reflectance and receiver reflectance.

SuggestedRemedy

resolve sensitivity to reflections or state that it is not relevant, supported by appropriate testing

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The clause 115 has been developed assuming that ~650nm red Light Emitting Diode (LED) is used by PMD TX. However it is only suggested, but not clear, in 115.7.

Contrary to EE lasers (FP, DFB, …) or VCSELs, fast red LEDs designed and already qualified for 1mm SI-POF communications (e.g. MOST, Profinet) are basically insensitive to back-reflection. The experience in the lab is that reflection does not produce fluctuations of the light spectrum and intensity.
Fundamental ideas behind that:
- Wide spectrum (20nm) and random phase light generation; no coherent.
- Low slope efficiency, low quantum efficiency: small portion of energy generated is really injected into fiber, so small portion reflected.
- Typical LED active area ~80um (high current density to speed up the device) against 1mm of POF or even larger coupling lens: thefore, even lower portion can be reflected.

Remedy:
- Add row to Table 115-3: Transmitter type, Light Emitting Diode (LED)
- State in 115.4.1 the insensitivity to reflections because the used light source (concrete wording with license to editorial team).

Cl **115** *SC* *P* **104** *L* **31** # 61

Grow, Robert — RMG Consulting

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

The change to continuous generation for a number of the primitives is wrong. We erred in the resolution of D1.1 comment resolution for comments #392 and #393. The D1.1 text did though need improvement. While it is prudent for an implementation to use a continuous signal, the style for service primitives is to only signal changes in value as an event.

SuggestedRemedy

PMD_TXPWR.request, PMD_RXPWR.request, and PMD_SDINH.request, should be generated only on a change in value of the parameter. For example: "The PMD_TXPWR.request(tx_pwr) is generated by the PCS transmitter whenever the value of tx_pwr changes as specified by the state diagram of Figure 114-46 (see 114.5)."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **115** *SC* **115.2** *P* *L* # 4

Stassar, Peter — Huawei Technologies

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

A definition of tx_signal is not provided

SuggestedRemedy

create definition

Proposed Response *Response Status* **W**

PROPOSED REJECT.

tx_signal is defined in 115.3.3 and cross-reference is provided in 115.2.1 when PMD_COMSIGNAL.request is specified.

Cl **115** *SC* **115.2** *P* *L* # 6

Stassar, Peter — Huawei Technologies

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

In 115.2.1 tx_signal is stated to be analog but it is also defined to be one of 512 discrete values in Clause 114

SuggestedRemedy

fix ambiguity

Proposed Response *Response Status* **W**

PROPOSED REJECT.

There is no ambiguity. See comment #7.

Cl **115** *SC* **115.3** *P* *L* # 5

Stassar, Peter — Huawei Technologies

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

Values for tx_signal in 115.3.3 are not clear because of the following provided relation: a <= tx_signal < a

SuggestedRemedy

add a "minus" sign to the "left-hand" "a"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **115** *SC* **115.3.2** *P* **107** *L* **21** # 46

Remein, Duane — Huawei

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

It strikes me as odd that we imply that link type C is only for automotive use. Wouldn't these work in planes, trains, boats, trucks and home attics too?

SuggestedRemedy

Change "Automotive grade" to "Extended temperature grade"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add a footnote to the table Ambient Temperature Range column header:
"The identification of an application indicates the market application requirements that drive the temperature and topology and are not intended to imply the only application that may find the specified Type useful."

Cl **115** *SC* **115.3.3** *P* **107** *L* **38** # 77

Tajima, Takayuki — Yazaki Corporation

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

It is not clear the symbol of "P" in the equation.

SuggestedRemedy

Install " "(space) at the head of this equation.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

In Framemaker: 'Unwrap equation' and then "Shrink-wrap equation'

Cl **115** *SC* **115.3.3** *P* **107** *L* **42** # 22

Takahashi, Satoshi — POF promotion

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

A minus sign is missing to "a" at the left side of the inequality.

SuggestedRemedy

Change "a =< tx_signal < a" to "-a =< tx_signal < a".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **115** *SC* **115.3.5** *P* **108** *L* **52** # 78

Tajima, Takayuki — Yazaki Corporation

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

Improper description in Receive condition at Table 115-2

SuggestedRemedy

Eliminate "is" before <-35 dBm or add "is" before >-29dBm.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Eliminate "is" before <-35 dBm

Cl **115** *SC* **115.3.5** *P* **109** *L* **6** # 56

Grow, Robert — RMG Consulting

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

Figure 115-2 – Power-on = FALSE is something that to me is imaginary. If there is no electrical power to the PMD, a state diagram implementation is incapable of making any state decisions.

SuggestedRemedy

This should be rewritten as pmd_reset or similar with pmd_reset including a power on reset which typically keeps logic from going off and doing stuff until logic operability is assumed.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change state variable name "power_on" to "pmd_reset".
Modify figure 115-2 according to "perezaranda_2_0915.pdf" (802.3bv TF Sept 2015).

Change description of state diagram to:
"Upon reset (pmd_reset = ON), the PMD signal detect function transitions to PMDDET_FAIL indicating signal_detect = FAIL. When PMD signal detect is not inhibited (sd_inh = FALSE) receive optical power at the MDI needs to be higher than a threshold of -29 dBm to indicate signal_detect = OK (PMDDET_OK state). Once in this state, receive optical power at the MDI has to decrease below -35 dBm to cause transition to the PMDDET_FAIL state. These separated thresholds provide hysteresis in the signal_detect indication.

When sd_inh = TRUE, the PMD signal detect is inhibited, indicating signal_detect = OK."

Change PMD signal detect state variables:
"pmd_reset
Variable that causes reset of all PMD functions. PMD reset occurs with power on or the PHY reset being set to one (register bit 1.0.15).
Values: ON: reset is asserted
OFF: reset is deasserted"

Cl **115** *SC* **115.4** *P* *L* # 3

Stassar, Peter — Huawei Technologies

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

Only a single PMD 1000BASE-RH is given, but there are in fact 6 subtypes. It is general practice to make different PMD types for different power budgets. See for instance 100GBASE-LR4 and 100GBASE-ER4, which are specified in a single clause in the same tables, with different columns.

SuggestedRemedy

create 6 PMDs

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The suggested remedy was considered by the PMD ad-hoc group. However, it was discarded because subtypes only differ on application, temperature range and topology of the POF link. Photonics devices and fiber are going to be essentially the same, with variations for extended temperature range of operation (jacket material) or application (dust/water protection, vibration tolerance, kojiri criteria, etc).

In C/38, 1000BASE-LX PHY type is defined for 62.5um MMF, 50um MMF and SMF, being different in Table 38-7 the average launch power as a function of fiber type. Same example can be seen in C/59 for 1000BASE-LX10.

TF considered that the above examples support the adopted approach for C/115 and there is not exist necessity to define 6 different PMDs.

The comment highlighted the need to update the editor's note in P107, L6 to:
"The below Table 115-1 has subtypes that only differ in temperature range and topology requirements. This was done so that during WG ballot, reviewers will better see the option to adjust topology specifications for the temperature ranges. If comments are accepted to change the topology for the different temperature range then the four Type C subtypes will be required. If not, then subtypes could be merged in Sponsor ballot reducing the number of subtypes."

Cl **115** *SC* **115.4** *P* *L* # 16

Stassar, Peter Huawei Technologies

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

The receiver spec in Table 115-4 does not contain a spec for stressed receiver sensitivity with associated conditions.

SuggestedRemedy

add spec for stress receiver sensitivity with appropriate testing conditions to Table 115-4

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The sensitivity specifications of Table 115-4 corresponds to the stressed conditions for each link subtype. The min values of Table 115-4 have to be met for a receiver connected to a transmitter compliant with specifications of Table 115-3 for each link type defined in Table 115-1 and MPD lower bound in 2nd column of Table 115-6.
MPD lower bounds at TP3 (worst case) are specified also in Table 115-6 for each link subtype.

See comment #11.

Cl **115** *SC* **115.4** *P* *L* # 13

Stassar, Peter Huawei Technologies

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

The receiver spec in Table 115-4 does not contain a wavelength spec.

SuggestedRemedy

add wavelength range to Table 115-4

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The local PMD RX is connected to a remote PMD TX through a POF fibre as indicated in 115.3.1 and operation of 1000BASE-RH is defined in 114.1.4.

The wavelength specification for the PMD TX is provided and the physical medium (POF) can only produce a small spectral filtering (to higher or to lower wavelengths, depending on the TX temperature). Therefore, the photo-detector device has to be sensitive to the same spectrum produced by the TX.

Because ot the above reason, it was considered by the PMD ad-hoc group that the responsitivity profile of the photo-detector should be up to the implementer to meet sensitivity specifications of table 115-4.

Copy wavelength specification of Table 115-3 to Table 115-4.

Cl **115** *SC* **115.4** *P* *L* # 14

Stassar, Peter Huawei Technologies

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

The receiver spec in Table 115-4 does not contain a maximum input power specification

SuggestedRemedy

add maximum input power to Table 115-4

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Max input power is included in Table 115-4 (last column).

Cl **115** *SC* **115.4** *P* *L* # 15

Stassar, Peter Huawei Technologies

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

The receiver spec in Table 115-4 does not contain a damage threshold specification

SuggestedRemedy

add damage threshold to Table 115-4

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Max AOP injected at TP2 and max AOP permitted at TP3 are equal, and only attenuation can be produced by POF. Therefore, it is not considered necessary to include a damage threshold specification.

Cl **115** *SC* **115.4** *P* *L* # 8

Stassar, Peter Huawei Technologies

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

In the transmitter spec in Table 115-3 the required signaling rate is not specified.

SuggestedRemedy

add signaling rate to Table 115-3

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Signal rate is not specified in Table 115-3 because PMD transmit function translates analog electrical signals into analog optical signals. Therefore, signal rate, assumed that it means symbol rate, is going to be determined by the PCS.
Symbol rate and its tolerance is specified in 114.7.
As stated in 115.5, P 113, L1: "The transmitter testing methodology assumes that a 1000BASE-RH PMD is not tested standalone, but is always considered as part of a complete Physical Layer (i.e. 1000BASE-H PCS and PMA sublayers are included). TP1 is not used as a stimulus point, rather the complete PHY is instructed through management to generate signals that are measured at TP2."

Cl **115** *SC* **115.4** *P* *L* # 17

Stassar, Peter Huawei Technologies

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

The link spec in Table 115-5 does not contain any maximum penalty, nor a maximum discrete reflectance.

SuggestedRemedy

add maximum penalty and maximum discrete reflectance to Table 115-5

Proposed Response *Response Status* **W**

PROPOSED REJECT.

All the penalties are already included in TP2 and TP3 specifications. See comments #9 and #19.

For discrete reflectance, see comment #20.

Cl **115** *SC* **115.4** *P* *L* # 12

Stassar, Peter Huawei Technologies

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

The receiver spec in Table 115-4 does not contain any reflectance requirement.

SuggestedRemedy

add reflectance to Table 115-4

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See comment #20

Cl **115** *SC* **115.4** *P* *L* # 11

Stassar, Peter Huawei Technologies

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

The receiver spec in Table 115-4 is only specified for different power levels, not associated with any performance requirement. Even a mobile phone will comply to it.

SuggestedRemedy

generate specification for multi-vendor compatibility

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Performance is already specified:
As stated in 115.4.2, P110, L49: "The sensitivity is defined as the minimum value of AOP at TP3. It is assumed that a 1000BASE-RH PMD is not tested standalone, but is always considered as part of a complete PHY (i.e. 1000BASE-H PCS and PMA sublayers are also included). Therefore, a complete 1000BASE-RH PHY shall be able to establish a reliable link throughout the average optical power (AOP) range between the minimum and maximum defined in Table 115–4."

For reliable link establishment, see 114.3 PMA state diagrams.

For establishing a reliable link a complete Physical Layer (PCS, PMA, and PMD) is necessary. There is no way to qualify the PMD standalone. This is the same case of the PMA/PMD of a copper PHY.

Cl **115** *SC* **115.4** *P* *L* # 10

Stassar, Peter Huawei Technologies

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

The transmitter spec in Table 115-3 does not contain a parameter "Optical return loss tolerance (max)" and "Transmitter reflectance (max)".

SuggestedRemedy

add additional parameters

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See comment #20

Cl **115** *SC* **115.4** *P* *L* # 9

Stassar, Peter Huawei Technologies

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

The transmitter spec in Table 115-3 does not provide "conventional" transmitter quality parameters, like TDP, which are normally used to ensure that the required distance can be bridged with acceptable penalties, and eye mask (or similar) spec that guarantees sufficient eye opening of the 16-level PAM16 signal under worst case (reflection) conditions. The commenter has been unable to find results of testing to check if the currently used parameters "amplitude", "linearity" and "spectral width" are sufficient to support multi-vendor interoperability.

SuggestedRemedy

generate appropriate specification for multi-vendor compatibility

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The set of transmitter specifications in Table 115-3 has been developed by the GEPOF PMD ad-hoc group, composed by participants affiliated with multiple companies currently developing POF based communications products. Therefore, it should be considered a multi-vendor specification.

The max and min values for each spec are based on experimental statistical characterization and integrated circuit simulations and have been agreed among all the participants involved on the PMD ad-hoc group.
The result of the PMD ad-hoc group has been considered as the minimum set of parameters for multi-vendor compatibility.

The optical PHY specified in C/114 and C/115 is not a conventional optical PHY. This is due to the special modulation and equalization techniques never used before for optical systems, although well familiar in copper based communications.
The set of parameters for PMD transmitter and PMD receiver, as well as the methods used to measure them, have been developed considering that PMD always operates connected to the PCS and PMA sublayers type 1000BASE-H.

Eye pattern has not been considered a valid specification for this PMD because the bandwidth limitation caused by the PMD TX. Moreover, THP is used as equalization technique to compensate the ISI produced by the channel response (TX+POF+RX) and THP signal take values from a continuous uniform distribution (vs. discrete set of values). Therefore, the number of optical levels at MDI is much larger than the original PAM16 modulation. The cardinality of the set of light values is finaly determined by the DAC resolution (implementation dependent). The specifications are for a PMD transmit function that is defined as a translator between electrical analog signal and optical analog signal.

TDP (transmitter and dispersion penalty) is already considered in this specification for worst case link budget (115.4.3), however is not quantized as a separate magnitude. Contrary to 59.7.10, a device meeting all the separate requirements of 115.4.1 provides the high enough quality level to establish a Gigabit link under the sensitivity specifications and MPD

at TP3.

Cl **115** *SC* **115.4** *P* **109** *L* **46** # 54

Anslow, Pete — Ciena

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

Clause 115 should provide sufficient specifications to allow a transmitter from one manufacturer to interoperate with a receiver from another manufacturer.
The requirements in 115.4 do not seem to be sufficient to achieve this.

See attached presentation "anslow_3bv_01_0915" containing simulations of a transmitter that is compliant with the specifications but a completely closed eye.

SuggestedRemedy

Include sufficient specifications to adequately define the transmitter quality so that a receiver manufacturer has some limit as to how bad the transmitted eye can be.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Results of slides 4 and 5 seem not to be compliant with ER specification.
Anyway, eye diagram of slide 4 shoud be considered a very optimistic eye diagram. The reality is going to be worse in TP2, and much worse at TP3 after modal distortion produced by POF, specially for 50m length.

What is important to note is that receiver will be able to provide BER<10^-12 after equalization and FEC decoding.

See "perezaranda_3bv_1_0915.pdf" (802.3bv TF Sept 2015) that shows simulation results of a PHY implementation according to 802.3bv D1p2.

Cl **115** *SC* **115.4.1** *P* **109** *L* **52** # 64

Grow, Robert — RMG Consulting

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

I think "normal inter-frame" frame should be normal operation. This also seems to be mostly redundant with the similar, but more correct phrase in parenthesis on page 110, line 39.

SuggestedRemedy

Delete the parenthetical expression on p.109, l.52.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **115** *SC* **115.4.1** *P* **110** *L* **1** # 47

Remein, Duane — Huawei

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

It appears the there is an assumption regarding the linearity of the transmitter as you are using PAM-16 modulation. However there is nothing in the transmitter specification regarding this. If I were to use a totally non-linear laser this scheme could not work. It does not matter that such a device may not exist as you cannot predict the future.

SuggestedRemedy

Add the required linearity specifications.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Linearity is specified as harmonic distortion HD2 and HD3 in table 115-3 and measurement methodology in 115.5.7 that uses the PCS in test mode 4 as defined in 114.9.4.

Cl **115** *SC* **115.4.1** *P* **110** *L* **1** # 79

Tajima, Takayuki — Yazaki Corporation

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

Table 115-3 is located at the wrong position.

SuggestedRemedy

Move Table 115-3 to the end of subsection.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Location of Table 115-3 is correct according to IEEE Standards Style Manual.

Cl **115** *SC* **115.4.2** *P* **110** *L* **43** # 55

Anslow, Pete — Ciena

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

There seem to be no specifications on the receiver at all other than it should absorb a certain range of optical power. A brick would do that satisfactorily.

SuggestedRemedy

Provide a set of receiver specifications:
wavelength range
damage threshold
receiver sensitivity (optical power for a given BER)
overload
reflectance

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See comment #11

Cl **115** *SC* **115.5** *P* *L* # 18

Stassar, Peter — Huawei Technologies

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

The optical measurements clause 115.5 does not contain any performance related testing, like TDP, with associated reference transmitters and receivers.

SuggestedRemedy

add performance related testing to Clause 115.5

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See comments #9, #11, #19.

Cl **115** *SC* **115.5** *P* *L* # 19

Stassar, Peter — Huawei Technologies

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

The optical measurements clause 115.5 does not contain a worst case channel spec (115.4.3 is informative).

SuggestedRemedy

add worst case channel spec to clause 115.5

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Worst-case channel is defined by:
- MPD lower bounds at TP3 (115.5.9)
- Min AOP (sensitivity) at TP3 (115.4.2)
- Pointer to IEC std at 115.8

MPD by EAF measurement method determines accurately the time-domain response of the optical communication channel. Min signal strength at TP3 is specified at Table 115-4. On the other hand, max noise in transmiter is given by RIN spec and response of TX is also specified. Therefore, a complete communication channel (response and noise) is provided, although not including the specific implementation dependant receiver characteristics, as usual.

Cl **115** *SC* **115.5.8** *P* **113** *L* **35** # 53

Brugarolas, Luis Miguel — KDPOF

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

Equation 115-4 is not correct

SuggestedRemedy

Replace with:
RIN = 10*log10(Pn/(BW*Ioe^2*R))-G

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **115** *SC* **115.6.1** *P* **114** *L* **31** # 48

Remein, Duane Huawei

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

This statement implies that the customer may not want to purchase your product if you don't meet their specifications that may be above and beyond what IEEE specifies, which of course is true but need not be stated.
"All equipment subject to this clause may be additionally required to conform to applicable local, state, or national motor vehicle standards or as agreed to between the customer and supplier."

SuggestedRemedy

Strike the statement

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

This was copied from P802.3bp, editor will check for updates to P802.3bp text and keep harmonized. The editor will suggest to P802.3bp that the last phrase be deleted if it hasn't already been deleted since copied. The majority of the sentence about codes is appropriate to retain.

Cl **115** *SC* **115.6.2** *P* **114** *L* **36** # 49

Remein, Duane Huawei

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

the statement below strike me as odd when I look at Table 115–1 and observe link types A and B which are intended for "Consumer" and "Industrial" grade temperature ranges.
"The 1000BASE-RH PHY is designed to operate in the automotive environment"

This is especially odd because as I recall the SG attempted to use home appplications as a justification for Braod Market Potential.

Clearly if a 1000BASE-H PHY is designed for automotive environment they will cost themselves out of other markets.

SuggestedRemedy

Reframe the section so that it covers all intended markets.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Subclause 115.6 is devoted to environmental specifications for automotive applications.

Change:
"The 1000BASE-RH PHY is designed to operate in the automotive environment. All equipment in automotive applications shall conform to the potential environmental stresses …"
to:
"All equipment integrating a PHY subject to this clause shall conform to the potential environmental stresses … "

Cl **115.1** *SC* **115.1** *P* **103** *L* **7** # 45

Remein, Duane Huawei

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

"it shall be integrated ..." but the only "it" I see is "the PMD and medium". Should I conclude that the POF must come permanently attached to the PHY device?

SuggestedRemedy

change "i"t to "the PMD"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.48** *P* **26** *L* **8** # 67

Grow, Robert RMG Consulting

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

Add a reference for register usage description.

SuggestedRemedy

At end of first sentence add: (see 114.4.1).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.48.4** *P* **27** *L* **12** # 66

Grow, Robert RMG Consulting

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

The subclause title for TXO_TYPE appears to have been accidentally merged into the preceding paragraph.

SuggestedRemedy

TXO_TYPE (3.500.11:0) needs to be on its own line and a FrameMaker 5th level heading style (H5).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.49** *P* **27** *L* **28** # 68

Grow, Robert RMG Consulting

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

Add a reference for register usage description.

SuggestedRemedy

At end of first sentence add: (see 114.4.3).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.51.14** *P* **32** *L* **9** # 73

Grow, Robert RMG Consulting

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

Add a reference for OAM support.

SuggestedRemedy

At end of first sentence add: (see 114.4).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.3.52.1** *P* **32** *L* **36** # 69

Grow, Robert RMG Consulting

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

Grammar.

SuggestedRemedy

Delete superflous "in".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** SC **45.2.3.54** P **33** L **7** # 57

Grow, Robert RMG Consulting

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

Is this really the way we want to define 1000BASE-H counters. It is common to clear a counter like this on read. It then is the responsibility of the management software to keep a aggregate count (by adding the value to the aggregate count). As defined, a read and write are required and that results in potentially missing data counts.

SuggestedRemedy

I prefer self clearing counter to the counter that is reset as described here.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The variable loc_rcvr_status has to be equal to 1 to allow link_status = 1 by Link monitor state diagram. loc_rcvr_status = 1 means that payload data reception is reliable when BER objective specified in 114.1.1 is provided after MLCC decoding (see response to comment #44). On the other hand, according to P91,L43, the counter is reset for any transition of link_status state variable. Therefore, the BER that is going to be tested is expected to be low. From this point of view, any of the solutions for the counter reset can be considered valid.

However, the suggested remedy is more suitable for cases of mid/high BER test conditions.

Change register 3.522:
+ Eliminate reset bit
+ Extend counter to 16 bits
+ Modify counter register definition to clear on read.
+ Pay attention that this does not mean self-clear (SC). The register remains RO/NR.

Cl **45** SC **45.2.3.54.2** P **33** L **34** # 70

Grow, Robert RMG Consulting

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

Grammar.

SuggestedRemedy

Change "are" to "is".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **78** SC **78.2** P **35** L **17** # 74

Grow, Robert RMG Consulting

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

Bad editing instruction.

SuggestedRemedy

Change "above" to "below".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **99** SC P **1** L **1** # 1

Maguire, Valerie Siemon

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

Variable link appears to be broken. IEEE P802.3bv™/D1.1 should read IEEE P802.3bv™/D1.2.

SuggestedRemedy

Repair broken variable link.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Also detected same error in P1, L27.