Cl **1** *SC* **1.4.128d** *P* **20** *L* **11** # 392
Kramer, Glen Broadcom

Comment Type **E** *Comment Status* **X**

50/50-EPON - Missing "G"

SuggestedRemedy

Change to 50/50G-EPON

Proposed Response *Response Status* **O**

Cl **1** *SC* **1.4.129a** *P* **20** *L* **15** # 330
Powell, William Nokia

Comment Type **E** *Comment Status* **X**

speeds

SuggestedRemedy

throughputs

Proposed Response *Response Status* **O**

Cl **1** *SC* **1.4.245a** *P* **20** *L* **33** # 391
Kramer, Glen Broadcom

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

We provide definition for EQ and also list the "EQ" under the abbreviations, showing the expanded name as "envelope quantum". But there is no definition for the "envelope quantum". Additionally, the definition of EQ is incorrect. EQ is not always 72 bits. In MPCP and above, EQ is 64 bits. In PCS, after 64B/66B encoding, an EQ is 66 bits.

SuggestedRemedy

Use the following definition of EQ:

1.4.245a Envelope Quantum: The unit of measurement of volume of information. Each envelope quantum represents 64 bits of data plus the layer-specific encoding. Thus, at the MAC sublayer and above, an envelope quantum is equal to 64 bits. Within the MCRS, an envelope quantum contains 72 bits (i.e., 64 bits of data and 8 bits of control). Within PCS, after the 64B/66B encoding, an envelope quantum contains 66 bits.

Proposed Response *Response Status* **O**

Cl **1** *SC* **1.4.278** *P* **19** *L* **26** # 409
Kramer, Glen Broadcom

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

The definition of Grant provides specific details for C144, but is silent on similar details in C64 and C77

SuggestedRemedy

Change the definition to the following:

"1.4.278 Grant: Within P2MP protocols, a permission to transmit at a specific time, for a specific duration. Grants are issued by the OLT (master) to ONUs (slaves) by means of GATE messages. <u>In Clause 64 and Clause 77, a GATE MPCPDU contain one or multiple grants issued to a single LLID. Each grant results in one or multiple upstream bursts transmitted by the ONU. In Clause 144, a grant includes envelope allocations for multiple LLIDs. The OLT conveys a grant to the ONU using one or multiple GATE MPCPDUs, all having the same StartTime values. There is a one-to-one correspondence between the grants issued to an ONU and upstream bursts transmitted by that ONU, i.e., a grant issued to an ONU results in a single upstream burst transmitted by that ONU.</u>"

<u>...</u> - underline

Proposed Response *Response Status* **O**

Cl **30** *SC* **30** *P* **31** *L* **1** # 322
Laubach, Mark Broadcom

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

Clause 30 changes to add to the draft

SuggestedRemedy

Insert new Clause 30 changes as per laubach_3ca_5_0119.pdf

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **22** *L* **16** # 331
Powell, William Nokia

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

recipient stop

SuggestedRemedy

recipient stops

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **22** *L* **20** # 332
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
recipient allow

SuggestedRemedy
recipient allows

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **22** *L* **41** # 333
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
recipient allow

SuggestedRemedy
recipient allows

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **23** *L* **12** # 334
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
Request that recipients to attempt

SuggestedRemedy
Request that recipients attempt

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **23** *L* **15** # 335
Powell, William Nokia

Comment Type **E** *Comment Status* **X**
Used by OLT to announce elements of the FEC-unprotected area (SP) to all ONUs on the given PON

SuggestedRemedy
Sync pattern used by the OLT to indicate the start of elements of the sync area to all ONUs on the given PON.

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **23** *L* **15** # 402
Kramer, Glen Broadcom

Comment Type **T** *Comment Status* **X**
Description of SYNC_PATTERN in Table 31A-1 is inaccurate. SYNC_PATTERN cannot be sent to *all* ONUs on the given PON. It can be sent to all unregistered ONUs, or all registered ONUs, or several registered ONUs, or individual registered ONUs. Also, it does not announce all the elements of FEC-unprotected area (i.e., EBD).

SuggestedRemedy
Use the following description:

"Announces burst synchronization patterns to all unregistered ONUs, multiple/all registered ONUs, or individual registered ONUs."

Proposed Response *Response Status* **O**

Cl **31A** *SC* **31A** *P* **23** *L* **18** # 295
Lynskey, Eric Broadcom

Comment Type **T** *Comment Status* **X**
CCP frames not listed in Table 31A-1.

SuggestedRemedy
Change reserved to be 00-19 through 00-1f. Add row for 00-20, CC_REQUEST, 144.4.2.1, Query or change the state of ONU channel(s), No. Add row for 00-21, CC_RESPONSE, 144.4.2.2, Report current channel(s) sate and action result code, No. Add row for reserved 00-22 through 01-00.

Proposed Response *Response Status* **O**

Cl **31A** SC **31A** P **23** L **19** # 363
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
Requests that the recipient stop transmissions in

SuggestedRemedy
Request that the recipient stops transmission in

Proposed Response *Response Status* **O**

Cl **31A** SC **31A** P **23** L **26** # 364
Powell, William Nokia

Comment Type **E** *Comment Status* **X**
This frame is used …

SuggestedRemedy
Request that the MAC Control generates …

Proposed Response *Response Status* **O**

Cl **45** SC **45.2.1** P **24** L **5** # 417
Remein, Duane Huawei

Comment Type **TR** *Comment Status* **X**
Proposed material for Clause 45 PMA/PMD registers.

SuggestedRemedy
See remein_3ca_1_1901.pdf

Proposed Response *Response Status* **O**

Cl **45** SC **45.2.1** P **24** L **5** # 418
Remein, Duane Huawei

Comment Type **TR** *Comment Status* **X** *post-deadline*
Proposed material for Clause 45 PCS registers.

SuggestedRemedy
See remein_3ca_2_1901.pdf (to be included in the draft) and remein_3ca_3_1901.pdf

Proposed Response *Response Status* **O**

Cl **45** SC **45.2.1.93a** P **24** L **32** # 365
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
writes ignored

SuggestedRemedy
write operations are ignored

Proposed Response *Response Status* **O**

Cl **45** SC **45.2.1.93a** P **24** L **39** # 366
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
Read only

SuggestedRemedy
Read-Only

Proposed Response *Response Status* **O**

Cl **56** SC **56.1.2** P **27** L **1** # 367
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
at 25.78125

SuggestedRemedy
at a 25.78125

Proposed Response *Response Status* **O**

Cl **56** SC **56.1.2** P **27** L **2** # 368
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
and 25.87125 GBd or 10.3125 GBd

SuggestedRemedy
and a 25.87125 GBd or a 10.3125 GBd

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.2.1** *P* **27** *L* **15** # 369
Powell, William Nokia

Comment Type **E** *Comment Status* **X**
in 77.4.

SuggestedRemedy
in Clause 77.4.

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.2.1** *P* **27** *L* **17** # 370
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
plus one or more

SuggestedRemedy
and one or more

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.3** *P* **29** *L* **19** # 371
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
For … signaling systems transmit rate

SuggestedRemedy
For … signaling systems the transmit rate

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.3** *P* **29** *L* **26** # 373
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
all of these

SuggestedRemedy
all these

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.3** *P* **29** *L* **26** # 372
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
sentence segment: mandatory FEC capability; in particular in Clause 56.1.2, the term "mandatory FEC function" is used.

SuggestedRemedy
mandatory FEC function

Proposed Response *Response Status* **O**

Cl **56** *SC* **56.1.3** *P* **29** *L* **29** # 374
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
a new table 56-4 and Changeing existing

SuggestedRemedy
a new Table 56-4 and changing the existing

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.1.1** *P* **34** *L* **19** # 375
Powell, William Nokia

Comment Type **ER** *Comment Status* **X**
OLT to the ONU

SuggestedRemedy
OLT to the ONUs OR OLT to an ONU

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.3.1.1** *P* **40** *L* **48** # 416

Remein, Duane Huawei

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

Delay constraints. Comment 434 against Draft 1.2 suggested a mecahnism to allocate delay constrints for Nx25G-EPON but there were objections to that proposal. This item has not been addressed yet and needs to be resolved in order for the draft to be technically complete and proceed to WG Ballot.

SuggestedRemedy

Work out a solution during the March meeting.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.3.1.5** *P* **41** *L* **48** # 284

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Missing link in red

SuggestedRemedy

Use "141.3.5" + make link live

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.4** *P* **44** *L* **1** # 325

Johnson, John Broadcom

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

The column headings on Tables 141-11 and 141-12 are inconsistent.

SuggestedRemedy

Change the heading on the first column of Table 141-11 to "Wavelength Name".

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.5.1** *P* **45** *L* **16** # 296

Lynskey, Eric Broadcom

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

Table 141-13 does not list the total average launch power for the single channel case. This is different than Table 141-14. Both tables should be consistent with each other.

SuggestedRemedy

Remove the 7.8 dBm total average launch power from Table 141-14.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.5.2** *P* **47** *L* **30** # 326

Johnson, John Broadcom

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

The line "Conditions of stressed receiver sensitivity test:" in Tables 141-15 and 16 is a section heading and has no associated parameter values. See example format in Table 141-19.

SuggestedRemedy

Remove TBD placeholders on this line in Tables 141-15 and 16 and merge the cells in the row on Table 141-16. Use formatting similar to Table 141-19.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.5.2** *P* **48** *L* **27** # 297

Lynskey, Eric Broadcom

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

Table 141-16 references Table 75-7 for parameters related to 10G upstream. However, in the 2018 revision of IEEE 802.3, Table 75-7 refers to 10/1 power receive characteristics.

SuggestedRemedy

Replace reference with Table 75-6.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.5.2** *P* **52** *L* **26** # 324

Johnson, John Broadcom

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

The same type of receiver technology will be used for Nx25G-EPON as for 10G-EPON (APD in TO-can). The same value of receiver reflectance (max) should be used.

SuggestedRemedy

Replace TBD values for Receiver reflectance (max) in Tables 141-19 and 141-20 with a value of -12 dB.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.7.4** *P* **54** *L* **32** # 304

Lynskey, Eric Broadcom

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

Some tests call for "any valid encoded 256B/257B data stream". Some call for "valid Nx25G-EPON signal". Pick one and be consistent.

SuggestedRemedy

Replace 256B/257B data stream with valid Nx25G-EPON signal.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.7.5** *P* **54** *L* **37** # 303

Lynskey, Eric Broadcom

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

It seems like the I2 reference is a copy paste from 10G/1G EPON.

SuggestedRemedy

Remove "repeating pattern /I2/ ordered set (see 36.2.4.12) or".

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.7.9** *P* **55** *L* **1** # 327

Johnson, John Broadcom

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

Section 141.7.9 is incomplete and requires additional text.

SuggestedRemedy

Use the text in johnson_3ca_1_0191.doc for section 141.7.9.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.7.13** *P* **55** *L* **25** # 301

Lynskey, Eric Broadcom

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

Max Ton value from Table 141-17 is 512ns, since it is inherited from Table 75-8.

SuggestedRemedy

Change 128ns to 512ns.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.7.13** *P* **55** *L* **33** # 302

Lynskey, Eric Broadcom

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

Max Toff value from Table 141-17 is 512ns, since it is inherited from Table 75-8.

SuggestedRemedy

Change 128ns to 512ns.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.7.13.2** *P* **56** *L* **25** # 419

Remein, Duane Huawei

Comment Type **E** *Comment Status* **X** *post-deadline*

We have 19 instances of "synchronization pattern", 2 of "Synchronization Pattern", and 17 of "Sync Pattern". Some consistency should be invoked.

SuggestedRemedy

Use "synchronization pattern".

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.8.5** *P* **59** *L* **36** # 388

Kramer, Glen Broadcom

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

There is no need to repeat a long list of all defined PMDs. All supported PMDs are already listed in Table 141-7 on page 38.

SuggestedRemedy

Replace the text "Defined PMDs are as follows: <list of PMDs>"
with the following text:
"The list of all supported PMDs is shown in Table 141-7."

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.9.1** *P* **60** *L* **41** # 413

Ferretti, Vince Corning

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

Insertion loss is not specified in Table 141.21

SuggestedRemedy

Change to "specified in Tables 141.1 through 141.5"

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.9.3** *P* **61** *L* **1** # 328

Johnson, John Broadcom

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

The downstream wavelength names in Table 141-21 are inconsistent with the definitions in Table 141-11.

SuggestedRemedy

Change the wavelength names in Table 141-21 to agree with Table 141-11. Change DW2 to DW0 and change the column order so that DW0 is to the left of DW1.

Proposed Response *Response Status* **O**

Cl **141** *SC* **141.9.3** *P* **61** *L* **19** # 414

Ferretti, Vince Corning

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

Insertion loss is not specified in Table 141.21

SuggestedRemedy

Change to "specified in Tables 141.1 through 141.5"

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1** *P* **64** *L* **9** # 376

Powell, William Nokia

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

The term "passive optical multipoint networks (PONs)" is introduced here. It seems more logical to use the "regular" term. The previous sentence already points out that this is a point-to-multipoint (P2MP) network.

SuggestedRemedy

remove "multipoint" to obtain: passive optical networks (PONs)

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.1** *P* **64** *L* **26** # 412

Kramer, Glen Broadcom

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

We repeat the Conventions section in every clause (C142, C143, C144). There is a lot of duplicated material, but also some differences in how requirements are stated.

SuggestedRemedy

Use one Convention section in C142 and reference it from C143 and C144. Expand the convention section to cover timers, vector notations, and FIFO operations. Specific changes:

1) Replace subclause 142.1.1 with the material shown in kramer_3ca_6_0119.pdf

2) In 142.2.5.3, delete definitions of FIFO.Append(v), FIFO.Fill(v), FIFO.GetHead(), and FIFO.IsEmpty()

3) Add this text to the last sentense of InputFifo definition: "and supports operations Append(), IsEmpty(), and GetHead() (see 142.1.1.5)."

4) Add this sentense of TxFifo definition: "The TxFifo[] supports operations Append(), Fill(), and GetHead() (see 142.1.1.5)."

5) Change title of 143.3.3.1 from "State diagram conventions" to "Conventions". Replace subclause text with "See 142.1.1."

6) Replace subclause 143.3.4.1 text with "See 142.1.1."

7) Change title of 144.1.6 from "State diagram conventions" to "Conventions". Replace subclause text with "See 142.1.1."

8) In 144.3.6.3, change definition of EnvList as follows:
8.a) Remove the sentence "Each EnvList[ch] list has several associated functions:".
8.b) Remove the list of functions
8.c) Insert text: "Each EnvList[ch] list supports operations Append(), Clear(), IsEmpty(), GetHead(), and PeekHead() (see 142.1.1.5)."

9) In Figure 144-22, replace "RemoveHead()" with "GetHead()" (2 places)

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.1** *P* **64** *L* **28** # 377

Powell, William Nokia

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

It seems useful to start with the remark that code examples adhere to the C programming language. The subsequent notation ++, --, += and -= does not need to be explained.

SuggestedRemedy

The notation used in the state diagrams in this clause follows the conventions in Clause 21.5. Code examples provided in this clause adhere to the style of the "C" programming language. In particular, if the notation ++ or -- is used directly after a variable name representing an integer value, this integer value is incremented by 1 or decremented by 1, respectively. Similarly, if the notation += and -= are used after a variable, the corresponding value is to be incremented or decremented by the following value, respectively.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **64** *L* **43** # 378

Powell, William Nokia

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

The term "FEC-unprotected" is not common.

SuggestedRemedy

Suggest to rewrite this, e.g., An ONU burst transmission comprises two or three distinct synchronization pattern (SP) zones, followed by one or more FEC codewords, and ending with an end-of-burst (EBD) delimiter.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **66** *L* **4** # 379

Powell, William Nokia

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

TXD[i]<31:0>, TXC[i]<3:0>, TXC, RXD[i]<31:0>, RXC<3:0>, RXC[i] in Figure 142-2 is first specified in Clause 143.3.1.1.

SuggestedRemedy

Propose to either introduce this notation in the text when describing Fig. 142-2, or to refer to Clause 143.3.1.1. BTW, should "TXC" be "TXC[i]"?

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **66** *L* **52** # 380

Powell, William Nokia

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

sentence fragment: where the last codeword may be shortened to minimize the unused LDPC codeword payload … This statement is inaccurate. First, the LDPC code used has wordlength 17,664, with a 14,592-bit payload and a 3,072-bit parity check segment. A transmitted codeword that comprises a maximum-size payload portion consists of 56 257-bit encoded and scrambled data blocks, i.e., a total of 14,392 bits, followed by 10 257-bit parity blocks carrying interleaved parity information and a codeword delimiter. As such, there is a 200-bit reduction in payload to allow for an integer-number of 256B257B blocks, and the last 512 parity check bits have been punctured to increase the code rate. Given that at this point, the LDPC encoder has not been introduced yet, and can also consider making a more general statement, that, depending on the number of bits to be transmitted during the burst transmission, one or several codewords will be formed, and that all codewords, except the last one, will be of full length.

SuggestedRemedy

Suggested change: The LDPC code used has wordlength 17,664, with a 14,592-bit payload and a 3,072-bit parity check segment. A transmitted codeword that comprises a maximum-size payload portion consists of 56 257-bit encoded and scrambled data blocks, i.e., a total of 14,392 bits, followed by 10 257-bit parity blocks carrying interleaved parity information and a codeword delimiter. As such, there is a 200-bit reduction in payload to allow for an integer-number of 256B257B blocks, and the last 512 parity check bits have been punctured to increase the code rate. The number of bits that are to be placed in the last transmitted codeword of a burst may be shorter than the maximum-size payload. In this case, only the information-carrying part of the payload is transmitted, followed by the entire 10 257-bit parity blocks.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **67** *L* **2** # 381

Powell, William Nokia

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

segment: … data blocks and 10 of 257-bit blocks carrying LDPC parity and codeword delimiter. At this point, the LDPC encoder has not been introduced yet. Consider making a more general statement, that, depending on the number of bits to be transmitted, one or several codewords will be formed, and that all codewords, except the last one, will be of full length.

SuggestedRemedy

Alternative option:In normal operation, the SBD is followed by a number of FEC codewords, where the payload of all codewords, except for the last codeword, comprises 56 257-bit 256B/257B encoded and scrambled data blocks. The last data part of a burst is sent, followed by the full-length parity segment.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **67** *L* **19** # 382

Powell, William Nokia

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

Figure 142-3 - the parameter N is used in the figure to denote the number of codewords in the burst. This may lead to confusion, given that the codeword length is also denoted by N.

SuggestedRemedy

Suggest to replace N by, e.g., B.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **67** *L* **20** # 403

Kramer, Glen Broadcom

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

“The default number of Sync Pattern zones is two” But yet the diagram for 3 zones is shown immediately below and text after the figure only describes two zones.

SuggestedRemedy

Swap order of figures 142-3 and 142-4.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.1.3** *P* **67** *L* **20** # 393

Kramer, Glen Broadcom

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

"TP Length" is shown in figures 142-3 and 142-4, but is not explained in text and is not used anywhere else.

SuggestedRemedy

Remove "TP Length" and the associated dimension arrows from both figures.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.2** *P* **70** *L* **20** # 394

Kramer, Glen Broadcom

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

"Prior to being transcoded into 257-bit blocks the Nx25G PCS scrambles four aggregated 66-bit blocks."

This sentence states that PCS itself is being transcoded.

SuggestedRemedy

Change to "The Nx25G PCS scrambles the payload of each 66-bit block. It then accumulates 66-bits blocks into groups of four and transcodes each group into a single 257-bit block"

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4** *P* **70** *L* **32** # 383

Powell, William Nokia

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

Original text: The Nx25G-EPON PCS shall encode the transmitted data stream using LDPC(16952,14392) FEC, defined in 142.2.4. Annex 142A gives an example of LDPC(16952,14392) FEC encoding and interleaving. The notation LDPC(16952,14392) FEC is not a common notation for an LDPC code, and it does not fully specify the code, unlike, e.g., a Reed Solomon code. It is suggested to provide a more general statement and refer to subsequent Clauses for further details.

SuggestedRemedy

The Nx25G-EPON PCS shall perform the FEC encoding operation using a quasi-cyclic low-density parity-check (QC-LDPC) code with blockwise interleaving as defined in Clause 142.2.4. Annex 142A provides examples of the blockwise interleaving and LDPC encoding operations.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4** *P* **70** *L* **33** # 384

Powell, William Nokia

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

Suggest to provide the details of the LDPC code in an Annex. The main advantage is that one can then first specify the full-length quasi-cyclic low-density parity-check code, using an mxn matrix that specifies the amount of cyclic rotation of a diagonal zxz sub-matrix.

SuggestedRemedy

Migrate portions of Clause 142.2.4 to an Annex.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4** *P* **70** *L* **34** # 385

Powell, William Nokia

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

Annex 142A has not been included yet.

SuggestedRemedy

Suggest to include examples as soon as possible. These may be modified/improved later on.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **37** # 386

Powell, William Nokia

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

The bit sequence input for a given code block to the FEC Encoder …

SuggestedRemedy

It may be best to state that during a burst transmission, an ONU is allocated sufficient time to transmit K_B bits. The number of codewords equals B = ceil(K_B/K_max).

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **38** # 387

Powell, William Nokia

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

sentence: … The parity check bit sequence produced by FEC Encoder …

SuggestedRemedy

rewrite: … Prior to encoding, the input bit sequence is grouped into K/z z-bit segments u_i^(j)

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **38** # 336

Powell, William Nokia

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

The current text is convoluted; it would make most sense to write that a quasi-cyclic LDPC code was selected, specified by an mxn shift-matrix and a lifting factor Z = 256. This specifies the maximum word length: N* = nZ and the number of parity-check bits M* = mZ. It is typically also useful to specify k = n-m, and K* = N-M, the maximum number of systematic bits. After the definition of the code and its parameters, one can state that one uses K information bits, where K <= K_max <= K*, and that the remaining K*-K bits are assumed to be zero, and not transmitted - this way, one also does not need a "zero-padding" module in the encoder. The first M = M* - 512 parity-check bits are transmitted; this implies that the remaining parity-check bits do not have to be computed (one does not need a puncturing module in the encoder). Using this outline, one does not need the parameters P and S.

SuggestedRemedy

Proposal: specify the full-length LDPC code in 142.2.4.1. Avoid any discussion about puncturing and shortening here. Move this to 142.2.4.3. The description on p. 75, lines 5-18 is generally better than on p. 71, lines 3-25.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **40** # 337

Powell, William Nokia

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

sentence: … where M is the number of parity check bits.

SuggestedRemedy

… where M is the number of transmitted interleaved parity-check bits.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **41** # 338

Powell, William Nokia

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

sentence: … where N = K + M is the length of the encoder output sequence … Issue: in Fig. 142-6, the FEC encoder only produces parity-bit segments.

SuggestedRemedy

rewrite this sentence to: …. where N = K+M is the length of the transmitted codeword.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **51** # 404

Kramer, Glen Broadcom

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

"— the number of shortened information bits, S (Smin = 200); "

We never use Smin anywhere else in text. And it is not clear that Smin is only used when we have Kmax information bits. It would be more informative to illustrate how value S is obtained.

SuggestedRemedy

Replace "(Smin = 200)" with "(S = 14592 - K)"

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **53** # 340

Powell, William Nokia

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

sentence: … where M is the number of parity-check bits after puncturing

SuggestedRemedy

rewrite: … where M is the number of transmitted parity-check bits.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **70** *L* **54** # 341

Powell, William Nokia

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

sentence: … the number of parity-check bits after puncturing, M (M = 3072 - 512 = 2560);

SuggestedRemedy

please note that M has already been defined on p. 70, line 5; it may not be necessary to redefine it here. Alternatively, rewrite: … the number of transmitted interleaved parity-check bits, M (M = 2560).

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **71** *L* **1** # 342

Powell, William Nokia

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

sentence: the number of output bits … it would be less ambiguous to refer to this as the transmitted sequence?

SuggestedRemedy

the number of transmitted bits

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **71** *L* **1** # 343

Powell, William Nokia

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

a maximum number of information bits is specified, but can this be any number, or is it a multiple of 8, 16, …? Should one also specify a minimum number of information bits? On p. 67, lines 1-4, it seems that the data granularity is 256 bits.

SuggestedRemedy

Add information on the minimum payload length and the granularity. If there are no restrictions, then indicate that K can take any possible value, as long as K <= K_max.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **71** *L* **1** # 344

Powell, William Nokia

Comment Type **E** *Comment Status* **X**

sentence: … on the burst length pattern to determine shortening length … This sentence is ambiguous. The notion of "burst length" is mentioned in 141.3.5.2, p. 43, line 23. There is no notion of a burst length pattern prior to p. 71.

SuggestedRemedy

Suggest to more specifically formulate the number of bits to be transmitted during a burst, in terms of information bits, and possibly introduce extra variables: the number of data bits, the number of input bits to the FEC encoder (256B/257B redundancy), ...

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **71** *L* **3** # 345

Powell, William Nokia

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

sentence: the code rate, R = K/N, defined as the code rate after puncturing and after shortening. Propose to use the standard definition.

SuggestedRemedy

Rewrite: the code rate, R = K/N, defined as the ratio between the number of information bits (K) and the number of transmitted bits (N).

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **71** *L* **5** # 346

Powell, William Nokia

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

sentence: The encoder supports highest code rate Rmax = Kmax/Nmax = 0.849.

SuggestedRemedy

Rewrite: The FEC Encoder supports an FEC code rate up to Rmax = Kmax/Nmax = 14392/16952 = 0.849.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **71** *L* **8** # 320

Laubach, Mark Broadcom

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

After producing and verifying the test vector addition to Annex 142A, these figures were updated to improved clarity, fix process flow, create symmetry and align with other PCS figures and state diagrams.

SuggestedRemedy

Replace both Figure 142-6 and 142-15 (page 87, line 34) with the respective figures in laubach_3ca_3_0119.pdf

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.1** *P* **74** *L* **23** # 348

Powell, William Nokia

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

Fig. 142-7 - the labeling in this figure is ambiguous. If the systematic part of this "codeword" represents the input to the encoder, then the label "transmitted user bits" is inaccurate, as the encoder operates on an "bit-interleaved" sequence. The label "Transmitted Parity Bits" is also ambiguous, as the Parity Bits are interleaved prior to transmission. At the same time, this is also not a depiction of the transmitted sequence.

SuggestedRemedy

It is proposed to modify at least the labels, and possibly to introduce a second/third figure, or a combined figure. One could then show: block of K information bits; implicit zero-extension; 256-bit blockwise interleaving; encoding, i.e., determination of the first 10 256-bit parity-check segments; (de)interleaving of the parity segments; transmission of the K user bits, followed by 2560 interleaved parity-check bits.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.2** *P* **71** *L* **47** # 347

Powell, William Nokia

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

right column shifts

SuggestedRemedy

propose to introduce a shift-by-one Z×Z matrix B, or using a cyclic permutation. The matrix probably works best. The HC matrix would then specify the exponent of B (repeated shifts).

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.3** *P* **74** *L* **43** # 349

Powell, William Nokia

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

Sentence: … which is then interleaved … To be consistent with other parts of the text, the term de-interleaved should be used; a better option seems to be to write that a reverse omega network is used.

SuggestedRemedy

Propose to write: the first 10 256-bit segments of computed parity bits p^(1) p^(10) are interleaved using an 8-stage reverse Omega network with seed value s(i).

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **1** # 420

Laubach, Mark Broadcom

Comment Type **TR** *Comment Status* **X** *post-deadline*

Reviewing the test vector addition to Annex 142A and the updates to the 142.2.4.4 interleaver text, reviewing additonal comments and proposed responses, then suggested reviewing all encoder text. This update removes ambiguities, improves clarity, reduces wording, fixes typos, and attempts to address some of the proposed comments. Doing these as many individual comments could lead to error, so bulk replacement text is provided. Also provided is laubach_3ca_7_0119.pdf, a framemaker compare with the Draft 1.4 text.

SuggestedRemedy

Replace 142.2.4 intro text, 142.2.4.1, 142.2.4.2, 142.2.4.3 with the respective contents of laubach_3ca_6_0119.pdf.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **1** # 319

Laubach, Mark Broadcom

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

After producing and verifying the test vector addition to Annex 142A, the interleaver text was reviewed. This update removes ambiguities, improves clarity, and reduces wording. Also provided is laubach_3ca_2_0119.pdf, a framemaker compare with the Draft 1.4 text.

SuggestedRemedy

Replace 142.2.4.4 with contents of laubach_3ca_1_0119.pdf.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **1** # 350

Powell, William Nokia

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

sub-clause title is confusing; the information part is transmitted in regular order (non-interleaved)

SuggestedRemedy

Proposed change: Interleaving operation of parity-bit segment

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **3** # 351

Powell, William Nokia

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

For the purposes here: … it is hard to parse this sentence. The recommendation is to remove this paragraph.

SuggestedRemedy

Proposed change: remove this paragraph.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **7** # 353

Powell, William Nokia

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

Sentence: … reverse-omega networks. The term omega network is not all that common. It may be a better idea to introduce the omega network and the reverse network first, as for the LDPC code, and then describe the encoder and decoder operation.

SuggestedRemedy

Proposal: change the order of discussion - first the full-length LDPC code, the omega network and the reverse omega network, and then the FEC Encoder (and optionally, the FEC Decoder).

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **7** # 352

Powell, William Nokia

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

The term interleaving is generally used to describe the process of transforming a sequence that is in regular order into a sequence that is interleaved. Rather than turning this definition upside-down, it is proposed to discuss the 8-stage 256-input omega network and the 8-stage 256-input reverse omega network. One can then simply state that for the interleaver in the encoder, an 8-stage 256-input reverse omega network is used, and that, consequently, the decoder uses the 8-stage 256-bit omega network.

SuggestedRemedy

The FEC Encoder uses an 8-stage 256 x 256 reverse omega network.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **15** # 354

Powell, William Nokia

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

The proposed de-interleaver/interleaver is a module that has 256 data inputs, 256 data outputs, a 128-bit seed, and a "fixed/pre-defined" cyclic rotation of this seed (shift factor: 17). Fig. 142-8 seems to imply that a massively parallel structure is needed with 57 * 256 inputs.

SuggestedRemedy

It seems more straightforward to present one de-interleaver unit and then associate the seeds with the segment indices.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **28** # 356

Powell, William Nokia

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

Sentence: The parity bit interleaver … given that Fig. 142-8 show the information bit de-interleaver, it seems to make sense to first discuss the parity-check bit interleaver

SuggestedRemedy

Sentence: The parity-check bit de-interleaver …

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **28** # 355

Powell, William Nokia

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

Sentence: The first ten … These local interleavers are realized by 12 independent omega networks.

SuggestedRemedy

Proposed change: Change first "de-interleaved" to "interleaved"

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **30** # 357

Powell, William Nokia

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

Sentence: … consists of 12 local interleavers … not sure what local refers to; it seems to make more sense to state that the first 10 256-bit parity-check bit segments are de-interleaved using an 8-stage 256x256 reversed omega network, where each segment has its own seed.

SuggestedRemedy

Proposed: The first 10 256-bit parity-check bit segments are de-interleaved using an 8-stage 256x256 reversed omega network, where each segment has its own seed.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.4** *P* **75** *L* **36** # 358

Powell, William Nokia

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

The figure caption is misleading, as this is the Parity-Check Bit interleaver.

SuggestedRemedy

Revised caption: Parity-Check Bit interleaver.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.4.5** *P* **76** *L* **31** # 359

Powell, William Nokia

Comment Type **E** *Comment Status* **X**

Sentence: … and i - 0, …, 127 - the regular numbering thus far starts at 1. In the context of the permutation, an index starting at 0 can be useful, but it is not difficult to let this index also start at 1.

SuggestedRemedy

Rewrite: … and i = 0, …, 127.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.1** *P* **80** *L* **26** # 298

Lynskey, Eric Broadcom

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

The lower 257-bits are no longer TBD, per 142.3.5.1. Also, it shouldn't be necessary to specify the 258-bit value here and 257-bit value elsewhere.

SuggestedRemedy

Value: {MSB = 0, EBD] as specified in 142.3.5.1}

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.2** *P* **81** *L* **25** # 278

Hajduczenia, Marek Charter Communicatio

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

ClkOut and ClkXfr are defined in 142.2.5.2 and have the very same definition: "The clear on read variable ClkOut is set to true once for each 257-bits of data output by the PMD." - since the event happens at the specific moment of time (when 257 bits are transfered by the PMD), we could
- combine definition into just one
- rewrite it to set to true on bit 257 and false otherwise - this is sufficient to trigger transition in target SDs

SuggestedRemedy

Remove ClkXfr
Change definition of ClkOut to read "The variable ClkOut is set to true once every 257-bits of data output by the PMD and set to false otherwise."
Change the name of ClkOut to ClkOut257b. Update SDs (142-12, 142-13, and 142-14 accordingly)
Change all instances of ClkXfr to ClkOut257b. Update SDs (142-12, 142-13, and 142-14 accordingly)

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.3** *P* **83** *L* **11** # 360

Powell, William Nokia

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

FecParity() - would it make sense to provide a counter as argument?

SuggestedRemedy

FecParity(i)

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.3** *P* **83** *L* **15** # 323

Laubach, Mark Broadcom

Comment Type **E** *Comment Status* **X**

Appears to be a pre-mature line return after "return"

SuggestedRemedy

Fix if possible.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.3** *P* **83** *L* **20** # 361

Powell, William Nokia

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

Sentence: This function adds the block v to the input of FIFO buffer.

SuggestedRemedy

Rewrite: This function adds block v to the input of the FIFO buffer.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.3** *P* **83** *L* **23** # 362

Powell, William Nokia

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

Sentence: This function writes block v, to each element of FIFO buffer. Suggest to remove the comma, and to insert "the".

SuggestedRemedy

Rewrite: This function writes block v to each element of the FIFO buffer.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.5.3** *P* **83** *L* **40** # 292

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Dead reference to Figure 143-2

SuggestedRemedy

Make link live, it is correct reference

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.2.6.2** *P* **81** *L* **38** # 390

Kramer, Glen Broadcom

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

When we define a variable with "[]" at the end, we always specify the type as "array of <units>". We create such array definitions only if we need to access individual elements using an index. The ParityStagingBuffer definition has "[]", but the type is defined as "block of 2570 bits".
This is inconsistent. We either need to define it as "array of 270 bits" or remove the brackets. In text or in the state diagrams, we never access individual elements of ParityStagingBuffer. We only use "<m:n>" notation as we do for blocks (vectors).

SuggestedRemedy

1) Make the type "2570-bit block"
2) Remove "[]" from the definition.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3** *P* **84** *L* **50** # 285

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Missing link in red

SuggestedRemedy

Use "142.3.1.1" + make link live

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3.1** *P* **85** *L* **48** # 286

Hajduczenia, Marek Charter Communicatio

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

Remove current text from the subclause and insert red TBD

SuggestedRemedy

Per comment

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3.5** *P* **88** *L* **15** # 411

Kramer, Glen Broadcom

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

There are multiple issues with the PCS receive data path state diagrams:

1) OLT and ONU synchronizers don't pass any aligned data to the rest of PCS receive path
2) Receive state diagram attempts to find perfect match for EBD and SBD values, which with input BER of 0.01 will happen only in 0.6% of bursts.
3) PMAUDI is a primitive. But it is used in the PCS receive state diagram as if it is a variable or a buffer.
4) In PCS Output SD, the variable OutEqCtr is used without being initialized
5) Non-mutually exclusive transitions from state NEXT_VECTOR

SuggestedRemedy

Replace subclause 142.3.5 with the material in kramer_3ca_2_0119.pdf.

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3.5.1** *P* **89** *L* **6** # 398

Kramer, Glen Broadcom

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

"parity delimiter" term is undefined. We use the term "FEC codeword delimiter"

SuggestedRemedy

Replace "parity delimitet" with "FEC codeword delimiter" in two places:
page 89, line 6
page 89, line 37

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3.5.2** *P* **90** *L* **12** # 415

Remein, Duane Huawei

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

PMAUDI[i] Alias for PMA_UNITDATA[i]<256:0>.indication needs refinement

SuggestedRemedy

Change to: PMAUDI[i]
Alias for PMA_UNITDATA[i](rx_code_group<256:0>)

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3.5.2** *P* **90** *L* **32** # 287
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Missing link in red

SuggestedRemedy

Use "142.1.3" + make link live

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.3.5.3** *P* **90** *L* **48** # 288
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Missing link in red

SuggestedRemedy

Use "142.2.5.3" + make link live

Proposed Response *Response Status* **O**

Cl **142** *SC* **142.4.1** *P* **70** *L* **46** # 339
Powell, William Nokia

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

sentence: the LDPC parity check matrix is a 12-by-69 quasi-cyclic matrix - this is confusing. The matrix that specifies the H-matrix is a 12x69 matrix, but the matrix itself is 12Z x 69Z. It is suggested to move all text that defines a QC-LDPC code to 142.2.4.1 and the encoding details to 142.2.4.2.

SuggestedRemedy

the LDPC parity check matrix is specified by a 12 x 69 matrix H_c OR, move the paragraphs starting on p. 71, lines 29 up to p. 74, line 30 to the beginning of Clause 142.2.4.1. The Encoder-related material in 142.2.4.1 can then move to Clause 142.2.4.2.

Proposed Response *Response Status* **O**

Cl **142A** *SC* **142A** *P* **97** *L* **37** # 321
Laubach, Mark Broadcom

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

Insert informational test vector text. Note: the five test vector files are also provided to the Editor in a zip file.

SuggestedRemedy

Insert new text after 142A.1 as per laubach_3ca_4_0119.pdf

Proposed Response *Response Status* **O**

Cl **143** *SC* **143.2.4.2** *P* **100** *L* **29** # 405
Kramer, Glen Broadcom

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

Figure 143-3 may be confusing to readers, since it doesn't show the envelope headers at the beginning of each frame, as Figure 143-4 does. Probably just leaving Figure 143-4 is enough.

SuggestedRemedy

Delete Figure 143-3 and its referemce in text.

Proposed Response *Response Status* **O**

Cl **143** *SC* **143.2.4.3** *P* **101** *L* **18** # 299
Lynskey, Eric Broadcom

Comment Type **E** *Comment Status* **X**

Text says LLID is N, figure says LLID is L.

SuggestedRemedy

Replace LLID N with LLID L.

Proposed Response *Response Status* **O**

Cl **143** *SC* **143.2.6** *P* **106** *L* **23** # 401

Kramer, Glen Broadcom

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

Section 143.2.6 "MCRS Time synchronization" is located in the generic part of MCRS clause, but it talks about EPON-specific concepts, such as OLT, ONU, LocalTime. At the same time, there is an empty section 143.4.2 "MCRS and MPCP clock synchronization" in the EPON-specific part of the clause.

SuggestedRemedy

Move the subclause 143.2.6 into 143.4.2. Use the title "MCRS Time synchronization"

Proposed Response *Response Status* **O**

Cl **143** *SC* **143.3.3.2** *P* **115** *L* **51** # 289

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Missing link in red

SuggestedRemedy

Link is correct, just make it live

Proposed Response *Response Status* **O**

Cl **143** *SC* **143.3.4.4** *P* **125** *L* **12** # 400

Kramer, Glen Broadcom

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

Definition of IsMisalifgned function is wrong. The function is supposed to return true is the first xGMII transfer contains the second part of IBI EQ and the second transfer contains the first half of an envelope header.

SuggestedRemedy

Replace the definition of IsMisaligned() function with the one shown in kramer_3ca_5_0119.pdf. Note the italics and indentation.

Proposed Response *Response Status* **O**

Cl **143** *SC* **143.4.1** *P* **128** *L* **34** # 395

Kramer, Glen Broadcom

Comment Type **E** *Comment Status* **X**

"These are passive optical multipoint networks (PONs)"

We use terms "passive optical networks (PON)" and "point-to-multipoint (P2MP)", but we never define "passive optical multipoint networks" (POMN?)

Also, not clear what "these" refers to.

SuggestedRemedy

Replace "These" with "P2MP networks". Strike "multipoint".

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.1** *P* **135** *L* **19** # 300

Lynskey, Eric Broadcom

Comment Type **E** *Comment Status* **X**

Missing descriptions for bandwidth allocation, authentication, provisioning, and more.

SuggestedRemedy

"This clause does not address…"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.1.1** *P* **135** *L* **38** # 305

Lynskey, Eric Broadcom

Comment Type **E** *Comment Status* **X**

Reference to clause instead of figure.

SuggestedRemedy

Replace Clause 144-1 with Figure 144-1.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.1.2** *P* **138** *L* **3** # 279
Hajduczenia, Marek Charter Communicatio

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

Text missing in 144.1.2 "Position of Multipoint MAC Control within the IEEE 802.3 hierarchy"

SuggestedRemedy

Use the text per hajduczenia_3ca_1_0119.pdf

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.1.3** *P* **138** *L* **20** # 316
Lynskey, Eric Broadcom

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

The CCP is missing from Figure 144-3.

SuggestedRemedy

Add, similar to GATE generation process, to show that there are multiple instances.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.2.1** *P* **141** *L* **31** # 280
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

I believe note in red can be removed, since botj Control Parser and Control Multiplexer are already shown in Figure 144-5/6, respectively.

SuggestedRemedy

Strike the note in red.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.1** *P* **182** *L* **48** # 294
Lynskey, Eric Broadcom

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

INVALID_COMMAND is not defined.

SuggestedRemedy

INVALID_COMMAND. This constant represents the value of ActionResultCode corresponding to "Invalid command", per Table 144-11. Value 0x4.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.1.1** *P* **144** *L* **54** # 290
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Red link: 143.2.6

SuggestedRemedy

Link is correct, just make it live

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.1.1** *P* **146** *L* **2** # 282
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Red link: 143.2.6

SuggestedRemedy

Make link live, remove red highlight

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.1.1** *P* **146** *L* **16** # 281
Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Dead link: 143.2.6

SuggestedRemedy

Make link live

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.2.2** *P* **148** *L* **6** # 293

Lynskey, Eric Broadcom

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

MLID is also used to carry CCPDUs.

SuggestedRemedy

Add "and CCPDUs (see 144.4)" to end of first sentence.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.3** *P* **148** *L* **53** # 283

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Table 144-1 is missing bottom cell line

SuggestedRemedy

Add the missing line at line 53

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.4** *P* **149** *L* **28** # 410

Kramer, Glen Broadcom

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

Action item form Bangkok meeting to update the MPCPDU desacription section to reflect the new approach of operand list structure in state diagrams

The main purpose of this update was to align field names and message structures with what we use in state diagrams and to ensure that all fields are defined only once in a single place.

SuggestedRemedy

Replace the current subclause 144.3.4 with the text and figures provided in kramer_3ca_3_0119.pdf.

In the new subclause, each MPCPDU has its operands grouped in a single structure called MsgName and every field can be accessed in any state diagram by using notation MsgName.FieldName. All state diagrams in C144 already use this notation.

(By definition, the operand list in a MAC Control message comprises all the fields following the opcode, but excluding Pad and FCS).

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.4** *P* **149** *L* **44** # 313

Lynskey, Eric Broadcom

Comment Type **E** *Comment Status* **X**

There is no subclause 144.6.2.

SuggestedRemedy

Looking at previous EPON standards, it is likely supposed to be a reference to the empty 144.1.2.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.4.1** *P* **151** *L* **39** # 306

Lynskey, Eric Broadcom

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

The bit positions of FR and F in Figure 144-10 are not clear.

SuggestedRemedy

Add some bit positions on the figure to show that F corresponds to bit [23] and FR corresponds to bit [22] and EnvLength corresponds to bits [21:0]. This would be similar to Figure 144-15.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5** *P* **161** *L* **3** # 308

Lynskey, Eric Broadcom

Comment Type **E** *Comment Status* **X**

This is the only page in the draft that uses the term off-line ONU. The term, unregistered, is used more frequently.

SuggestedRemedy

Replace off-line with unregistered on lines 3, 4, and 27.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5** *P* **161** *L* **15** # 307

Lynskey, Eric Broadcom

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

The statement about aborting the registration attempt should be from the point of view of receiving the new SYNC_PATTERN_MPCPDU.

SuggestedRemedy

If a SYNC_PATTERN_MPCPDU is received prior to the transmission of a REGISTER_REQ MPCPDU of an ONU responding to a previous discovery window…

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5** *P* **161** *L* **28** # 406

Kramer, Glen Broadcom

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

"Discovery windows are unique in that they are the only times when multiple ONUs can access the PON simultaneously, and transmission overlap can occur."

This statement is not true in multi-channel PON.

SuggestedRemedy

Change the sentence to
"Discovery windows are unique in that they are the only times when multiple ONUs can access the same upstream channel simultaneously, and transmission overlap can occur."

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5** *P* **161** *L* **50** # 407

Kramer, Glen Broadcom

Comment Type **E** *Comment Status* **X**

"bonding" should be "binding" in the following sentences:

"Upon receipt of a valid REGISTER_REQ MPCPDU, the OLT registers the ONU, allocating and assigning two new port identities (PLID and MLID), and bonding them to corresponding MACs in the OLT."

"It is the responsibility of Layer Management to perform the MAC bonding, and start transmission from/to the newly registered ONU."

SuggestedRemedy

Replace "bonding" with "binding"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5** *P* **161** *L* **54** # 309

Lynskey, Eric Broadcom

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

The final sentence that carries over to the next page is incorrect. The OLT no longer sends laser on/off back to the ONU.

SuggestedRemedy

Delete the final sentence on page 161 beginning with, "The OLT also…"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5** *P* **162** *L* **4** # 408

Kramer, Glen Broadcom

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

There are several problems with the following sentence:

"The OLT at that time has enough information to schedule the ONU for access to the PON and transmits a standard GATE MPCPDU allowing the ONU to transmit a REGISTER_ACK MPCPDU."

1) Not clear at what time the OLT has the information.
2) "transmits a standad GATE" implies that 802.3ca standard will also describe a non-standard GATE.

SuggestedRemedy

Change the sentence to

"After processing the REGISTER_REQ MPCPDU received from a given ONU, the OLT has enough information to schedule that ONU for access to the PON. The OLT transmits a GATE MPCPDU allowing the ONU to transmit a REGISTER_ACK MPCPDU."

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5.1** *P* **164** *L* **15** # 310

Lynskey, Eric Broadcom

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

Does a constant need a default value?

SuggestedRemedy

Remove "default value".

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.5.1** *P* **164** *L* **29** # 311

Lynskey, Eric Broadcom

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

A constant shouldn't have an unknown value.

SuggestedRemedy

Move GRANT_MARGIN to 144.3.5.3 Variables.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.6.3** *P* **170** *L* **54** # 291

Hajduczenia, Marek Charter Communicatio

Comment Type **E** *Comment Status* **X**

Missing link in red

SuggestedRemedy

Given that the only location were envelope descritptor is defined is the same subclause, see Env structure, te reference is not needed.
Change "(see 144.x.x.x)" to (see Env variable)"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.3.6.8.** *P* **172** *L* **39** # 396

Kramer, Glen Broadcom

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

In Figure 144-22, "=" shall be "<=". The originally accepted state diagram had the correct symbol.

SuggestedRemedy

Replace "MsgGate.StartTime - LocalTime = MPCP_PROCESS_DLY"
with
"MsgGate.StartTime - LocalTime <= MPCP_PROCESS_DLY"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.1.1** *P* **177** *L* **9** # 314

Lynskey, Eric Broadcom

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

It doesn't seem quite right to have the ONU send a unicast CC_RESPONSE. In 144.4.2, it says the destination address of the CCPDU can have either the multicast address or a unicast address associated with a PLID. It seems that the ONU should be able to use the multicast DA here.

SuggestedRemedy

Remove "unicast" in all five instances of "sends a unicast CC_RESPONSE".

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.2** *P* **178** *L* **54** # 312

Lynskey, Eric Broadcom

Comment Type **E** *Comment Status* **X**

There is no subclause 144.6.2.

SuggestedRemedy

Looking at previous EPON standards, it is likely supposed to be a reference to the empty 144.1.2.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.3** *P* **181** *L* **35** # 389

Kramer, Glen Broadcom

Comment Type **E** *Comment Status* **X**

Missing "n" in "Chanel"

SuggestedRemedy

Change to "Channel"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.3.1** *P* **182** *L* **7** # 397

Kramer, Glen Broadcom

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

No units are needed for CCP_TIMEOUT, since this interval applies to a timer, not a counter. We do not specify time resolution units for timers.

SuggestedRemedy

Strike ",expressed in units of EQT."

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.3.1** *P* **182** *L* **11** # 317

Lynskey, Eric Broadcom

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

Setting a 100ms timeout and retry limit of 3 appears to be taking control away from the client. In the current draft, the client could immediately issue the same CCP message again after 300ms.

SuggestedRemedy

Delete these two constants.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.3.3** *P* **184** *L* **7** # 399

Kramer, Glen Broadcom

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

No return value is needed in the definition of function UpdateChState(int chIndex, int NewState)

SuggestedRemedy

Delete "int4"

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.3.6** *P* **185** *L* **1** # 318

Lynskey, Eric Broadcom

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

In a different comment, I suggested removing the timeout and retry limits. If that is accepted, changes will also be needed in figure 144-29.

SuggestedRemedy

Remove all state transitions leaving FORWARD_REQUEST. Add a new UCT transition from FORWARD_REQUEST to WAIT_FOR_CCPDU. Also remove the CcpRetry action in WAIT_FOR_CCPDU.

Proposed Response *Response Status* **O**

Cl **144** *SC* **144.4.3.6** *P* **186** *L* **8** # 315

Lynskey, Eric Broadcom

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

There is no enforced priority if the MCSR and MCII happen at the same time.

SuggestedRemedy

Change so that MCII(MsgChRequest) has priority when leaving WAIT_FOR_CCPDU and FORWARD_CC_REQUEST states.

Proposed Response *Response Status* **O**

Cl **Abstrac** *SC* **Abstract** *P* **2** *L* **1** # 329

Powell, William Nokia

Comment Type **E** *Comment Status* **X**

extends operation

SuggestedRemedy

extends the operation

Proposed Response *Response Status* **O**