Cl **FM** *SC* **FM** *P* **1** *L* **2** # 151

Grow, Robert — RMG Consulting

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

IEEE Std 802.3-2022 is both approved and published.

SuggestedRemedy

Change all instances of 802.3-202x to 802.3-2022 (headers and draft text).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 1

Cl **FM** *SC* **FM** *P* **1** *L* **10** # 152

Grow, Robert — RMG Consulting

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

I think P802.3cw is currently identified as Amendment 8.

SuggestedRemedy

Fill in assigned amendment number.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** *SC* **FM** *P* **1** *L* **23** # 21

Marris, Arthur — Cadence Design Systems

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

Change 802.3-202x to 802.3-2022 and correct list of amendments

SuggestedRemedy

Change to "This draft is an amendment of IEEE Std 802.3-2022 as amended by IEEE Std 802.3dd-2022, IEEE Std 802.3cs-202x, IEEE Std 802.3db-202x, IEEE Std 802.3ck-202x, IEEE Std 802.3de-202x, IEEE Std 802.3cx-202x, and IEEE Std 802.3cz-202x."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Make the amendment order consistent with the order prescribed by the Working Group chair and update their descriptions as required. See response to comment 1. With editorial license.

Cl **FM** *SC* **FM** *P* **1** *L* **25** # 153

Grow, Robert — RMG Consulting

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

List of amendments is not current. IEEE Std 802.3dd-2022 is approved and can be referenced by year; and cs, db, ck, and de are all at RevCom and depending on when your D2.1 is produced might also be able to be listed with approval year of 2022. Amendment 6 is cx, Amendment 7 is cz.

SuggestedRemedy

Update list order and years as appropriate. Make the same edits to the list of amendments in the introduction starting on page 10.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** *SC* **FM** *P* **1** *L* **25** # 1

Hajduczenia, Marek — Charter Communications

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

"IEEE Std 802.3-202x" is no lomnger correct - we know it will be 2022 release

SuggestedRemedy

Change all dated references to 802.3 from 202x to 2022

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **FM** *SC* **FM** *P* **2** *L* **3** # 410

Dawe, Piers — Nvidia

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

for operation over DWDM systems - not. Figure 156-1 has it right: "PMD FOR DWDM CHANNEL OVER A DWDM BLACK LINK"

SuggestedRemedy

Change "for operation over DWDM systems" to "for DWDM operation"

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The name of the task force is "IEEE P802.3cw 400 Gb/s over DWDM Systems Task Force".

Cl **FM** *SC* **FM** *P* **3** *L* **18** # 154

Grow, Robert — RMG Consulting

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

This is not the current mandatory front matter. Because it contains legal disclaimers and notices it should be current.

SuggestedRemedy

Replace mandatory frontmatter with that in the current IEEE SA templates.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **FM** *SC* **FM** *P* **7** *L* **18** # 155

Grow, Robert — RMG Consulting

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

The P802.3cw ballot group is now inown, and can be inserted so participants can review their names for proper presentation.

SuggestedRemedy

Populate list with the P802.3cw ballot group (removing the officer names already listed in lines 5 through 16.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **FM** *SC* **FM** *P* **10** *L* **34** # 22

Marris, Arthur — Cadence Design Systems

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

Section 9 goes up Clause 160

SuggestedRemedy

Change to "Section Nine—Includes Clause 141 through Clause 160 and Annex 142A through Annex 154A. Clause 141 through Clause 144 and associated annexes specify symmetric and asymmetric operation of Ethernet passive optical networks over multiple 25 Gb/s channels. Clause 145 and associated annexes specify increased power delivery using all four pairs in the structured wiring plant. Clause 146 through Clause 149 and associated annexes specify Physical Layers for 10 Mb/s, 2.5 Gb/s, 5 Gb/s, and 10 Gb/s operation over a single balanced pair of conductors. Clause 150 and Clause 151 include additional 400 Gb/s Physical Layer specifications. Clause 153 and Clause 154 specify 100 Gb/s operation over DWDM channels. Clause 157 through Clause 160 include 10 Gb/s, 25 Gb/s, and 50 Gb/s bidirectional Physical Layer specifications."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **FM** *SC* **FM** *P* **10** *L* **44** # 373

Wienckowski, Natalie — General Motors

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

802.3dd has been approved

SuggestedRemedy

Change: IEEE Std 802.3dd(TM)-202x
To: IEEE Std 802.3dd(TM)-2022

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #21.

Cl **FM** *SC* **FM** *P* **11** *L* **3** # 368

Wienckowski, Natalie — General Motors

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

The expansion for PMA is physical medium attachment per 802.3-2022 1.5.

SuggestedRemedy

Change: Physical Media Attachment (PMA)
To: Physical Medium Attachment (PMA)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **FM** *SC* **FM** *P* **11** *L* **20** # 156

Grow, Robert — RMG Consulting

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

P802.3cx is no longer designated as Amendment 5.

SuggestedRemedy

Renumber and move to Amendment 6. P802.3de/D3.1 has been submitted to Revcom as Amendment 5. Reorder and number IEEE Std 802.3de-202x (or 2022 if approved).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** SC **FM** P **11** L **21** # 23

Marris, Arthur — Cadence Design Systems

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

Swap cx and de and add cz

SuggestedRemedy

Make 802.3de amendment 5 and 802.3cx amendment 6.. Add amendment 7 for "IEEE Std 802.3cz -202x Amendment 7 - This amendment to IEEE Std 802.3-2022 adds physical layer specifications and management parameters for 2.5 Gb/s, 5 Gb/s, 10 Gb/s, 25 Gb/s and 50 Gb/s operation on optical fiber for use in automotive applications."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** SC **FM** P **11** L **30** # 369

Wienckowski, Natalie — General Motors

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

The description of cx doesn't match D3.0 of P802.3cx.

SuggestedRemedy

Change: transmit and receive path delays
To: transmit and receive path data delays

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **FM** SC **FM** P **11** L **32** # 157

Grow, Robert — RMG Consulting

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

P802.3cz has been designated Amendment 7.

SuggestedRemedy

Insert self description from the current P802.3cz draft (D2.3 soon to be released, with D3.0 expected following September interim).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** SC **FM** P **11** L **32** # 370

Wienckowski, Natalie — General Motors

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

Missing ammendment 7

SuggestedRemedy

Add: IEEE Std 802.3cz™-202x
Amendment 7—This amendment includes changes to IEEE Std 802.3-2022 and adds Clause 166. This amendment adds 2.5 Gb/s, 5 Gb/s, 10 Gb/s, 25 Gb/s and 50 Gb/s Physical Layer specifications and management parameters for optical automotive Ethernet.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** SC **FM** P **11** L **33** # 158

Grow, Robert — RMG Consulting

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

I believe P802.3cw has been designated Amendment 8.

SuggestedRemedy

Number based on current designations from the WG Chair.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** SC **FM** P **11** L **35** # 371

Wienckowski, Natalie — General Motors

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

cw is ammendment 8

SuggestedRemedy

Change: Ammendment x
To: Ammendment 8

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

Cl **FM** SC **FM** P **11** L **37** # 411

Dawe, Piers
Nvidia

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

for operation over DWDM systems - not. Figure 156-1 has it right: "PMD FOR DWDM CHANNEL OVER A DWDM BLACK LINK"

SuggestedRemedy

Change "for operation over DWDM systems" to "for DWDM operation".
This should match the abstract on page 2.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

See response to comment 410

Cl **00** SC **0** P L # 582

Dawe, Piers
Nvidia

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

8 could be p = 4, 8, or 16 as in Figure 120A-8. Or just 4

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **00** SC **0** P L # 372

Wienckowski, Natalie
General Motors

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

802.3 has been approved

SuggestedRemedy

Change: IEEE Std 802.3-202x
To: IEEE Std 802.3-2022
throughout the document

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 1

Cl **00** SC **0** P **1** L **2** # 34

Ran, Adee
Cisco

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

P802.3 was approved as a revision standard by the IEEE SA Standards Board on 13 May 2022.

P802.3dd was approved as a new standard by the IEEE SA Standards Board on 16 June 2022.

SuggestedRemedy

Change "IEEE Std 802.3™-202x" to "IEEE Std 802.3™-2022" in the page header.

Change "IEEE Std 802.3dd-202x" to "IEEE Std 802.3dd-2022" on line 25.

Apply in other places across the document as appropriate, with editorial license.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comments 1 and 21

Cl **1** SC **1.4.144b** P **18** L **9** # 170

D'Ambrosia, John
Fuuturewei, US Subsidiary of Huawei

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

As the 400GBASE-ZR PHY uses the 400GBASE-ZR PCS, and is the only device that uses it - there is no family. Furhtermore, while it leverages the 400GBASE-R PCS, it is not really 400GBASE-R encoded.

SuggestedRemedy

Delete 1.4.144b

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **1** *SC* **1.4.144b** *P* **18** *L* **9** # 347

Zimmerman, George — CME Consulting/APL Group, Cisco, Commscope, Ma

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

The term 400GBASE-Z seems to only once in the specification, and there is no description of the "family" described in this definition. Further, based on where it is used appears to be in error. I only find it in connection with Figure 155-2 (page 35) in the sentence "A functional block diagram of the 400GBASE-Z PCS sublayer is shown in Figure 155-2". The figure itself calls this the 400GBASE-ZR PCS, and 400GBASE-ZR is used everywhere else. Suggest this definition may be left over from some earlier thought...

SuggestedRemedy

Delete 1.4.144b definition. Alternatively, add text to the draft (likely 155) explaining the general family and its members…

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **1** *SC* **1.4.144b** *P* **18** *L* **9** # 413

Dawe, Piers — Nvidia

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

"family of Physical Layer devices" is misleading, as there would be only one member, based on this draft. Also it's unnecessary: any future 400GBASE-Z project could add the word at the time when the facts change.

SuggestedRemedy

Delete "family of"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **1** *SC* **1.4.144b** *P* **18** *L* **9** # 412

Dawe, Piers — Nvidia

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

"using 400GBASE-R encoding" doesn't represent what's in this draft: the BASE-R encoded signal is transported, but what is actually used is GMP, SC-FEC, SD-FEC, DP-16QAM and coherent transmission and detection. But we would call any 80 km-capable PHY "Z" anyway, whatever coding technology it used. The definitions for BASE-H, T, E, L, S don't discuss coding, they adress medium, reach or wavelength.

SuggestedRemedy

Change to:
1.4.144b 400GBASE-Z: IEEE 802.3 family of Physical Layer devices with reach up to at least 80 km on single-mode optical fiber. (See IEEE Std 802.3, Clause 156.)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **1** *SC* **1.4.144c** *P* **18** *L* **12** # 171

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The 400GBASE-ZR PHY is not encoded with the 400GBASE-R PCS.

SuggestedRemedy

Modify definition to
IEEE 802.3 Physical Layer specification for 400 Gb/s dense wavelength division multiplexing (DWDM) PHY using 400GBASE-ZR encoding, dual polarization 16-state quadrature amplitude
modulation (DP-16QAM) modulation, and coherent detection with reach up to at least 80 km. (See IEEE
Std 802.3, Clause 155 and Clause 156.)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **1** *SC* **1.4.144c** *P* **18** *L* **13** # 414

Dawe, Piers Nvidia

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

Defining this PHY as "using 400GBASE-R encoding ... DP-16QAM, and coherent detection" is highly misleading. The BASE-R encoded signal is transported, but what is actually used is GMP, SC-FEC, SD-FEC DP-16QAM and coherent transmission and detection. Although it is debatable whether GMP is useful, or just included because it's there. In a short definition we need to say something about the GMP and FEC becuase neither are BASE-R, but we don't need the detail.

SuggestedRemedy

Change "using 400GBASE-R encoding, dual polarization 16-state quadrature amplitude modulation (DP-16QAM) modulation, and coherent detection" to "using 400GBASE-R encoding, GMP, strong FEC , dual polarization 16-state quadrature amplitude modulation (DP-16QAM) modulation, and coherent optical signalling"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **1** *SC* **1.5** *P* **18** *L* **21** # 339

Zimmerman, George CME Consulting/APL Group, Cisco, Commscope, Ma

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

ADC is already used in IEEE Std 802.3 and is a well understood term. See later comments about use in this draft as well...

SuggestedRemedy

delete inserted abbreviation

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **1** *SC* **1.5** *P* **18** *L* **23** # 340

Zimmerman, George CME Consulting/APL Group, Cisco, Commscope, Ma

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

DAC is already used in IEEE Std 802.3 and is a well understood term. This is only used in a figure, and without expansion in the draft.

SuggestedRemedy

delete inserted abbreviation

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **1** *SC* **1.5** *P* **18** *L* **24** # 415

Dawe, Piers Nvidia

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

As the base 802.3 uses PAM2, PAM4, PAM5, PAM16, DSQ128, QAM8, QAM16 and QAM128

SuggestedRemedy

Change 16QAM to QAM16 and DP-16QAM to DP-QAM16 throughout

Proposed Response *Response Status* **W**

PROPOSED REJECT.

16QAM or DP-16QAM is the industry standard naming for optical coherent transmission

Cl **1** *SC* **1.5** *P* **18** *L* **30** # 149

Lusted, Kent Intel Corporation

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

The term "GMP" is used 42 times in the draft and is not listed in the abbreviation table.
The term "GMP" is loosely defined in 155.1.3 item c as "Generic mapping procedure".
GMP is described in 155.2.4.3 (p38, line 8) but not formally defined

SuggestedRemedy

Add "GMP: generic mapping procedure" to the entries.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

"GMP" is included in 1.5 of IEEE Std 802.3-2022

Cl **1** *SC* **1.5** *P* **18** *L* **30** # 148

Lusted, Kent Intel Corporation

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

The term "SC-FEC" is used 59 times in the draft and is not listed in the abbreviation table.
Cl 155.1.2 defines SC-FEC to mean "staircase forward error correction".

SuggestedRemedy

Add "SC-FEC: staircase forward error correction" to the entries.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

"SC-FEC" is included in 1.5 of IEEE Std 802.3-2022

Cl **30** *SC* **30.5.1.1.2** *P* **19** *L* **12** # 196

Huber, Thomas — Nokia

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

The values of aMAUType are alphabetized by rate in 802.3-2022. 400GBASE-ZR should be inserted after 400GBASE-VR4 that 802.3db added.

SuggestedRemedy

Change SR16 to VR4 in the editing instruction

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change editing instruction to "Insert 400GBASE-ZR PHY type into the “APPROPRIATE SYNTAX” section of 30.5.1.1.2 after 400GBASE-VR4 (as inserted by IEEE Std 802.3db-202x) as follows"

Cl **30** *SC* **30.5.1.1.2** *P* **19** *L* **17** # 24

Marris, Arthur — Cadence Design Systems

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

MAU type needs to mention the medium

SuggestedRemedy

Change to "400GBASE-ZR PCS/PMA over single-mode fiber PMD with reach up to at least 80 km as specified in Clause 156"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

As noted in 156.1 the medium is stated as a single-mode fiber-based dense wavelength division multiplexing (DWDM) channel which may contain one or more optical amplifiers and is specified using a black link approach (see 156.6). Change to "400GBASE-ZR PCS/PMA over a DWDM channel PMD with reach up to at least 80 km as specified in Clause 156".

Cl **45** *SC* **45.2.1** *P* **20** *L* **14** # 374

Wienckowski, Natalie — General Motors

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

syle

SuggestedRemedy

Add an elipses in the first blank row in Tagle 45-3. Delet the blank row after the row for 1.825 through 1.899.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.1.9** *P* **21** *L* **32** # 159

Grow, Robert — RMG Consulting

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

Incorrect subclause number.

SuggestedRemedy

Change to 45.2.1.22

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.1.22.13** *P* **22** *L* **1** # 25

Marris, Arthur — Cadence Design Systems

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

Needs to reference modification made by 802.3db and change paragraph number to 45.2.1.22.1aa

SuggestedRemedy

Change editig instruction to: "Insert new subclause 45.2.1.22.1aa after 45.2.1.22.1 and before 45.2.1.22.1a (as inserted by IEEE Std 802.3db-2022) as follows:"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change editing instruction to "Insert new subclause 45.2.1.22.1c after 45.2.1.22.1b (as inserted by IEEE Std 802.3db-2022) as follows:"

Cl **45** *SC* **45.2.1.22.13** *P* **22** *L* **1** # 160

Grow, Robert — RMG Consulting

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

Incorrect insert point, subclauses are in decreasing register bit number order.

SuggestedRemedy

Insert new subclause 45.2.1.22.1c after 45.2.1.22.1b (as inserted by IEEE Std 802.3db-202x) as follows:
Renumber subclause as 45.2.1.22.1.c.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 25

Cl **45** *SC* **45.2.1.1150** *P* **22** *L* **15** # 375

Wienckowski, Natalie — General Motors

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

typo 154.6 is not a proper Table number.

SuggestedRemedy

Change: 154.6
To: 154-5

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **45** *SC* **45.2.1.150.1** *P* **22** *L* **11** # 161

Grow, Robert — RMG Consulting

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

The subclause title for this subclause number and the following text is: Tx optical channel index (1.800.5:0)

SuggestedRemedy

Correct title as in 802.3-2022.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change subclause title to "Tx optical channel index (1.800.5:0)"

Cl **45** *SC* **45.2.1.150.1** *P* **22** *L* **17** # 416

Dawe, Piers — Nvidia

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

It would help to point out that these the channel plans differ in more ways than that one has more channels than the other.

SuggestedRemedy

Maybe NOTE--These two tables are significantly different?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The referenced tables provide the information necessary to understand how they are different.

Cl **45** *SC* **45.2.1.153.1a** *P* **23** *L* **4** # 221

Law, David — Hewlett Packard Enterprise

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

Subclause 45.2.1.153.1a 'Tx index ability 48 through 63 (1.804.0 through 1.804.15)' says that 'Bits 1.804.1 through 1.804.15 indicate the equivalent for index values 48 through 63, respectively.'. Bit 1.804.1 is Tx index ability 49, not Tx index ability 48 (see page 23, line 23).

SuggestedRemedy

Suggest that the text '... for index values 48 through 63 ...' should read '... for index values 49 through 63 ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 198

Cl **45** *SC* **45.2.1.153.1a** *P* **23** *L* **31** # 376

Wienckowski, Natalie — General Motors

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

45.2.1.153.1a is not being placed under 45.2.1.153.1 in the base spec, it should be under 45.2.1.153a in this spec.

SuggestedRemedy

Change: 45.2.1.153.1a
To: 45.2.153a.1
Also in the instructions on P22L19.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 162

Cl **45** *SC* **45.2.1.153.1a** *P* **23** *L* **35** # 198

Huber, Thomas — Nokia

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

The index value associated with bit 1.804.1 should be 49 rather than 48

SuggestedRemedy

Change
"Bits 1.804.1 through 1.804.15 indicate the equivalent for for index values 48 through 63, respectively."
to
"Bits 1.804.1 through 1.804.15 indicate the equivalent for for index values 49 through 63, respectively."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The index values of 48 to 63 are correct which continue from Table 45-122 in IEEE Std 802.3-2022 which contain values 32 to 47. In the third sentence change "Bits 1.804.1 through 1.804.15 indicate" to "Bits 1.804.0 through 1.804.15 indicate"

Cl **45** *SC* **45.2.1.153.1a** *P* **23** *L* **37** # 222

Law, David — Hewlett Packard Enterprise

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

Subclause 45.2.1.153.1a 'Tx index ability 48 through 63 (1.804.0 through 1.804.15)' includes the text 'For 400GBASE-ZR see Table 156–4.' at the end of the subclause. Similarly, subclause 45.2.1.157a 'Rx optical frequency ability 4 register (Register 1.824)' includes the text 'For 400GBASE-ZR see Table 156–4.' at the end of the subclause. Since Tx index ability 0 through 47 and Rx index ability 0 through 47 will now also apply to 400GBASE-ZR, as well as 100GBASE-ZR, suggest that similar text be added to the end of subclauses 45.2.1.151.1 through 45.2.1.157.1.

SuggestedRemedy

Suggest changes to subclauses 45.2.1.151.1 through 45.2.1.157 be added to the draft. These changes should change the text at the end of these existing subclauses that reads 'For 100GBASE-ZR see Table 154–5.' to read 'For 100GBASE-ZR see Table 154–5, for 400GBASE-ZR see Table 154–5.'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In 45.2.1.151.1, 152.1, 153.1, 155.1, 156.1, and 157.1 change the last sentence from "For 100GBASE-ZR see Table 154–5." to "For 100GBASE-ZR see Table 154–5 and for 400GBASE-ZR see Table 156–4." In 45.2.1.150.1 add a new last sentence "For 400GBASE-ZR the specific optical frequency corresponding to each channel index number is listed in Table 156–4." In 45.2.1.154.1 add a new second to last sentence "For 400GBASE-ZR the specific optical frequency corresponding to each channel index number is listed in Table 156–4." With editorial license.

Cl **45** *SC* **45.2.1.153a** *P* **22** *L* **19** # 162

Grow, Robert — RMG Consulting

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

Insert point is after the subclauses of 45.2.1.153.

SuggestedRemedy

Insert 45.2.1.153a and 45.2.1.153.1a after 45.2.1.153.1 as follows:

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change editing instruction to "Insert 45.2.1.153a after 45.2.1.153.1 as follows" and add new editing instruction to "Insert 45.2.1.153a.1 after 45.2.1.153a as follows"

Cl **45** *SC* **45.2.1.153a** *P* **22** *L* **19** # 197

Huber, Thomas — Nokia

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

The numbering of the subclauses in the editing instruction is not consistent with the style guide. The subclause underneath new subclause 45.2.1.153a should be numbered as .1 rather than 1a.

SuggestedRemedy

Change 45.2.1.153.1a to 45.2.1.153a.1

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 162

Cl **45** *SC* **45.2.1.157.1a** *P* **24** *L* **1** # 377

Wienckowski, Natalie — General Motors

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

45.2.1.157.1a is not being placed under 45.2.1.157.1 in the base spec, it should be under 45.2.1.157a in this spec.

SuggestedRemedy

Change: 45.2.1.157.1a
To: 45.2.157a.1
Also in the instructions on P24L3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 163

Cl **45** *SC* **45.2.1.157a** *P* **22** *L* **19** # 163

Grow, Robert — RMG Consulting

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

Insert point is after the subclauses of 45.2.1.157.

SuggestedRemedy

Insert 45.2.1.157a and 45.2.1.157.1a after 45.2.1.157.1 as follows:

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change editing instruction to "Insert 45.2.1.1573a after 45.2.1.157.1 as follows" and add new editing instruction to "Insert 45.2.1.157a.1 after 45.2.1.157a as follows"

Cl **45** *SC* **45.2.1.157a** *P* **24** *L* **19** # 199

Huber, Thomas — Nokia

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

The numbering of the subclauses in the editing instruction is not consistent with the style guide. The subclause underneath new subclause 45.2.1.157a should be numbered as .1 rather than 1a.

SuggestedRemedy

Change 45.2.1.157.1a to 45.2.1.157a.1

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 163

Cl **78** *SC* **78** *P* **26** *L* **1** # 35

Ran, Adee — Cisco

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

802.3cw does not have an objective to support EEE.

The usage of EEE in current high-speed Ethernet applications is practically non-existent. Therefore there is no need to list new PHYs as supporting EEE, nor to add LPI specific features to new PCSs that are added for these PHYs. Having optional features that are never used is a burden for readers and implementers.

SuggestedRemedy

Remove clause 78 from this amendment.

Remove the "O" in the 400GBASE-ZR row for EEE in Table 116-5.

Delete all registers and functions related to EEE or LPI from the PCS specifications in clause 155.

Implement additional changes as necessary with editorial license.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **78** *SC* **78.1.4** *P* **26** *L* **16** # 172

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

EEE Clauses point to the respective PCS, PMA, and PMD sublayers of the PHY.
Clause 118 is an extender sublayer but the DTE/ PHY XS sublayers, which are essentially PCS functions. So it may be ok to leave - but this has never been done before.
Clause 120 is not part of the 400GBASE-ZR stack.

SuggestedRemedy

Change entry in Clause field to:
155, 156

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.3** *P* **27** *L* **22** # 417

Dawe, Piers — Nvidia

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

As in an earlier comment: just saying "using 400GBASE-R encoding" is highly misleading. This PHY and its coding is very different to normal BASE-R.

SuggestedRemedy

Either, change "using 400GBASE-R encoding" to "using 400GBASE-R encoding, GMP, strong FEC, dual polarization DP-16QAM, and coherent optical signalling",
or delete "using 400GBASE-R encoding". People can follow the link to Clause 156 to find out more.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.3** *P* **27** *L* **22** # 418

Dawe, Piers — Nvidia

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

All normal BASE-R PHYs use the same Clause 120 PMA, so it has not been mentioned in this table up to now. This one is different.

SuggestedRemedy

Change "(see Clause 156)" to "(see Clause 155 and Clause 156)"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.3** *P* **27** *L* **22** # 419

Dawe, Piers — Nvidia

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

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

SuggestedRemedy

I can think of three options:
Redo Clause 155, leaving out GMP and FAW and simplifying the training sequence and pilot sequence to make an Ethernet PHY;
Cancel this project, and encourage those interested to feed their learnings into OIF's "400ZR" maintenance;
Rename this PHY to 400GBASE-ZW, which is more honest and leaves the "400GBASE-ZR" name available to any future native Ethernet PHY, should the broad market potential be found.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.3** *P* **27** *L* **22** # 173

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The 400GBASE-ZR PHY leverages the 400GBASE-R PCS, but is not really 400GBASE-R encoded.

SuggestedRemedy

modify description entry of Table 116-2 to:
400 Gb/s PHY using 400GBASE-ZR encoding capable of transmission over a specified channel on a defined DWDM grid in each direction of transmission with reach up to at least 80 km (see Clause 155 and Clause 156)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.4** *P* **28** *L* **8** # 4

Brown, Matt — Huawei

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

This table is wider than the defined margins. It would be better to create a new table for 400GBASE-Z optical PHYs. Note that 400GBASE-ZR is part of the family of physical layer devices called 400GBASE-Z as defined in 1.4.144b.

SuggestedRemedy

Change title of Table 116-5 to "PHY type and clause correlation (400GBASE-R optical)" with appropriate editorial instruction and change formating. Insert new Table 116-x "PHY type and clause correlation (400GBASE-Z optical)" and include the row for 400GBASE-ZR as provided in Table 116-5 in D2.0 with only the necessary columns.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.4** *P* **28** *L* **10** # 36

Ran, Adee — Cisco

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

Table 116-5 has been changed in 802.3db to have one column group for clause 167 (with its two PHYs).

Also, the table ruling should be cleaned up.

SuggestedRemedy

Align the columns with 802.3db D3.2 and apply formatting as required to match the original table structure.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.4** *P* **28** *L* **10** # 164

Grow, Robert — RMG Consulting

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

Base text is not correct. P802.3db/D3.2 inserted two columns under clause 167 (400GBASE-SR4 PMD is missing). The column is also missing from P802.3ck/D3.3

SuggestedRemedy

Add column for 400GBASE-SR4 PMD under Clause 157 as found in the latest version of P802.3db (or if approved or published IEEE Std 802.3db).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.4** *P* **28** *L* **42** # 175

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

While the 400GMII Extender is optional, it may only be used above the 400GBASE-ZR PHY, and not within the PHY itself.

SuggestedRemedy

Add note C to entry for Clause 118.
Note C - The 400GMII Extender SHALL only be used between the RS and 400GBASE-ZR PCS.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.4** *P* **28** *L* **42** # 174

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The table notes the following clauses as optional - 119, 120, 120B, 120C, 120D, 120E, 120F, and 120G. These layers are not directly used as part of the 400GBASE-ZR PHY, but are inferred through the use of the 400GMII Extender.

SuggestedRemedy

Make entries for the following clauses blank: 119, 120, 120B, 120C, 120D, 120E, 120F, and 120G..

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.1.4** *P* **28** *L* **43** # 223

Law, David — Hewlett Packard Enterprise

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

Subclause 155.2.4.11 'Hamming SD-FEC encoder' says that 'The 128-bit code words are sent as 8-bit symbols to the 400GBASE-ZR PMA sublayer on the PMA:IS_UNITDATA_0.request to PMA:IS_UNITDATA_7.request inter-sublayer signals.'. Further, subclause 155.2.5.1 'Hamming SD-FEC decoder' says 'The incoming DP-16QAM symbols are digitized to an m-bit resolution by the PMA sublayer receive direction (see 155.3.3.5) and provided to the PCS receive direction by PMA:IS_UNITDATA_0.indication to PMA:IS_UNITDATA_m–1.indication inter-sublayer signals.' and that 'The Hamming SD-FEC decoder is a soft decision decoder and so requires a higher resolution than 2 bits / 4 levels for each of the signals XI, XQ, YI, and YQ.'. Finally, Figure 155-10 '400GBASE-ZR PMA functional block diagram' says 'm is implementation dependent and is the number of bits of resolution of the DP-16QAM symbols.'

Rather than operating as n parallel asynchronous PCS lanes that carry alignment markers and lane numbers that enable the original data to be restored or n lanes to be multiplex into m lanes, it appears the 400GBASE-ZR PMA service interface between the PCS and the PMA operates as an n-bit synchronous data path, transferring a single DP-16QAM symbol during each operation. This seems to be confirmed by subclause 155.2.4.3 'GMP mapper' that says '... 400GBASE-ZR frames are not mapped to 16 PCS lanes ...'. In the case of the transmit path, the DP-16QAM symbols are encoded as 8-bit words, 2 bits representing the 4 levels for each of the in-phase and quadrature components of the X and Y polarizations. In the case of the receive path, the DP-16QAM symbols are encoded as p bits representing q levels, where p and q are implementation dependant.

This all seems to preclude the physical instantiation of the 400GBASE-ZR PMA service interface between the PCS and the PMA as a 400GAUI. This is because [1] the PMA service interface doesn't support alignment markers and lane numbers allowing multiplexing and de-multiplexing to different widths; [2] the PMA service interface width on the receive path is implementation dependant; and [3] the PMA service interface operates as a synchronous data path, transferring a single DP-16QAM symbol during each operation, requiring a skew between the bits of less than one 400GBASE-ZR frame DP-16QAM symbol time (~17.3 ps) which I don't believe a 400GAUI would meeting. This seems to be confirmed by the one example given in annexe 120A.6 'Partitioning example supporting 400GBASE-ZR' which only shows a 400GAUI 'above' the 400GBASE-ZR PCS, and not 'below'.

Based on the above, add footnotes to the 'O's in the 400GAUI columns of the 400GBASE-ZR row in Table 116–5 to note the 400GAUI is only supported 'above' the 400GBASE-ZR PCS.

SuggestedRemedy

Add a footnote to the 'O's in the 400GAUI columns of the 400GBASE-ZR row in Table 116–5 that reads '400GAUI only supported as a physical instantiation of the 400GMII Extender (see 118.1.3).'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.3** *P* **28** *L* **53** # 5

Brown, Matt — Huawei

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

The 400GBASE-ZR is part of the family of physical layer devices called 400GBASE-Z as defined in 1.4.144b, not 400GBASE-R. The editorial changes in 116.2.3 are therefore incorrect.

SuggestedRemedy

Rather than changing the first paragraph, add the following new paragraph at the end of 116.2.3: "The term 400GBASE-Z refers to a specific family of Physical Layer devices using 400GBASE-R encoding, a combination of phase and amplitude modulation, and coherent detection. The 400GBASE-ZR PCS defined in Clause 155 performs encoding of data from the 400GMII, applies FEC, and transfers the encoded data to the PMA."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.3** *P* **29** *L* **1** # 176

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The changes to the base text are incorrect as 400GBASE-ZR is not a member of 400GBASE-R family.

SuggestedRemedy

Delete noted text in 802.3cw D2.0 116.2.3
recommended text will be provided in a follow-up presentation.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.3** *P* **29** *L* **2** # 420

Dawe, Piers — Nvidia

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

This says "The term 400GBASE-R refers to a specific family of Physical Layer implementations based upon the 64B/66B coding method specified in Clause 119 or Clause 155 and the PMA specifications defined in Clause 120 or Clause 155." But these are two distinctly different "families".

SuggestedRemedy

Revert this text and add a separate paragraph introducing 400GBASE-W

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.3** *P* **29** *L* **6** # 421

Dawe, Piers — Nvidia

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

This paragraph summarizing the PCS needs a new sentence specifically for the Clause 155 PCS, which does clock domain translation and uses a concatenated FEC scheme, neither part of which is a BASE-R FEC

SuggestedRemedy

Add new sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.4** *P* **29** *L* **10** # 177

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The changes to the base text are incorrect as 400GBASE-ZR is not a member of 400GBASE-R family.

SuggestedRemedy

Delete noted text in 802.3cw D2.0 116.2.4
recommended text will be provided in a follow-up presentation.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.4** *P* **29** *L* **12** # 200

Huber, Thomas — Nokia

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

P802.3cw is introducing a second PMA for 400GBASE-R. While the text "all 400GBASE-R PMAs other than 400GBASE-ZR are specified in clause 120" is correct, it also implies that there are many 400GBASE-R PMAs besides the one in clause 155, which is not the case.

SuggestedRemedy

Change the first sentence to read "The 200GBASE-R PMA and 400GBASE-R PMA for PHYs other than 400GBASE-ZR are specified in Clause 120."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.4** *P* **29** *L* **12** # 422

Dawe, Piers — Nvidia

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

"all 400GBASE-R PMAs other than 400GBASE-ZR" is making my point that this is not a type R PMA.

SuggestedRemedy

Add a new sentence to the first paragraph explaining what the Clause 155 PMA does - it's different (including, no loopback).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.4** *P* **29** *L* **12** # 6

Brown, Matt — Huawei

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

The 400GBASE-ZR is not a 400GBASE-R PMA, but rather a 400GBASE-Z PMA as defined in 1.4.144b. The editorial changes in 116.2.3 are therefore incorrect.

SuggestedRemedy

Change the editorial instructions to modify the content of 116.2.4 as follows.
Make the first sentence of the first paragraph a paragraph of its own.
Merge the second paragraph with the previous paragraph.
Add a new paragraph at the end of 116.2.4 as follows:
"The 400GBASE-ZR PMA, which is a 400GBASE-Z PMA, is defined in Clause 155."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.5** *P* **29** *L* **18** # 178

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The changes to the base text are incorrect as 400GBASE-ZR is not a member of 400GBASE-R family.

SuggestedRemedy

Delete noted text in 802.3cw D2.0 116.2.5
recommended text will be provided in a follow-up presentation.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.2.5** *P* **29** *L* **19** # 7

Brown, Matt — Huawei

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

The 400GBASE-ZR is not a 400GBASE-R PMD, but rather a 400GBASE-Z PMD as defined in 1.4.144b. The editorial changes in 116.2.3 are therefore incorrect.

SuggestedRemedy

Change the editorial instructions to modify the contents of 116.2.5 as follows:
Add the following sentence: "The 400GBASE-ZR PMD, which is a 400GBASE-Z PMD, and its corresponding media is specified in Clause 156."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.4** *P* **29** *L* **27** # 8

Brown, Matt — Huawei

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

In the editorial instruction, statement "unchanged rows not shown" is incorrect since the two rows shown are inserted, not changed.

SuggestedRemedy

Change "unchanged rows not shown" to "some unchanged rows not shown".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **116** *SC* **116.4** *P* **29** *L* **30** # 179

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

As noted, 400GBASE-ZR is not a member of 400GBASE-R. It is also noted that per 1.4.215, the bit time is the reciprocal of the bit rate.

SuggestedRemedy

Modify beginning of notes a and b to
For 400GBASE-R and 400GBASE-ZR

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.4** *P* **29** *L* **35** # 183

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

Note a and b for Table 116-7 only provide respective defiintions for 400GBASE-R.

SuggestedRemedy

Modify notes to provide definitions for 400GBASE-ZR.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.4** *P* **29** *L* **35** # 37

Ran, Adee — Cisco

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

4688 pause_quanta equals 2400256 bit times, not 2400000, and 6000.64 ns, not 6000. So either BT and ns column or pause_quanta column should be changed.

The precedence (e.g. in 153.2.2) is to use integer pause_quanta and whatever time/BT that result from it.

SuggestedRemedy

Change maximum in BT from 2400000 to 2400256 and maximum in ns from 6000 to 6000.64.

Also change in 155.6.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.5** *P* **30** *L* **9** # 195

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

400GBASE-ZR has no PCS lanes -

SuggestedRemedy

all of these notes need to remove any references to clause 156

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **116** *SC* **116.5** *P* **30** *L* **30** # 180

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

Upon further review it is not clear how Table 116-8 actually ties into 400GBASE-ZR:
The skew variation is tied to 400GBASE-R - 3RD column
- Unclear that there are PCS lanes in 400GBASE-ZR
- Both Fig 1164 and 116-5 are relevant to 400GBASE-ZR and these are not the same service interfaces that are defined for 400GBASE-ZR

SuggestedRemedy

Presentation to be provided to address topic.
Proposed remedy at this time -
1. Delete Table 116-8 in P802.3cw - not relevant.to 400GBASE-ZR
2. Create new skew constratint table
3. A skew points diagram for 400GBASE-ZR is neeeded.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **119** *SC* **119** *P* **31** *L* **1** # 165

Grow, Robert — RMG Consulting

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

The strikethrough text does not appear in the published IEEE Std 802.3-2022 standard.

SuggestedRemedy

Delete Clause 119 from the draft.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **119** *SC* **119** *P* **31** *L* **1** # 201

Huber, Thomas — Nokia

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

The change indicated to be made to the NOTE in 119.2.5.7 has already been made in 802.3-2022

SuggestedRemedy

Remove clause 119 (and all subclauses)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 165

Cl **120A** *SC* **120A.6** *P* **103** *L* **8** # 2

Hajduczenia, Marek — Charter Communications

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

Text of the editorial instruction should be bolded and italics

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120A** *SC* **120A.6** *P* **103** *L* **30** # 3

Hajduczenia, Marek — Charter Communications

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

Missing space between "400GXS" and "="

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **120A** *SC* **120A.6** *P* **103** *L* **43** # 581

Dawe, Piers — Nvidia

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

two 400GMII and 400GAUI-8 interfaces

SuggestedRemedy

Only one 400GAUI-8 interface

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.1** *P* **32** *L* **3** # 126

Nicholl, Gary — Cisco Systems

Comment Type **TR** *Comment Status* **D** *PMA description*

This is a single clause that covers both the PCS and PMA sublayers. Section 155.1 includes a summary of the PCS functions (in section 155.1.3). For consistency with previous standards I think this section should also include a summary of the PMA functions.

SuggestedRemedy

Add a new sub-section after 155.1.3 and before 155.1.4, to include a summary of the PMA functions.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.1** *P* **32** *L* **10** # 9

Brown, Matt — Huawei

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

PHY name breaks across two rows.

SuggestedRemedy

In 400GBASE-ZR change hyphen to non-breaking hyphen ([ESC],[-],[h]).
Same for "DP-16QAM" on line 18.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.1** *P* **32** *L* **10** # 125

Nicholl, Gary — Cisco Systems

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

Use non-breaking hypen for "400GBASE-ZR"

SuggestedRemedy

Use non-breaking hypen for "400GBASE-ZR" throughtout document..

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.1** *P* **32** *L* **14** # 26

Marris, Arthur — Cadence Design Systems

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

Missing space

SuggestedRemedy

Change "characters.The" to "characters. The"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.1** *P* **32** *L* **14** # 423

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **D** *PCS description*

"The 64B/66B code is transcoded to 256B/257B encoding to reduce the overhead before the addition of forward error correction (FEC)": that's what true 400GBASE-R does. This is different.

SuggestedRemedy

before clock domain translation, addition of a CRC, the addition of forward error correction (FEC) and SC-FEC, scrambling, interleaving and a second FEC

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.1** *P* **32** *L* **17** # 169

Maguire, Valerie — Copperopolis

Comment Type **T** *Comment Status* **D** *PCS description*

The QAM naming convention in the 802.3-2022 document employs a hyphen between the number of states and QAM (e.g, 16-QAM). See 45.2.1.208.3 for an example reference.

SuggestedRemedy

Globally replace "16QAM" with "16-QAM" and "DP-16QAM" with "DP-16-QAM".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.2** *P* **32** *L* **29** # 38

Ran, Adee — Cisco

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

Clause 119 is included in this amendment.

SuggestedRemedy

Make "Clause 119" an active cross reference.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.2** *P* **32** *L* **30** # 39

Ran, Adee — Cisco

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

Superfluous comma before "and"

SuggestedRemedy

Delete the comma

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.2** *P* **32** *L* **30** # 378

Wienckowski, Natalie — General Motors

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

A comma is not needed after "and" when it is a list of only 2 items.

SuggestedRemedy

Change: staircase forward error correction (SC-FEC), and soft decision forward error correction
To: staircase forward error correction (SC-FEC) and soft decision forward error correction

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.2** *P* **32** *L* **30** # 186

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

SC-FEC is used throughout the draft, but is not detailed in 1.5

SuggestedRemedy

add abbreviation SD-FEC - staircase forward error correction

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add to the list of abbreviations in 1.5 and entry for:
SC-FEC staircase forward error correction

Cl **155** *SC* **155.1.2** *P* **33** *L* **18** # 181

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

See Figure 155-1. The bottom of the stack should include a label that is the PMD. Reference Figure 124-1 for a similar diagram.

SuggestedRemedy

Add 400GBASE-ZR under the box labeled "MEDIUM" . Reference Figure 124-1 for a similar diagram.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.3** *P* **33** *L* **36** # 379

Wienckowski, Natalie — General Motors

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

wording

SuggestedRemedy

Change: Transcoding from 66-bit blocks to (from) 257-bit blocks.
To: Transcoding of 66-bit blocks to (from) 257-bit blocks.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.3** *P* **33** *L* **40** # 127

Nicholl, Gary — Cisco Systems

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

Item d on the list references to "ITU-T G.709 Annex D". Is this a publically available document ?

SuggestedRemedy

This is just a question for clarification.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
G.709 is already in the list of normative references at 1.3. The latest version, including Annex D is available at:

https://www.itu.int/rec/T-REC-G.709/en

Cl **155** *SC* **155.1.3** *P* **33** *L* **42** # 128

Nicholl, Gary — Cisco Systems

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

Item e) and f) mention SC-FEC, but there is no definiton of "SC-FEC" in the definitions section (1.4).

SuggestedRemedy

Add a definition for "SC-FEC" into section 1.4 (unless it was added by a previous project).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See resolution to comment #186, which adds SC-FEC to the list of abbreviations at 1.5.
Also note that G.709.2 is a normative reference at 1.3.

Add a definition at 1.4:
"1.4.xxx SC-FEC: Forward error correction using 512 x 510 staircase codes as defined in ITU-T G.709.2 Annex A."

Cl **155** *SC* **155.1.4** *P* **33** *L* **49** # 129

Nicholl, Gary — Cisco Systems

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

This section is under "overview" and is titled "Inter-sublayer interfaces" . However it only mentions the inter-sublayer interfaces above and below the PCS. Shouldn't this section also cover the PMA inter-sublayer interfaces ?

SuggestedRemedy

Add a description of the PMA inter-sublayer interfaces to this section.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.4** *P* **33** *L* **52** # 182

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

When using an Extender, the PCS is connecting to the 400GMII in theory. This sentence does not express this -
Optionally the upper interface may connect to a 400GMII Extender, defined in Clause 118, which then
connects to the Reconciliation Sublayer.

SuggestedRemedy

Delete noted sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.4** *P* **34** *L* **2** # 424

Dawe, Piers — Nvidia

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

8 x 59.84375 x (28/29) ...

SuggestedRemedy

use multiplication sign as elsewhere

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.4** *P* **34** *L* **2** # 425

Dawe, Piers — Nvidia

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

Giving an encoded rate in "Gb/s" is confusing because that's how we express MAC rates.

SuggestedRemedy

Something like:
The 400GBASE-ZR PCS has a nominal transfer rate rate at the 8-wide PMA service interface of 59.84375 x (28/29) Gtransfers/s +/- 20 ppm for a total of ~462.2414 Gtransfers/s.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.4** *P* **34** *L* **2** # 41

Ran, Adee — Cisco

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

The letter x should be replaced by the multiplication sign ? (twice)

SuggestedRemedy

Change per comment, and apply across the draft (search for "x" as a whole word)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.4** *P* **34** *L* **2** # 42

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **D** *PCS description*

The "rate" of the PCS output has been defined as per-lane transfer rate in previous PCS clauses, not as the aggregate bit rate as defined here.
Consistency is preferable.

SuggestedRemedy

Change to the per-lane rate (59.84375 ? 28/29 Gb/s on each of 8 PCS lanes).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"The 400GBASE-ZR PCS has a nominal rate at the PMA service interface of 8 x 59.84375 x (28/29) Gb/s +/- 20 ppm (~462.2414 Gb/s)"
to
"The 400GBASE-ZR PCS has a nominal rate per lane at the PMA service interface of 59.84375 x (28/29) Gb/s (~57.780172 Gb/s)"

Cl **155** *SC* **155.1.4** *P* **34** *L* **2** # 40

Ran, Adee Cisco

Comment Type **T** *Comment Status* **D** *PCS description*

The nominal rate is a specific number, and should not include range (in ppm).

Also in 155.3.2.

SuggestedRemedy

Either delete "+/- 20 ppm" or delete "nominal", in both subclauses.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

At 155.1.4, delete +/- 20 ppm.
At 155.3.2, delete +/- 20 ppm in two places.

Cl **155** *SC* **155.1.4.2** *P* **32** *L* **15** # 27

Marris, Arthur Cadence Design Systems

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

Missing word "The"

SuggestedRemedy

Change to "The PMA service interface"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.4.2** *P* **34** *L* **15** # 184

D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

Missing word "The" at beginning of first sentence.

SuggestedRemedy

add "The" at the beginning of the sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.4.2** *P* **34** *L* **15** # 380

Wienckowski, Natalie General Motors

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

wording

SuggestedRemedy

Change: PMA service interface
To: The PMA service interface

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.4.2** *P* **34** *L* **16** # 185

D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

The inclusion of the word FEC in this sentence implies that the only encoding is FEC - The PMA Service Interface supports the exchange of FEC encoded data between the PCS and PMA sublayer.
There is also the 64B/66B encoding.

SuggestedRemedy

delete the word FEC.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.4.2** *P* **34** *L* **17** # 381

Wienckowski, Natalie General Motors

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

grammar, you are talking about 2 sublayers, not 1 sublayer.

SuggestedRemedy

Change: between the PCS and PMA sublayer.
To: between the PCS and PMA sublayers.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.4.2** *P* **34** *L* **17** # 187

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

Comment Type **TR** *Comment Status* **D** *cross references*

Stated sentence - The PMA service interface is defined in 155.3
The link for 155.3 does not go to a PMA service interface sub clause.

SuggestedRemedy

Pointer should be to 155.3.2.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.5** *P* **35** *L* **1** # 427

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **D** *PCS description*

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

SuggestedRemedy

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

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The suggested remedy does not propose specific changes to the draft.

Cl **155** *SC* **155.1.5** *P* **35** *L* **3** # 130

Nicholl, Gary — Cisco Systems

Comment Type **TR** *Comment Status* **D** *Block diagrams*

Figure 155-2 is only a functional block diagram of the PCS. However section 155.1 is an overview for both the PCS and PMA sub-layers, so I think the functional block diagram should include both layers.

SuggestedRemedy

Either update Figure 155-2 to include the PMA functions, or add a separate functional block diagram of the 400BASE-ZR PMA.

Another option would be delete section 155.1.5, and include the functional block diagrams of the PCS and the PMA under sections 155.2 and 155.3 respectively.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.5** *P* **35** *L* **3** # 10

Brown, Matt — Huawei

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

"400GBASE-Z" should be "400GBASE-ZR".

SuggestedRemedy

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

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.1.5** *P* **35** *L* **13** # 426

Dawe, Piers — Nvidia

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

Transcode

SuggestedRemedy

transcode
Scrub the figures for capitals that should not be there.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.1.5** *P* **35** *L* **25** # 428

Dawe, Piers — Nvidia

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

"SC-FEC adapt & encoding", "SC-FEC decoding & adapt" - it would help to know that there is interleaving here as well as below.

SuggestedRemedy

"SC-FEC adapt, encoding and interleaving", "SC-FEC de-interleving, decoding & adapt" ?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change text in transmit direction from:
"SC-FEC adapt & encoding"
to
"SC-FEC adapt, encoding & interleaving"
Change text in receive direction from:
"SC-FEC decoding & adapt"
to
"SC-FEC de-interleaving, decoding & adapt"

Cl **155** *SC* **155.1.5** *P* **35** *L* **43** # 429

Dawe, Piers — Nvidia

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

"PMA:IS_UNITDATA_m-1.indication": the "m" in one direction only is not usual (so it looks like a leftover from Clause 119 where two widths are possible, but for a known and different reason), and not explained until much later in the document

SuggestedRemedy

Add an informative NOTE saying why it's m-1 not 7, and referring to the appropriate subclause.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add a note to Figure 155-2:
"The PMA service interface in the receive direction has a variable width of "m" where m > 8, and is implementation dependent. This is because the Hamming decoder is a soft-decision decoder and needs higher precision than the 8 bits in the transmit direction. See 155.3.3.8."

Cl **155** *SC* **155.1.5** *P* **55** *L* **3** # 338

Zimmerman, George — CME Consulting/APL Group, Cisco, Commscope, Ma

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

The sentence says 400GBASE-Z PCS sublayer, but the figure is labeled and used as the 400GBASE-ZR PCS sublayer (also the "R" generally is used to refer to the BASE-R encoding used here.)

SuggestedRemedy

change 155.1.5, page 34 line 3, to "400GBASE-ZR PCS sublayer" to agree with the figure

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.1** *P* **36** *L* **6** # 43

Ran, Adee — Cisco

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

The sentence "The PCS . can operate in nromal mode or in test-pattern mode" is out of place in the first paragraph. These modes are only discussed in the third paragraph.

SuggestedRemedy

Move the last sentence of the first paragraph to a separate paragraph before the current third paragraph.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.1** *P* **36** *L* **7** # 44

Ran, Adee — Cisco

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

Line 5 says "PCS Transmit and PCS Receive processes", but then in lines 7,17, and 27 it is "transmit channel", and line 35 "receive channel".
"channel" is an overloaded term, it is not defined in this clause and its other meanings are quite different.

SuggestedRemedy

Change "transmit channel" to "Transmit process", 3 times. Change "receive channel" to "Receive function".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.1** *P* **36** *L* **12** # 188

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

The following is stated -
When communicating with the PMA in the transmit direction, the 400GBASE-ZR PCS provides eight digital lanes, which the PMA encodes into two streams of 16QAM symbols.

What are eight digital lanes? Isn't this just the PMA Service Interface

SuggestedRemedy

Reword
Transmit data-units are sent to the PMA service interfacee via the PMA:IS_UNITDATA_i.request primitive. The PMA then encodes the data into two streams of 16QAM symbols.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.1** *P* **36** *L* **13** # 202

Huber, Thomas — Nokia

Comment Type **TR** *Comment Status* **D** *PCS description*

There is inconsistency wording between Figure 155-2 (which shows m lanes in the receive direction between the PMA and PCS), the text in 155.2.1 (which indicates two streams of m-bit symbols), and text in 155.2.5.1 and in 155.3 2 (both of (which reference DP-16QAM symbols digitized to m-bit resolution).

SuggestedRemedy

Change
"When communicating with the PMA in the receive direction, the 400GBASE-ZR PCS receives two streams of digitally encoded m-bit 16QAM symbols."
to
"When communicating with the PMA in the receive direction, the 400GBASE-ZR PCS receives digitally encoded m-bit DP-16QAM symbols."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.1** *P* **36** *L* **14** # 430

Dawe, Piers — Nvidia

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

"receives two streams of digitally encoded m-bit 16QAM symbols" we need an explanation of why "m-bit".

SuggestedRemedy

Add sentence explaining that m is an implementation choice, for SD-FEC.

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The proposed response to comment 429 adds a note to Figure 155-2 explaining why the PMA service interface is m lanes wide in the receive direction, and pointing to 155.3.3.8. It seems unecessary to add an explanatory sentence everywhere that m-bits is used in the document.

Cl **155** *SC* **155.2.1** *P* **36** *L* **20** # 45

Ran, Adee — Cisco

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

Missing space between "20" and the unit "ppm".

SuggestedRemedy

Insert a space.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.1** *P* **36** *L* **20** # 16

Gorshe, Steve — Microchip Technology

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

The current text refers to "the +/- 100ppm 257-bit blocks" Blocks don't have a frequency or ppm offset in and of themselves. Rather it is the block stream that has a rate with associate frequency tolerance.

SuggestedRemedy

In this paragraph and any other occurances, references to the frequency or frequency offset of "blocks" should be changed to "block stream"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"The transcoded blocks are then mapped into a 400GBASE-ZR frame using GMP, with the ?100 ppm 257-bit blocks being mapped into a ?20ppm timing domain."
to
"The transcoded blocks have a frequency tolerance of +/- 100 ppm and are mapped into a 400GBASE-ZR frame with a frequency tolerance of +/- 20 ppm, using GMP."

Cl **155** *SC* **155.2.1** *P* **36** *L* **20** # 431

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *GMP mapper*

Is 20 ppm necessary or useful? 100GEL introduced 50, and considering the raw BER, this is a very noisy signal. There is spare space in the GMP wrapper.

SuggestedRemedy

If GMP is kept, consider changing 20 nearer to 50

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The comment and suggested remedy do not propose a specific change to the draft.

Cl **155** *SC* **155.2.1** *P* **36** *L* **21** # 432

Dawe, Piers — Nvidia

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

Markers

SuggestedRemedy

markers

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.1** *P* **36** *L* **22** # 190

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

Comment Type **TR** *Comment Status* **D** *PCS description*

This line has inner and outer FEC codes reversed -
The transmit data is encoded with a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer Hamming code SD-FEC.

SuggestedRemedy

Modify noted sentence -
The transmit data is encoded
with a concatenated forward error correction (CFEC) code consisting of an outer SC-FEC code and an inner
Hamming code SD-FEC.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See the response to comment 20.

Cl **155** *SC* **155.2.1** *P* **36** *L* **22** # 434

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *PCS description*

As interleavers are a significant feature of this scheme

SuggestedRemedy

Mention the interleavers in the transmit direction. (There is one mention in the receive direction.)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Note the proposed response to comment 20, which is included in this proposed response.
Change:
"The transmit data is encoded with a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer Hamming code SD-FEC."
to
"The transmit data is encoded with a concatenated forward error correction (CFEC) code consisting of an outer SC-FEC code and an inner Hamming code SD-FEC. Between the SC-FEC output and the SD-FEC input, there is a scrambler followed by a convolutional interleaver."

Cl **155** *SC* **155.2.1** *P* **36** *L* **22** # 433

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *PCS description*

"transmit data is encoded with a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer Hamming code SD-FEC": this is intuitive but not the accepted (Forney's) use of inner and outer.

SuggestedRemedy

transmit data is encoded with a concatenated forward error correction (CFEC) code consisting of an outer SC-FEC code and an inner Hamming code SD-FEC

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See the response to comment 20.

Cl **155** *SC* **155.2.1** *P* **36** *L* **22** # 20

Gustlin, Mark — Cisco

Comment Type **TR** *Comment Status* **D** *pcs description*

The use of inner and outer FEC codes seems to be backwards when compared to industry standards.Two industry books on FEC are: Error control coding (Shu Lin/Daniel Costello) and Error Control Coding (Peter Sweeney), both refere to the first code in a concatenation as the outer, and the 2nd code in a concatenation as the inner. This makes sense when you look at a diagram of the FEC codes, though it does not make sense when looking at the locaiton of the cods in the concatenation.

SuggestedRemedy

Reverse the usage to: "an outer SC-FEC code" and "an inner Hamming code SD-FEC"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"...consisting of an inner SC-FEC code and an outer Hamming code SD-FEC."
to
"...consisting of an outer SC-FEC code and an inner Hamming code SD-FEC."

Cl **155** *SC* **155.2.1** *P* **36** *L* **25** # 131

Nicholl, Gary — Cisco Systems

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

"Transmit data-units are sent to the service interface via the PMA:IS_UNITDATA_i.request primitive." I presume when we say "service interface here" we are referring to the PMA service interface and not the PCS service interface ?

SuggestedRemedy

Change
From:
"Transmit data-units are sent to the service interface via the PMA:IS_UNITDATA_i.request primitive."
To:
"Transmit data-units are sent to the PMA service interface via the PMA:IS_UNITDATA_i.request primitive."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.1** *P* **36** *L* **29** # 46

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **D** *pcs description*

The scrambled idle pattern defined in 119.2.4.9 cannot be used here as is, because the PCS processes are different.

SuggestedRemedy

Add a new subclause based on 119.2.4.9 but specific to this clause, and refer to it instead.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

A contribution with the proposed test pattern is needed.

Cl **155** *SC* **155.2.1** *P* **36** *L* **31** # 435

Dawe, Piers — Nvidia

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

Suddenly talking about receiver without warning - hard to understand at first.

SuggestedRemedy

Insert "in the receive direction,"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.1** *P* **36** *L* **32** # 436

Dawe, Piers — Nvidia

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

PCS Synchronization process

SuggestedRemedy

PCS synchronization process ?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.1** *P* **36** *L* **35** # 28

Marris, Arthur — Cadence Design Systems

Comment Type **T** *Comment Status* **D** *pcs description*

Should this be "128 bit"?

SuggestedRemedy

Consider changing "128-symbol" to "128 bit symbol". Similar issue with "119-symbol" on line 37.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"...decodes a stream of 128-symbol codewords."
to
"...decodes a stream of 128-bit codewords."

Change:
"...the resulting 119-symbol codewords."
to
"...the resulting 119-bit codewords."

Cl **155** *SC* **155.2.1** *P* **36** *L* **35** # 437

Dawe, Piers — Nvidia

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

PCS Receive process

SuggestedRemedy

PCS Receive function or PCS receive process

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change "Receive process" to "receive process"

Cl **155** SC **155.2.1** P **36** L **38** # 47

Ran, Adee Cisco

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

"SC-FEC blocks of 510 ? 512"
I assume is it the number of bits (otherwise, what is it?)

SuggestedRemedy

Add "bits" after "510 ? 512".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.1** P **36** L **38** # 439

Dawe, Piers Nvidia

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

SC-FEC blocks

SuggestedRemedy

SC-FEC codewords (as on line 39)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.1** P **36** L **38** # 438

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **D** *PCS description*

SC-FEC blocks of 510 x 512

SuggestedRemedy

whats? bits? bytes?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"...blocks of 510 ? 512 are."
to
"...blocks of 510 ? 512 bits are."

Cl **155** SC **155.2.1** P **36** L **40** # 224

Law, David Hewlett Packard Enterprise

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

The terms 'overhead fields' (page 36, line 40) and 'OH fields' (page 38, line 46), 'OH bytes' (page 38, line 2) then 'OH blocks' on the next line, and 'GMP overhead' (page 38, line 12), seem to be used interchangeable.

SuggestedRemedy

Please use a consistent term, 'overhead field' seems to be the most common.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

At item 3 of the list in 155.2.4.3, change: "carry OH bytes" to "carries the overhead field"

At the last sentence of the 3rd paragraph of 155.2.4.3, change:
"details of the encoding of the GMP overhead"
to
"details of the encoding of the GMP justification control bytes that are carried in the 400GBASE-ZR frame's overhead field"

At 155.2.4.4, change:
"The AM, pad and OH fields are"
to
"The AM, pad and overhead fields are"

Cl **155** SC **155.2.1** P **36** L **41** # 29

Marris, Arthur Cadence Design Systems

Comment Type **T** *Comment Status* **D** *pcs description*

Is "frame" the correct word to use here?

SuggestedRemedy

Consider changing "each 400GBASE-ZR frame" to "each 400GBASE-ZR PCS lane" or define what "frame" means in this context. Perhaps add a link to Figure 155-3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"The PCS then removes the alignment markers and overhead fields from each 400GBASE-ZR frame and passes the data to the GMP de-mapper."
to
"The PCS then removes the alignment marker, pad and overhead fields from the received data and passes the remaining payload bits, shown in Figure 155-3, to the GMP de-mapper."

Cl **155** *SC* **155.2.1** *P* **36** *L* **43** # 48

Ran, Adee Cisco

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

"257B blocks" is inconsistent with "257-bit blocks" used earlier. "B" is not used to denote bits elsewhere (except as abbrevations in coding scheme names).

Similarly "66b", "120b", and other instances in this draft.

SuggestedRemedy

Change "257B" to "257-bit" across the draft except where it is part of "256B/257B".

Similarly, change "66b" to "66-bit" in 155.2.2, "120b" to "120-bit" in 155.2.4.3, and similar instances as necessary.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4** *P* **37** *L* **8** # 225

Law, David Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **D** *PCS description*

The only 'shall' statement regarding the PCS transmit path (155.2.4) is in subclause 155.2.4.9 'Frame synchronous scrambler', similarly the only 'shall' statement regarding the PCS receive path (155.2.5) is in subclause 155.2.5.3 'Descrambler' and 155.2.5.6 'CRC32 check and error marking'. Mandatory PCS transmit requirements, mandatory PCS receive requirements and other mandatory requirements need to be covered by 'shall' statements.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
A contribution is needed to list where PCS mandatory requirements are described.

Cl **155** *SC* **155.2.4** *P* **37** *L* **8** # 132

Nicholl, Gary Cisco Systems

Comment Type **T** *Comment Status* **D** *PCS description*

It is not clear to me from reading the descriptions as to how the 400GBASE-ZR base frame (Figure 155-3), 400GBASE-ZR OH frame (Figure 155-4) and the SC-FEC frame (Figure 155-5) are related and aligned ?

SuggestedRemedy

Add a description or diagram to indicate how the various frame structures described in the comment are related and aligned (if indeed they are aligned).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

A contribution with the suggested diagram and description is needed.

Cl **155** *SC* **155.2.4.1** *P* **37** *L* **12** # 203

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **D** *PCS description*

The two paragraphs of 155.2.4.1 jump back and forth between 66b and 257b blocks in a way that could confuse a reader who is unfamiliar with the details of the clause 119 PCS.

SuggestedRemedy

Rewrite the text as follows:
The transmit PCS generates 66-bit blocks based upon the TXD<63:0> and <TXC<7:0> signals received from the 400GMII, as specified in the transmit state diagram showni n Figure 119-14. One 400GMII data transfer is encoded into one 66-bit block. The contents of each block are contained in a vector tx_coded<65:0>, which is passed to the 64B/66B to 256B/257B transcoder. tx_coded<1:0> contains the sync header and the remainder of the bits contain the block payload. The rate matching described in 119.2.4.1 is not required for the 400GBASE-ZR PCS because the mapping of the transcoded block stream into the 400GBASE-ZR frame structure performs clock compensation between the two clock domains.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Replace the text at 155.2.4.1 with:
"The transmit PCS generates 66-bit blocks based upon the TXD<63:0> and TXC<7:0> signals received from the 400GMII, as specified in the transmit state diagram shown in Figure 119-14. One 400GMII data transfer is encoded into one 66-bit block. The contents of each block are contained in a vector tx_coded<65:0>, which is passed to the 64B/66B to 256B/257B transcoder. tx_coded<1:0> contains the sync header and the remainder of the bits contain the block payload. The rate matching described in 119.2.4.1 is not required for the 400GBASE-ZR PCS because the mapping of the transcoded block stream into the 400GBASE-ZR frame structure performs clock compensation between the two clock domains."

Cl **155** *SC* **155.2.4.3** *P* **37** *L* **29** # 226

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **D** *GMP mapper*

Subclause 155.2.4.3 'GMP mapper' says that 'The GMP mapper inserts the serialized stream of 257B blocks into the payload area of a 400GBASE-ZR frame.' and that 'The frame is illustrated as a structure with 256 rows of 10 280 bits with a logical transmission order of left to right, top to bottom.'. This seems to imply that the stream of 257B blocks is inserted into one 400GBASE-ZR frame at a time.

Subclause 155.2.4.3 however then says that 'The Payload area of a four-frame multi-frame is divided into 10 220 GMP words of 4 x 257 = 1028 bits.' and that 'Each 1028-bit GMP word is either filled with data (the logically serialized 257B encoded stream produced according to 155.2.4.2) ...'. This seems to imply that the 257B blocks are inserted into four 400GBASE-ZR frames, that form a single multi-frame, at a time.

Subclause '155.2.4.6 CRC32 and multi-block alignment signal (MBAS) insertion' then says 'The stream of 400GBASE-ZR frames, illustrated in Figure 155-3, provide the input ...' seems to imply 400GBASE-ZR frames are formed one at a time, and does not reference multi-frames.

SuggestedRemedy

Clarify the definition of a multi-frame, potentially through a figure, how 257B blocks are mapped to it, and how it is mapped to the SC-FEC message.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
A contribution with proposed figure is needed.

257-bit blocks from the transcoder are grouped into 4x257=1028-bit GMP words. Because of the rate difference, between 10,214 and 10,218 plus between 6 and 2 stuffing words, for a total of 10,220 words are mapped into four 400GBASE-ZR frames along with the AM, pad and OH fields.

Cl **155** *SC* **155.2.4.3** *P* **37** *L* **29** # 440

Dawe, Piers — Nvidia

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

257B

SuggestedRemedy

257-bit, many places. Compare base doc. "256B/257B" can stay.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change 257B to 257-bit throughout, except for where used in "256B/257B".

Cl **155** *SC* **155.2.4.3** *P* **37** *L* **30** # 49

Ran, Adee — Cisco

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

"The frame is illustrated as a structure with 256 rows of 10 280 bits with a logical transmission order of left to right, top to bottom. This frame contains 5140 bits of overhead and 10 220 257B blocks of payload. This frame is illustrated in Figure 155-3"

The order should be clearly defined in the text, not just "illustrated" in a figure.

The text can be made shorter and clearer.

SuggestedRemedy

Change the quoted text to:
"The frame is a structure that contains 5140 bits of overhead followed by 10 220 257-bit blocks of payload. This frame is illustrated in Figure 155-3, with transmission order from top row to bottom row and from left to right within each row".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **37** *L* **31** # 392

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *257b blocks*

We traditionally refer to the 257b blocks as 257-bit blocks not 257B blocks (which could be inferred as 257 Byte)

SuggestedRemedy

Change the seven instances of 257B block to 257-bit block

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **37** *L* **44** # 441

Dawe, Piers — Nvidia

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

"Base Frame": undefined term not used elsewhere, rogue capitals

SuggestedRemedy

Change to "frame"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **37** *L* **49** # 442

Dawe, Piers — Nvidia

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

16 x 120b markers

SuggestedRemedy

120-bit

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **1** # 386

Slavick, Jeff — Broadcom

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

Section 155.2.4.5 defines/describes how the OH works

SuggestedRemedy

Change "discussed" to "described"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **1** # 30

Marris, Arthur — Cadence Design Systems

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

Define OH acronym as it is the first use in the Clause

SuggestedRemedy

Change "OH bytes" to "overhead (OH) bytes"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **2** # 204

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **D** *GMP mapper*

The description of the 20-bit pad says it is inserted after the OH blocks, but the OH is a 1280 bit field (which is later described as four chunks of 320 bits that are interleaved). Since much of the text talks about 66b blocks or 257 blocks, it is probably better to refer to the OH bits rather than blocks.

SuggestedRemedy

Change "A 20 bit pad of all zeros is added after the OH blocks" to "A 20 bit pad of all zeros is added after the 1280 OH bits."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **5** # 50

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **D** *GMP mapper*

"starting at column 5141 of row 0 and ending at column 10 280 of row 255, using GMP"

"column" has not been mentioned in preceding text. I assume a column is a bit, so there's no no need to use another term (and possibly create confusion, since in the related Clause 155 the columns denote octets).

The payload area ends simply at the end of the frame, so rows are not necessary either.

SuggestedRemedy

Change the quoted text to "from bit 5141 to the end of the frame, using GMP"

Change "column" to "bit" across this description.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **5** # 227

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *GMP mapper*

Subclause 155.2.4.3 says 'The 400GBASE-ZR PCS payload is mapped ...' however this is the only use of the term '400GBASE-ZR PCS payload' in the draft.

SuggestedRemedy

Suggest that the text 'The 400GBASE-ZR PCS payload is mapped ...' is changed to read 'The 400GBASE-ZR PCS payload of the serialized stream of 257B blocks is mapped ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **6** # 394

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *row and column numbering*

in item 5 it refes to the PCS payload beginning at column 5141 which would be true for a indexing that begins at 1, but Table 155-1 appears to use column indexing that begins with 0

SuggestedRemedy

Change "column 5141 or row 0 and ending at column 10 280 of row 255" to "column 5140 of row 0 and ending at collumn 10 279 of row 255".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **8** # 228

Law, David — Hewlett Packard Enterprise

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

The antepenultimate paragraph of subclause 155.2.4.3 'GMP mapper' seems to be an introduction to the GMP and would be better placed as the first paragraph.

SuggestedRemedy

Suggest that the antepenultimate paragraph of subclause 155.2.4.3 'GMP mapper' should be moved to be the first paragraph of subclause 155.2.4.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **11** # 205

Huber, Thomas — Nokia

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

Clause 9.4.3.2 of ITU-T G.709 does not discuss GMP. Since the GMP OH being used aligns with 400ZR, maybe it is better to point to 155.2.4.5.3 (which then points to the OIF 400ZR IA). ITU-T G.709 and G.709.x don't specifically discuss the GMP encoding that is used in 400ZR and 400GBASE-ZR

SuggestedRemedy

Change
The principles of the GMP mapper are described in ITU-T G.709 (06/2020) Annex D, with details of the encoding of the GMP overhead in ITU-T G.709 Clause 9.4.3.2.
to:
The principles of the GMP mapper are described in ITU-T G.709 (06/2020) Annex D. Details of the overhead encoding for 400GBASE-ZR are in 155.2.4.5.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **11** # 443

Dawe, Piers — Nvidia

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

ITU-T G.709 Clause 9.4.3.2

SuggestedRemedy

ITU-T G.709 Clause 19.4.3.2 ?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 205

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **11** # 393

Slavick, Jeff — Broadcom

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

I could not find a Clause 9.4.3.2 in ITU-T G.709 but I did find a 19.4.3.2 that talks about GMP

SuggestedRemedy

Change 9.4.3.2 to 19.4.3.2

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 205

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **12** # 229

Law, David — Hewlett Packard Enterprise

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

Subclause 155.2.4.3 'GMP mapper' says 'The principles of the GMP mapper ... with details of the encoding of the GMP overhead in ITU-T G.709 Clause 9.4.3.2.'. On review of ITU-T G.709/Y.1331 (06/2020) <https://www.itu.int/rec/recommendation.asp?lang=en&parent=T-REC-G.709-202006-I>, there doesn't seem to be a subclause 9.4.3.2. Perhaps the reference should have been to subclause 19.4.3.2 'Generic mapping procedure (GMP)' in ITU-T G.709, although that only seems to address the justification overhead bytes.

SuggestedRemedy

Correct the reference to the GMP overhead in ITU-T G.709.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 205

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **14** # 382

Wienckowski, Natalie — General Motors

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

Payload should not be capitalized.

SuggestedRemedy

Change:The Payload area
To: The payload area

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **15** # 150

Lusted, Kent — Intel Corporation

Comment Type **TR** *Comment Status* **D** *GMP mapper*

As a first time reader of this section, the term "stuff" and its use in this sub-clause is difficult to follow. It took me a while to understand what "stuff" was. In this case, I interpret "stuff" to mean non-data blocks or stuffing blocks. The last two paragraphs of the sub-clause could use wording improvements to make it clearer to the reader.

SuggestedRemedy

In the second to last paragraph, change:
"Each 1028-bit GMP word is either filled with data (the logically serialized 257B encoded stream produced
according to 155.2.4.2) or stuff, which is transmitted as zero and ignored on receipt."
to
"Each 1028-bit GMP word is either filled with data bits (the logically serialized 257B encoded stream produced
according to 155.2.4.2) or stuffing blocks, which is transmitted as zero and ignored on receipt."

In the last paragraph, change:
"While the GMP mechanism is generic, the particular clock rates and tolerances for this application result in
only five cases, allowing the positions of data and stuff to be pre-computed."
to
"While the GMP mechanism is generic, the particular clock rates and tolerances for this application result in
only five cases, allowing the positions of data blocks and stuffing blocks to be pre-computed."

Update title of Table 155-1 to:
"GMP stuffing block locations in 400GBASE-ZR frame"

In Table 155-1, change column header from:
"GMP word numbers of stuff
locations"
to
"GMP word numbers of stuffing block
locations"

In Table 155-1, change column header from:
"(row, column) of stuff location starting bits"
to
"(row, column) of stuffing block starting location"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **17** # 444

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *GMP mapper*

155.2.4.1 says "The rate matching described in 119.2.4.1 is not required", so the 257B encoded data can have a rate of 401.5625 Gb/s +/- 100 ppm, not 401.542892 Gb/s +/- 100 ppm

SuggestedRemedy

Change 401.5625 to 401.542892 mention both

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The suggested remedy is not clear.

The rate of 401.542892 is before insertion of the alignment marker block. Referring to Figure 119-8, the rate before AM insertion is: (163,832 / 163,840) x 401.5625 = 401.542892

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **18** # 445

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *GMP mapper*

The clock rate of the 400GBASE-ZR frame (GMP clock domain) is not given, although 155.1.4 gives the PMA service interface rate

SuggestedRemedy

Deffine the GMP rate in the PCS section

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

The GMP rate is a multiple of the line rate of 59.84375 GBd from Table 156-6. The presentation of the GMP rate requires a table showing the rate expansion between the GMP clock and the line clock.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **20** # 446

Dawe, Piers — Nvidia

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

~10 214.684 -eh?

SuggestedRemedy

Wow, this is hard to read! Spaces inside indivsible things such as numbers or variable names are bad!

Proposed Response *Response Status* **W**

PROPOSED REJECT.
The comment does not suggest a change to the draft.

The style manual, section 16.3.2 dictates the space between every 3rd digit for numbers with 5 or more digits.

Cl **155** *SC* **155.2.4.3** *P* **38** *L* **20** # 51

Ran, Adee — Cisco

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

The space as thousands separator in numbers with fractional digits is unusual and confusing.

Also the tilde prefix with numbers with three fractional digits seems unnecessary, especially since these numbers are then bounded by integer values.

SuggestedRemedy

Change "between ~10 214.684 and ~10 217.136" to "between 10 214 and 10 218".

Alternatively keep the fractions and delete the space separators.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "between ~10 214.684 and ~10 217.136" to "between 10 214 and 10 218"

Cl **155** SC **155.2.4.3** P **38** L **30** # 53

Ran, Adee Cisco

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

The "(row, column)" column seems redundant with the GMP word numbers. Also, "rows" is only used for illustration and "column" is not defined.

SuggestedRemedy

Consider deleting the third column. Otherwise, change "column" to "bit #".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Delete the 3rd column from Table 155-1.

Cl **155** SC **155.2.4.3** P **38** L **30** # 52

Ran, Adee Cisco

Comment Type **T** *Comment Status* **D** *GMP mapper*

It seems that the GMP word numbers start from 1 while the bits and rows start from 0.
If the starting index is inconsistent, it should at least be explicit.

SuggestedRemedy

Add "(starting from 1)" after "GMP word numbers".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change the heading of the 2nd column of Table 155-1 from
"GMP word numbers of stuff locations" to "GMP word numbers (starting from 1) of stuffing block locations"

See the response to comment 150.

Cl **155** SC **155.2.4.3** P **38** L **42** # 447

Dawe, Piers Nvidia

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

Blank line

SuggestedRemedy

Remove

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.3** P **39** L **6** # 54

Ran, Adee Cisco

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

"10 970 bit row aligned" - the number is part of a compound noun so a hyphen should be used. The separator is not helpful in this case.

SuggestedRemedy

Change to "10970-bit row aligned".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.3** P **39** L **7** # 55

Ran, Adee Cisco

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

"The AM field, containing am_mapped<1919:0> is transmitted LSB first, i.e. am_mapped<0> first, and am_mapped<1919> last"

This phrasing is awkward (am_mapped has already been defined in the first paragraph) and redundant.

SuggestedRemedy

Change to "The transmission order of am_mapped is from am_mapped<0> to am_mapped<1919>".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.4** P **38** L **46** # 206

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **D** *PCS description*

This text could be clarified. GMP is converting from the clock domain of the payload (stream of 257b blocks) to the clock domain of the 400GBASE-ZR frame. Presumably the payload blocks are already aligned to the payload clock.

SuggestedRemedy

Rewrite as follows: The AM, pad, and OH fields are populated after the GMP mapping process has rate-matched the 257B block stream to the payload area of the 400GBASE-ZR frame.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.4.1** *P* **38** *L* **50** # 387

Slavick, Jeff — Broadcom

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

The name of the section include 400GBASE-ZR, why? Cl119 uses "for 200GBASE-R" and "for 400GBASE-R" since it has two different methods done for the different rates. But this is only 1 rate clause and Clause 91 and 135 don't attach the rate to it's section heading

SuggestedRemedy

Remove "400GBASE-ZR" from the section title of 155.2.4.4.1 and 155.2.4.4.2

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.4.5** *P* **39** *L* **16** # 397

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *OH description*

The OH section of the 400GBASE-ZR frame is 1280 bits in size. This intro sentence states that OH is only a 40-byte is only 320 bits of data.

SuggestedRemedy

Remove 155.2.4.5.4 and update 155.2.4.5 as follows (retaining Figure 155-4):

155.2.4.5 Overhead (OH)

The 400GBASE-ZR frame contains a 1280-bit OH field. This field is logically composed of four 320- bit structures. The 40-byte overhead frame described in 155.2.4.5.1 is the first such 320-bit structure. The second, third, and fourth 320-bit structures are all zeros. The four 320-bit structures are 10-bit interleaved to form the 1280-bit overhead field.

155.2.4.5.1 40-byte overhead frame

The 40-byte overhead frame is a 40-byte frame structure that uses a four-frame multi-frame, as shown in Figure 155-4 and described in 155.2.4.5.1.1 through 155.2.4.5.1.3. The contents of the 40-byte overhead frame is dependent upon the two LSB bits of the MFAS (see 155.2.4.5.1.1)
155.2.4.5.1.1 Multi-frame alignment signal (MFAS)
The MFAS is in the first byte of the 40-byte overhead frame. It is a wrapping counter that is incremented each frame to provide a 256-frame multi-frame sequence as defined by ITU-T G.709.1 Clause 9.2.1.

Renumber 155.2.4.5.2 and 155.2.4.5.3 to 155.2.4.5.1.2 and 155.2.4.5.1.3 keeping the text unchanged for those sections.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Include the suggested remedy and apply editorial license for sub-clause numbers and accepted wording changes from other comments.

Cl **155** *SC* **155.2.4.5** *P* **39** *L* **16** # 56

Ran, Adee Cisco

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

"The 400GBASE-ZR overhead is a 40-byte frame structure that uses a four-frame multi-frame, as shown in Figure 155-4 "

There are 3 occurrences of "frame" in this sentence, it's unclear what they mean (especially with "400GBASE-ZR frame" also being defined; "frame" is an overly overloaded term).

Also, "byte" is not strictly defined in 802.3 and we typically use the more specific "octet" instead.

SuggestedRemedy

Change to "The 400GBASE-ZR overhead is a 160-octet block that is divided into four 40-octet frames, as shown in Figure 155-4".

Change "byte" to "octet" globally.

In 151.2.4.5.1, change "a 256-frame multi-frame sequence" to "a 256-frame sequence".

In 155.2.4.5.3 change "four-frame multi-frame" to "OH".

Change elsewhere as appropriate.
Implement with editorial license.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.1** *P* **38** *L* **38** # 189

D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

MFAS is not listed in abbreviations

SuggestedRemedy

Add to 1.5
MFAS Multi-frame alignment signal

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.1** *P* **39** *L* **40** # 58

Ran, Adee Cisco

Comment Type **T** *Comment Status* **D** *OH description*

I assume the MFAS is an 8-bit counter, but figure 155-4 shows only 2 bits. This can confuse readers.

SuggestedRemedy

Change "It is a wrapping counter that is incremented each frame" to "It is an auto-wrapping 8-bit counter that is incremented on each 40-octet frame within the OH block".

Proposed Response *Response Status* **W**

PROPOSED REJECT.
This needs more work to explain correctly.

The first 40 octets (320 bits) of Figure 155-4 are inserted into the OH field of a first 400GBASE-ZR frame. The second 40 octets are inserted into the next 400GBASE-ZR frame, and so on.

The suggested remedy sounds as though the four rows are going into the same OH field of a single 400GBASE-ZR frame.

Cl **155** *SC* **155.2.4.5.1** *P* **39** *L* **41** # 59

Ran, Adee Cisco

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

ITU-T G.709.1 seems to be a normative reference. It does not appear in the list in 1.3 (the ones that appear are G.709 and G.709.2; these are separate documents).

SuggestedRemedy

Add a reference in 1.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add an entry in 1.3 as follows:

ITU-T Recommendation G.709.1 - Flexible OTN short-reach interfaces

Cl **155** *SC* **155.2.4.5.1** *P* **39** *L* **41** # 448

Dawe, Piers — Nvidia

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

G.709.1 is not a normative reference

SuggestedRemedy

Remove GMP, define the 256-frame multi-frame sequence here, or add the reference

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 59.

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **32** # 390

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *Reserved bit*

Figure 155-4 shows the status field as having 4 different defined bits. But only 3 are specified in 155.2.4.5.2. The RES in the figure appears to be meant to be a "Reserved" field.

SuggestedRemedy

Remove the RES text from Figure 155-4 and change the color of the box to be grey

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **48** # 230

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *Link status monitoring*

Subclause 155.2.4.5.2 says 'The RPF bit indicates signal fail status was detected by the remote 400GBASE-ZR receive function ...' which seems to imply that the RPF bit is mapped from the it is mapped from the SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive.

SuggestedRemedy

If the RPF bit is mapped from the PMA:IS_SIGNAL.indication primitive, replace the second sentence of the second paragraph of subclause 155.2.4.5.2 with 'The bit is set based on the most recently received SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primative. It is "0" if the value was OK and "1" if the value was FAIL.'.

If the RPF bit is not mapped from the PMA:IS_SIGNAL.indication primitive, please define where it is mapped from, or the conditions for when it is set and cleared.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 449.

Add a sentence after the 1st sentence, 2nd paragraph of 155.2.4.5.2:
"The bit is set based on the most recently received SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive. It is "0" if the value was OK and "1" if the value was FAIL."

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **48** # 449

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *Link status monitoring*

"signal fail status was detected by the remote 400GBASE-ZR receive function in the upstream direction". But see
1.4.586 upstream: In an access network, transmission away from the subscriber end of the link. Applicable to networks where there is a clear indication in each deployment as to which end of a link is closer to a subscriber.
A status is generated, maybe based on detecting something.

SuggestedRemedy

Something like:
The RPF bit is used by a 400GBASE-ZR PHY to indicate to its link partner the signal fail status at its receive function

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"The RPF bit indicates signal fail status was detected by the remote 400GBASE-ZR receive function in the upstream direction.."
to:
"The RPF bit is used by a 400GBASE-ZR PHY to indicate to its link partner the signal fail status at its receive function.."

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **48** # 450

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **D** *Link status monitoring*

"The RPF bit indicates signal fail status was detected by the remote 400GBASE-ZR receive function": why is this here? Doesn't Ethernet RF do that job?

SuggestedRemedy

If the idea is that a 400GBASE-ZR PHY should continue to transmit data while its input is bad, then changes elsewhere would be needed for unidirectional operation

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

This bit appears to be carried over from OIF 400ZR, which referenced it from FlexO (G.709.1). The task force can decide if it's needed for Ethernet and if not, we can make it a reserved bit.

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **49** # 231

Law, David — Hewlett Packard Enterprise

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

Isn't '... 400GBASE-ZR receive function in the upstream direction ...' duplicative as the 'upstream direction' is the receive path. And since there is only one 400GBASE-ZR receive function, it doesn't need to be qualified by 'in the upstream direction'.

SuggestedRemedy

Suggest that '... 400GBASE-ZR receive function in the upstream direction and ...' should read '... 400GBASE-ZR receive function and ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 449.

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **50** # 232

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *Link status monitoring*

Subclause 155.2.4.5.2 'Link status monitoring and signaling' says 'RPF is set to "1" to indicate a remote 400GBASE-ZR PHY defect indication' however there appears to be no definition of a 400GBASE-ZR PHY defect in the draft.

SuggestedRemedy

Please provide a definition of the conditions considered a 400GBASE-ZR PHY defect.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 230.

Cl **155** *SC* **155.2.4.5.2** *P* **39** *L* **51** # 389

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *RPF field location*

Per Figure 155-4 the RPF field is in bit location 0 of the Status Octect. But the Text states it's bit location 1.

SuggestedRemedy

Change "in bit 1" to "the first bit"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.2** *P* **40** *L* **1** # 60

Ran, Adee Cisco

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

What do "downstream", "host interface signal" and "MDI" signal" mean?
Perhaps "downstream" should be "link partner"?
For signals, are these the signals received by the 400GAUI C2M (which is optional) and the MDI?

SuggestedRemedy

Please rephrase to clarify.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.4.5.2** *P* **40** *L* **5** # 451

Dawe, Piers Nvidia

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

Two sections, both called "Link status monitoring and signaling", say different things about e.g. STAT<6> 155.2.5.7.2 says "in the received STAT<6>", this earlier Tx one doesn't have the equivalent.

SuggestedRemedy

Add extra words to make the context clear. "in the transmitted" would help, but more may be needed

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In the first sentence of the 4th paragraph of 155.2.4.5.2 change:

"If there is an adjacent PHY 400GXS sublayer then the value of RD in STAT<6> is equal." to:
"If there is an adjacent PHY 400GXS sublayer then the value of RD in the transmitted STAT<6> is equal."

Cl **155** *SC* **155.2.4.5.2** *P* **40** *L* **9** # 61

Ran, Adee Cisco

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

"If there is not an adjacent PHY 400GXS sublayer"

Also in 155.2.5.7.2.

SuggestedRemedy

Change to "If there is no adjacent PHY 400GXS sublayer" (2 places).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.4.5.2** *P* **40** *L* **9** # 246

Law, David Hewlett Packard Enterprise

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

Suggest that '... connected to a MAC-RS ... ' should be changed to read '... connected directly to a MAC-RS ...'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.2** *P* **40** *L* **10** # 452

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **D** *Link status monitoring*

"the received status byte in the receive direction": eh?

SuggestedRemedy

Change "then the value of RD in STAT<6> is set to the value of LD in STAT<6> of the received status
byte in the receive direction" to "then the value of RD in the transmitted STAT<6> is set to the value of LD in the received STAT<6>"?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.3** *P* **40** *L* **17** # 453

Dawe, Piers — Nvidia

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

Reference to OIF-400ZR-01.0, March 10, 2020, subclause 8.9. Note that this document is subject to active maintenance

SuggestedRemedy

If feasible, write the specification here. If not, check that the reference is complete, correct and detailed enough, add a normative reference. Refer to a later OIF-400ZR if appropriate.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add a reference to the latest version of OIF-400ZR. The correct reference is to subclause 8.9.2 "GMP overhead encoding"

Cl **155** *SC* **155.2.4.5.3** *P* **40** *L* **17** # 62

Ran, Adee — Cisco

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

"OIF-400ZR-01.0, March 10, 2020, subclause 8.9"

This should be a normative reference document (in addition to the ITU-T documents). I found a matching document in https://www.oiforum.com/wp-content/uploads/OIF-400ZR-01.0_reduced2.pdf.

Note that there are updates to this document (OIF-400ZR-01.0 Maintenance, https://www.oiforum.com/get/51820) where the subclause number seems to have changed. Consider whether the reference should be to a specific dated version or to the up-to-date one.

Preferably provide a URL to the specific document.

SuggestedRemedy

Add a reference in 1.3 with either dated or undated version, preferebly with a URL.

Delete the date from the subclause text, here and in 155.2.4.6 (if a dated version is used, place the full dated reference in a footnote).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Current OIF website has the same version. There may be an updated version there soon. See:
https://www.oiforum.com/technical-work/implementation-agreements-ias/

Cl **155** *SC* **155.2.4.5.3** *P* **40** *L* **22** # 396

Slavick, Jeff — Broadcom

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

Everywhere else uses the word four not the number

SuggestedRemedy

Change "4-frame multi-frame" to "four-frame multi-frame"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.3** *P* **40** *L* **24** # 17

Gorshe, Steve — Microchip Technology

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

It seems worthwhile to provide some basic context regarding the meaning of Cm(t) and SCn(t). Although G.709 provides the details, it may be worthwhile expanding this statement somewhat.

SuggestedRemedy

I suggest adding the following sentences to the end of this paragraph: "Note that Cm(t) indicates the number of 1028-bit GMP data words that will be transmitted during the next multi-frame, with SCnD(t) nominally indicating the running remainder. Averaging the Cm(t) plus SCnD(t) values across multiple multi-frames, the average represent the incoming serial stream rate as the number of information bytes arriving at the GMP encoder per multi-frame."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.5.3** *P* **40** *L* **24** # 57

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **D** *GMP descritption*

C_m(t) and CnD(t) are used but not defined.
I assume they are defined in an external reference, but it is unclear. If all control bytes are defined externally then there is no need for this text.

SuggestedRemedy

Preferably add the detailed definitions from the referenced document.
Otherwise, delete the entire last paragraph.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 17.

Cl **155** SC **155.2.4.5.3** P **40** L **25** # 207

Huber, Thomas Nokia

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

The 'nD' in CnD(t) should be subscripted

SuggestedRemedy

Change the nD to subscript.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.5.4** P **40** L **30** # 348

Maniloff, Eric Ciena

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

A figure showing the interleaving of the 4 OH instances would help clarify the OH structure.

SuggestedRemedy

Add a figure showing the interleaved OH mapping

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Add a figure based on Figure 14 of the 400ZR IA.

Cl **155** SC **155.2.4.5.4** P **40** L **32** # 247

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *OH mapping*

It appears that the 10-bit interleaver isn't specified.

SuggestedRemedy

Specify the 10-bit interleaver.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 348

Cl **155** SC **155.2.4.6** P **40** L **37** # 248

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *SC-FEC blocks*

Subclause 155.2.4.6 'CRC32 and multi-block alignment signal (MBAS) insertion' says that 'Each SC-FEC block has 119 x 10 280 / 5 bits = 244 664 bits.', but isn't an input SC-FEC block 244 736 bits, formed of 244 664 information bits, 32 CRC bits, 6 MBAS bits, and 34 bits of padding (see figure 155-5). In addition, based on figure 155-5 and subclause 155.2.4.7, subclause 155.2.4.6 describes the input SC-FEC block.

SuggestedRemedy

Suggest that:

[1] The first paragraph of subclause 155.2.4.6 should be changed to read 'The stream of 400GBASE-ZR frames, illustrated in Figure 155-3, provide the information bits for the calculation of SC-FEC input blocks. To conform with the format of the input SC-FEC block, 119 rows from the stream of 400GBASE-ZR frames are mapped to the information bits in 5 successive SC-FEC input blocks. Each SC-FEC input block has 119 x 10 280 / 5 bits = 244 664 information bits.'.

[2] The text '... cyclic redundancy code is calculated over 244 664 input bits as ...' in the second paragraph of subclause 155.2.4.6 should be changed to read '... cyclic redundancy code is calculated over the 244 664 information bits as ...'.

[3] The term 'SC-FEC block' be changed to read 'SC-FEC input block' in subclause 155.2.4.6.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.6** P **40** L **39** # 63

Ran, Adee Cisco

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

"mapped to 5 successive SC-FEC blocks"

isolated numbers less than 10 in general text should be spelled out.

SuggestedRemedy

Change "5" to "five".

Implement similar changes, and write numbers greater than 9 in digits, across the document as necessary.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.6** P **40** L **42** # 249

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *CRC32 and MBAS*

Subclause 155.2.4.6 'CRC32 and multi-block alignment signal (MBAS) insertion' says 'The 32 bits of the CRC value are placed with the x31 term as the left-most bit...', however, it doesn't specify where. In addition, it also says, 'Following the CRC32 a 6-bit MBAS is added.', without specifying the bit order. Finally, the CRC is referred to as a field (page 40, line 44) whereas the MBAS is referred to as overhead.

SuggestedRemedy

Suggest that:

[1] The text '... the CRC value are placed with ...' in the second paragraph of subclause 155.2.4.6 should be changed to read '... the CRC value are placed immediately after the information bits in the SC-FEC input block with ...'.

[2] The first sentence of the last paragraph of subclause 155.2.4.6 should be moved to the end of the paragraph and changed to read 'The 6 bits of the MBAS field are placed immediately after the CRC with the most significant bit as the left-most bit of the MBAS field and the least significant bit as the right-most bit of the MBAS field. The bits of the MBAS are transmitted in the order of most significant bit first, least significant bit last.'.

[3] The two instances of ' MBAS overhead' should be changed to read 'MBAS field'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.6** P **40** L **43** # 64

Ran, Adee — Cisco

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

"The 32 bits of the CRC value are placed with the x31 term as the left-most bit of the CRC32 field and the x0 term as the right-most bit of the CRC32 field"

There is no illustration of the CRC32 block, so "right" and "left" are not really meaningful; The subsequent sentence defines the transmission order, so this sentence seems redundant.

SuggestedRemedy

Delete the quoted sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.6** P **40** L **49** # 250

Law, David — Hewlett Packard Enterprise

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

IEEE Std 802.3 doesn't specify implementations.

SuggestedRemedy

Suggest that '... staircase FEC implementation uses ...' should read '... staircase FEC uses ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.6** P **40** L **50** # 455

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *CRC32 and MBAS*

between source and sink

SuggestedRemedy

eh? Change to the usual terminology

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Delete the words "between source and sink"

Cl **155** SC **155.2.4.6** P **40** L **50** # 454

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *SC-FEC blocks*

Needs a figure showing the 400GBASE-ZR frame rows, SC-FEC blocks, CRC32 and MBAS

SuggestedRemedy

Please add a figure per comment.

Proposed Response *Response Status* **W**

See Fig 155-6

Cl **155** *SC* **155.2.4.7** *P* **41** *L* **1** # 251

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *SC-FEC blocks*

Suggest that subclause 155.2.4.7 be retitled 'SC-FEC adapt and encoding' to match the equivalent block in Figure 155-2.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.7** *P* **41** *L* **11** # 252

Law, David — Hewlett Packard Enterprise

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

Subclause 155.2.4.7 '400GBASE-ZR frame to SC-FEC adaptation' says '... which are added to the 400GBASE-ZR SC-FEC frame as ...'. This seems to be the only time the term '400GBASE-ZR SC-FEC frame' is used and the title of the referenced figure 155-6 is '400GBASE-ZR SC-FEC encoded frames'.

SuggestedRemedy

Subclause 155.2.4.7 '400GBASE-ZR frame to SC-FEC adaptation' says '... which are added to the 400GBASE-ZR SC-FEC frame as ...'. This seems to be the only time the term '400GBASE-ZR SC-FEC frame' is used and the title of the referenced figure 155-6 is '400GBASE-ZR SC-FEC encoded frames'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "400GBASE-ZR SC-FEC encoded frames" to "SC-FEC encoder input blocks" in 155.2.4.7. Change the title of Figure 155-6 to "SC-FEC encoder output block transmission format."

Cl **155** *SC* **155.2.4.7** *P* **42** *L* **5** # 253

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *SC-FEC blocks*

There is no specification of how the 8 parity blocks are mapped into bits 10280 to 10970 of the 400GBASE-ZR SC-FEC encoded frames.

SuggestedRemedy

Add a new paragraph to subclause 155.4.7 to specify the mapping of the 16384 parity bits into bits 10280 to 10970 of the 400GBASE-ZR SC-FEC encoded frames.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

This requires a contribution.

Cl **155** *SC* **155.2.4.7** *P* **42** *L* **11** # 254

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *SC-FEC blocks*

Both instances of block 7.11 in figure 155-6 are marked with an asterisk which, I assume, is meant to reference a footnote that says that only the information bits of block 7.11 are included, that the CRC32 and MBAS bits are appended after the parity bits, and the pad is discarded.

SuggestedRemedy

Add a new paragraph to subclause 155.4.7 to specify the mapping of the CRC32 and MBAS bits from block 7.11 and add a suitable footnote to figure 155-6.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add a new paragraph to subclause 155.4.7"
"The block labeled 7.11 in Figure 155-5 includes an added 72 bits containing the CRC32, the MBAS bits and a 34-bit pad. Only the information bits of 7.11 are a part of the 244 664 information bits of each input block in Figure 155-6. The CRC32 and MBAS are transmitted after the 16 384 parity bits of the prior input block Bj-1. The pad bits are not transmitted."

Cl **155** *SC* **155.2.4.7** *P* **42** *L* **12** # 400

Slavick, Jeff Broadcom

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

The "dark" line appears to be on the wrong side of the CRC+MBAS grey box. Should be on the right edge of all boxes but that's not true for 3 of them. And the last one isn't part of it's Bj+3 box.

SuggestedRemedy

Thicken the right edge of the grey boxes that represne the CRC+MBAS.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.7** *P* **42** *L* **42** # 388

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **D** *SC FEC frame*

Figure 155-6 does not show the 6x119b pad

SuggestedRemedy

Add box at the end of the i+119 row to the right of the CRC+MBAS labeled 6x119b PAD

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.8** *P* **43** *L* **4** # 391

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **D** *Pad bits*

What is the contents of the PAD?

SuggestedRemedy

Change "pad bits added" to "pad bits of all zeroes added"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.9** *P* **43** *L* **9** # 65

Ran, Adee Cisco

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

"a frame-synchronous scrambler of sequence 65 535"
Unclear; should it be "with sequence length of 65535"?
A 16-degree polynomial creates a periodic sequence length of 131071, so is it the first 65535 bits of that periodic sequence starting from the reset value?

SuggestedRemedy

Rewrite as appropriate.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
A contribution is needed with the scrambler details.

Cl **155** *SC* **155.2.4.9** *P* **43** *L* **9** # 456

Dawe, Piers Nvidia

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

sequence 65 535

SuggestedRemedy

sequence length 65 535 ?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.9** *P* **43** *L* **10** # 460

Dawe, Piers Nvidia

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

More iformation needed. Given the "generating polynomial", what has to be done? There are examples of scrambler definitions in the base document.

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 65

Cl **155** SC **155.2.4.9** P **43** L **12** # 459

Dawe, Piers Nvidia

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

which end goes first?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.
No suggested remedy.

Cl **155** SC **155.2.4.9** P **43** L **12** # 461

Dawe, Piers Nvidia

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

is row 1 the first or second row?

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED REJECT.
No suggested remedy.

Cl **155** SC **155.2.4.9** P **43** L **12** # 458

Dawe, Piers Nvidia

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

x

SuggestedRemedy

define x

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 65,

Cl **155** SC **155.2.4.9** P **43** L **12** # 457

Dawe, Piers Nvidia

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

x

SuggestedRemedy

italic

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.9** P **43** L **12** # 398

Slavick, Jeff Broadcom

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

Extra "."

SuggestedRemedy

Remove the . After the 1 in the equation

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.9** P **43** L **13** # 383

Wienckowski, Natalie General Motors

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

The equation should be numbered.

SuggestedRemedy

Add Equation number to the scrambler equation, e.g. (155-1).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.4.9** P **43** L **14** # 31

Marris, Arthur Cadence Design Systems

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

Is resetting the scrambler a functional requirement?

SuggestedRemedy

Consider changing "resets" to "shall be reset"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.9** *P* **43** *L* **14** # 66

Ran, Adee Cisco

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

The definition of the scrambler is ambiguous; The choice of coefficient order, shift direction, and the point from which the output is taken can create different results.

Scrambler specifications typically include a block diagram of an LFSR and sometimes a portion of the sequence for clarity.

SuggestedRemedy

Add a diagram (similar to e.g. Figure 49-8) and some portion of the sequence following the initial 16 bits (0xFFFF).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 65.

Cl **155** *SC* **155.2.4.9** *P* **43** *L* **16** # 399

Slavick, Jeff Broadcom

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

The scrambler stops advancing during the PAD bits? So the 714b of PAD will be either all 0's or all 1's?

SuggestedRemedy

Define the pad to be a random pattern or change "the scrambling state advances during each bit of the five SC-FEC blocks" to "the scrambling state advances for each transmitted bit"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 65

Cl **155** *SC* **155.2.4.10** *P* **43** *L* **20** # 255

Law, David Hewlett Packard Enterprise

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

Suggest that '... SC-encoder ...' should read '... SC-FEC encoder ...'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.10** *P* **43** *L* **21** # 67

Ran, Adee Cisco

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

ITU-T G.709.3 seems to be a normative reference.

SuggestedRemedy

Add a reference in 1.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.10** *P* **43** *L* **21** # 68

Ran, Adee Cisco

Comment Type **T** *Comment Status* **D** *convolutional interleaver*

"The convolutional interleaver is described in ITU-T G.709.3 subclause 15.4.3"
The text in this subclause and figure 155-7 are insufficient to understand/implement the interleaver function.
If it isn't fully defined (defined only in an external document) then there is no need for this text and figure.

SuggestedRemedy

Preferably add the detailed definitions from the referenced document.
Otherwise, delete the whole subclause except for the quoted sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add G.709.3 as a normative reference.

Delete all of this subclause except for the first 2 sentences.

Cl **155** *SC* **155.2.4.10** *P* **43** *L* **21** # 462

Dawe, Piers Nvidia

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

G.709.3 is not a normative reference

SuggestedRemedy

Add the content locally or add the reference and any information that is needed to make the definition accessible, complete and unambiguous

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 67

Cl **155** *SC* **155.2.4.10** *P* **43** *L* **22** # 256

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *convolutional interleaver*

IEEE Std 802.3 doesn't specify implementations.

SuggestedRemedy

Suggest, based on the in subclause 155.2.4.9 above (page 43, line 8), that the text The convolutional interleaver is described in ITU-T G.709.3 subclause 15.4.3. It contains 16 parallel delay lines that are accessed sequentially for each block of 119 bits.' is changed to read 'The convolutional interleaver shall be functionally equivalent to the convolutional interleaving process described in ITU-T G.709.3 subclause 15.4.3'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 68

Cl **155** *SC* **155.2.4.10** *P* **44** *L* **30** # 208

Huber, Thomas — Nokia

Comment Type **TR** *Comment Status* **D** *convolutional interleaver*

The convolutional interleaver and Hamming encoder are working with 10976 rows, but figure 155-7 indicates 10970 rows

SuggestedRemedy

Change 10970 to 10976 in Fgiure 155-7.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **36** # 32

Marris, Arthur — Cadence Design Systems

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

119b

SuggestedRemedy

Change "119b" to "119-bit"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **36** # 257

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *SD-FEC encoder*

Subclause seems to use the terms '119b', '119-bit block' and '119-bit message' interchangeably. Suggest that '119-bit message' is used to match subclause 155.2.5.1.

SuggestedRemedy

Suggest that:

[1] The text 'The 119b outputs of the convolutional interleaver are encoded ...' is changed to read 'The 119-bit messages output by the convolutional interleaver are encoded ...'

[2] The text '... to each of the 10 976 119-bit blocks as output ...' is changed to read '... '... to each of the 10 976 119-bit messages as output ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **36** # 463

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **D** *SD-FEC encoder*

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

SuggestedRemedy

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

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **37** # 69

Ran, Adee Cisco

Comment Type **T** *Comment Status* **D** *SD-FEC encoder*

"The generic operation of the Hamming SD-FEC scheme is specified in ITU-T G.709.3 Annex D"
The text in this subclause is insufficient to understand/implement the SD-FEC encoder function.
If it isn't fully defined (defined only in an external document) then there is no need for the details in the second paragraph.

SuggestedRemedy

Preferably add the detailed definitions from the referenced document.
Otherwise, delete the second paragraph.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See reponse to comment 463

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **40** # 258

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *SD-FEC encoder*

The 128-bit code word referenced in subclause 155.2.4.11 'Hamming SD-FEC encoder' is called the 'SD-FEC codeword' in Figure 155-8, subclause 155.2.5.1 (page 46, line 5) and subclause 155.3.3.2 (page 53, line 36). Suggest the same terminology should be used in subclause 155.2.4.11 'Hamming SD-FEC encoder'.

SuggestedRemedy

Suggest that:

[1] The text '... results in 10 796 128-bit blocks.' be changed to read '... results in 10 796 128-bit SD-FEC codewords.'.

[2] The text '... is encoded to the 128-bit code word ...' be changed to read '... is encoded to the 128-bit SD-FEC codeword ...'.

[3] The text 'The 128-bit code words are ...' should be changed to read 'The 128-bit SD-FEC codewords are ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.11** *P* **44** *L* **45** # 464

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **D** *SD-FEC encoder*

This says 8-bit symbols, 155.2.1 says two streams of 4-bit data.
PMA:IS_UNITDATA_i.request is 7 wide.

SuggestedRemedy

The difference may matter when we are discussing Skew limits

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change:
"The 128-bit code words are sent as 8-bit symbols.."
to:
The 128-bit code words are sent as two streams of 4-bit data.."

Cl **155** *SC* **155.2.4.12** *P* **45** *L* **33** # 465

Dawe, Piers Nvidia

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

hamming

SuggestedRemedy

Hamming

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.4.12** *P* **45** *L* **50** # 259

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *Transmit bit ordering*

Suggest that Figure 155-8 and the last paragraph of subclause 155.2.4.11 be updated to describe how the 128-bit code word from the SD-FEC encoder is passed across the PMA service interface. In addition, the fourth paragraph of subclause 155.3.3.1 should be updated to note that the 128-bit code word is passed across the PMA service interface to the PMA where the Gray mapping and polarization distribution described occurs.

SuggestedRemedy

[1] Suggest that the PMA service interface be added to Figure 155-8. To do this suggest that the label 'PMA:IS_UNITDATA_0.request' be added to the leftmost arrow at the bottom of the figure, with the label 'PMA:IS_UNITDATA_1.request' and 'PMA:IS_UNITDATA_2.request' staggered above on the next two arrows to the right. The label 'PMA:IS_UNITDATA_7.request' should be added to the rightmost arrow. As an existing example, see Figure 119-10 '200GBASE-R Transmit bit ordering and distribution'.

[2] Suggest that the last paragraph of subclause 155.2.4.11 be changed to read 'The 128-bit code word is then passed across the 8 lane PMA service interface to the PMA sublayer as 16 groups of 8 bits, each representing a DP-16QAM symbol. The first group of 8 bits are c0 through c7, the last group of 8 bits are c120 through C127, with the LSB through the MSB or each group of 8 bits mapped in order to the tx_symbol parameter of the PMA:IS_UNITDATA_0.request through the PMA:IS_UNITDATA_7.request primitive respectively (see Figure 155-8).'.

[3] Suggest that the text 'Each 128-bit code word from the SD-FEC encoder c = [c0, c1, ...,c127], is mapped ...' in the fourth paragraph of subclause 155.3.3.1 should be changed to read 'Each 128-bit code word from the SD-FEC encoder is passed across the PMA service interface as described in 155.2.4.11. Each 128-bit code word c = [c0, c1, ...,c127], is mapped ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.2.4.12** *P* **45** *L* **52** # 133

Nicholl, Gary — Cisco Systems

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

The format of the text in Figure 155-8 is all over the place. I know in 802.3df we are using a constant font for all text in figures.

SuggestedRemedy

Update Figure 155-8 to use a constant font for all text.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.1** *P* **46** *L* **11** # 467

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **D** *SD-FEC decoder*

"Logic described generically in ITU-T G.709.3 Annex D": generically - vague, and Annex D doesn't address FEC decoding at all, only check-block generation.

SuggestedRemedy

Write out what you need to say, here

Proposed Response *Response Status* **W**

PROPOSED REJECT.

There is no suggested remedy. I need text to put in the document.

Cl **155** *SC* **155.2.5.1** *P* **46** *L* **11** # 466

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *SD-FEC decoder*

"The Hamming SD-FEC decoder is a soft decision decoder"

SuggestedRemedy

What requires this? a sensitivity / OSNR tolerance spec? Please refer to wherever the reason is given.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

This is part of the baseline architecture adopted by the task force

Cl **155** SC **155.2.5.1** P **46** L **12** # 260

Law, David — Hewlett Packard Enterprise

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

The vast majority of references to the in-phase and quadrature-phase X and Y polarization use the symbols I<subscript>X</subscript>, Q<subscript>X</subscript>, I<subscript>Y</subscript>, and Q<subscript>Y</subscript> (e.g., Figure 155-10 on page 51, line 28 and subclause 155.3.3, page 52, line 9). There, however, seem to be a few instances where the X and Y are not in subscript, or the phase and polarization symbols are reversed.

SuggestedRemedy

On the assumption that they are referencing the same signals, please use I<subscript>X</subscript>, Q<subscript>X</subscript>, I<subscript>Y</subscript>, and Q<subscript>Y</subscript> in the following locations:

Subclause 155.2.5.1, page 46, line 12
Table 155-3, page 55, line 38
Table 155-4, page 56, line 35
Table 155-7, page 59, line 5 through 16

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.5.1** P **46** L **14** # 11

Lewis, Jon — Dell Technologies

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

need a non-breaking space between "Annex" and "D"

SuggestedRemedy

Add non-breaking space.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.5.1** P **46** L **16** # 468

Dawe, Piers — Nvidia

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

interleaver

SuggestedRemedy

Missing full stop

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.5.3** P **46** L **26** # 384

Wienckowski, Natalie — General Motors

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

You should refer to the equation.

SuggestedRemedy

Change: polynomial given in 155.2.4.9.
To: polynomial given by Equation (155-1).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.5.5** P **46** L **36** # 209

Huber, Thomas — Nokia

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

Missing an "of" in the second sentence

SuggestedRemedy

Change "Each incoming block 10976 x 119 bits." to "Each incoming block of 10976 x 119 bits."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.2.5.5** P **46** L **36** # 70

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **D** *SC-FEC decoder*

"The SC-FEC decoder function is described in ITU-T G.709.2 Annex A"
The text in this subclause is insufficient to understand/implement the SD-FEC decoder function.
If it isn't fully defined (defined only in an external document) then there is no need for the details in the first paragraph.

SuggestedRemedy

Preferably add the detailed definitions from the referenced document.
Otherwise, delete the first two paragraphs, retaining the quoted sentence.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Since G.709.2 Annex A is 25 pages, it's better to reference it.

Delete all but the first sentence of the first paragraph of 155.2.5.5.

Cl **155** *SC* **155.2.5.5** *P* **46** *L* **36** # 469

Dawe, Piers — Nvidia

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

incoming block 10 ...

SuggestedRemedy

incoming block of 10 ...?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 70

Cl **155** *SC* **155.2.5.5** *P* **46** *L* **43** # 210

Huber, Thomas — Nokia

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

Missing a subscript in Bi_corrected.

SuggestedRemedy

Make the i in Bi subscripted.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.5** *P* **46** *L* **46** # 401

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *MDIO mapping*

Last paragraph of this section states that link degrade status is provided,, but there's no MDIO mapping provided in the text to indicate it's status bits or coontrol of thresholds

SuggestedRemedy

Add references to the MDIO registers to control and observe link degrade

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 408

Cl **155** *SC* **155.2.5.5** *P* **46** *L* **46** # 71

Ran, Adee — Cisco

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

The third paragraph "The 400GBASE-ZR PCS provides detection and signaling of link degrade for use by network equipment..."
is repeated verbatim in 155.2.5.7.2. No need to write it twice.

SuggestedRemedy

Delete the third paragraph.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.5** *P* **46** *L* **48** # 408

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *MDIO mapping*

The last paragraph states that the link degrade function is provided and that the bit error ratio is used to indicate this. But in the MDIO mapping (Table 155-8) points to fields that exist but reference 119.2.5.3 which specifies the thresholds in terms of rs-symbol error rates and FEC codewords.

SuggestedRemedy

Replace the last paragraph of 155.2.5.5 with the following:

The 4000GBASE-ZR PCS may optionally provide the ability to signal degradation of the received signal. The presence of this option is indicated by the assertion of the FEC_degraded_SER_ability_variable (see 155.4.2.1). When the option is provided it is enabled by the assertion of the FEC_degraded_SER_enable variable (see 155.4.2.1).

When FEC_degraded_SER_enable is asserted, additional error monitoring is performed by the PCS. The PCS counts the number of bits corrected by the SC-FEC decoder in consecutive nonoverlapping SC-FEC frames of FEC_degraded_SER_interval (see 155.4.2.1). If the SC-FEC decoder determines that a codeword is uncorrectable or errors are detected by the CRC32 check (see 155.2.5.6), the number of symbol errors detected is increased by 957 x 257. When the number of bit errors exceeds the threshold set in FEC_degraded_SER_activate_threshold (see 155.5.1), the FEC_degraded_SER bit (see 155.5.1) is set. At the end of each interval, if the number of symbol errors is less than FEC_degraded_SER_deactivate_threshold, the FEC_degraded_SER bit is cleared. If either FEC_degraded_SER_ability or FEC_degraded_SER_enable is de-asserted then the FEC_degraded_SER bit is cleared.

Bring in 45.2.3.60.1 and add "155.2.5.5" to the see list
Bring in 45.2.3.61.1 and add "155.4.2.1" to the see list
Bring in 45.2.3.61.3 and add "155.2.5.5" to the see list
Bring in 45.2.3.61.4 and add "155.4.2.1" to the see list

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.6** *P* **46** *L* **53** # 470

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *CRC32 checker*

base block": not defined, used only once

SuggestedRemedy

I think this means the "B" blocks of 155.2.5.5. Are they "SC-FEC codewords", and are they named?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "the entire base block of 30 592 x 8 bits.." to "the entire block of information bits from the SC-FEC decoder (30 592 x 8 bits)."

Cl **155** *SC* **155.2.5.6** *P* **47** *L* **53** # 402

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **D** *MDIO registers*

Uncorrectable blocks are not tracked in MDIO registers

SuggestedRemedy

Add references to the MDIO register for counting corrected and uncorrected FEC CW and bits

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Need a contribution.

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **7** # 134

Nicholl, Gary — Cisco Systems

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

in "952 x 257B" does the "B" stand for bits ? If so I am not sure this follows the 802.3 style manual ?

SuggestedRemedy

Change "952 x 957B" into "952 x 957 bits" . Similar comment in the rest of this section where "B" is used.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **9** # 72

Ran, Adee Cisco

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

"will" is deprecated.

SuggestedRemedy

Change "will have" to "has".

Change other instances as necessary.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **9** # 471

Dawe, Piers Nvidia

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

will have

SuggestedRemedy

has

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **14** # 261

Law, David Hewlett Packard Enterprise

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

Suggest a direct reference to the Alignment marker lock state diagram is provided in subclause 155.2.5.7.

SuggestedRemedy

Suggest that the first sentence of the penultimate paragraph of subclause 155.2.5.7 be changed to read 'The process of locking to the AM field is described in the Alignment marker lock state diagram in Figure 155-16.'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **14** # 403

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **D** *cross reference*

Reference is to 155.4 which is all the FSM blocks, call out the specific AM lock one.

SuggestedRemedy

Change 155.4 to Figure 155-16

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **14** # 73

Ran, Adee Cisco

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

There are multiple state machines (diagrams) in 155.4.

I assume Figure 155-16 is the one.

SuggestedRemedy

Change "follows the state machine in 155.4" to "is depicted by the state diagram in Figure 155-16".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7** *P* **47** *L* **19** # 211

Huber, Thomas Nokia

Comment Type **T** *Comment Status* **D** *OH description*

Figure 155-9 is identical to Figure 155-4. It is also not referenced in the text at all, though it is obvious how it relates to the text. To avoid potential divergence of the figures, it would be better to refer to the earlier figure rather than replicate it.

SuggestedRemedy

Remove figure 155-9. Add a sentence to the end of clause 155.2.5.7 indicating that the overhead bytes over the four-frame multiframe are shown in Figure 155-4.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7.1** *P* **47** *L* **33** # 395

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **D** *cross reference*

Figure 155-9 is identical to 155-4 and is not referenced

SuggestedRemedy

Delete Figure 155-9. Add "(see Figure 155-4)" to the end of last paragraph

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7.1** *P* **47** *L* **33** # 472

Dawe, Piers Nvidia

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

Figure 155-9 is an orphan

SuggestedRemedy

Reference it or remove it. See another comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7.1** *P* **47** *L* **33** # 473

Dawe, Piers Nvidia

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

Figure 155-9 seems to be identical to Figure 155-4

SuggestedRemedy

Remove it, refer to 155-4 instead

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7.2** *P* **48** *L* **5** # 474

Dawe, Piers Nvidia

Comment Type **T** *Comment Status* **D** *Link status monitoring*

upstream, downstream

SuggestedRemedy

Rx, Tx. Compare base doc.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Change: "The RPF bit indicates, in the upstream direction, that.." to "The RPF bit indicates to its link partner, that.."

Change: "...are defined to indicate to the downstream 400GBASEZR PHY the quality.."
to
"..are defined to indicate to the link partner the quality.."

Cl **155** *SC* **155.2.5.7.2** *P* **48** *L* **9** # 475

Dawe, Piers Nvidia

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

detailed in 155.2.5.7.2 - but this is 155.2.5.7.2

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Replace 155.2.5.7.2 with 155.2.4.5.2.

Cl **155** *SC* **155.2.5.7.2** *P* **48** *L* **21** # 212

Huber, Thomas Nokia

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

It looks like there is an 'of' that should be 'or' - I think the intent is that if the receiver can't frame to the DSP frame, or the 400ZR frame or multiframe, it inserts LF

SuggestedRemedy

Change "In the case of a DSP framing of 400GBASE-ZR frame or multi-frame loss." to "In the case of a DSP framing loss or 400GBASE-ZR frame or multi-frame loss."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.7.2** *P* **48** *L* **22** # 476

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *Link status monitoring*

framing of frame or multi-frame loss - eh?

SuggestedRemedy

In the case of a loss of 400GBASE-ZR frame sync or multi-frame sync?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 212

Cl **155** *SC* **155.2.5.7.2** *P* **48** *L* **23** # 74

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **D** *Link status monitoring*

"LF ordered sets" are not defined in this draft.

I assume it is the "Local Fault" RS ordered set.

SuggestedRemedy

Change to "Local Fault ordered sets (see 81.3.4)".

(or another ordered set if so intended)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.8** *P* **48** *L* **36** # 18

Gorshe, Steve — Microchip Technology

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

The sentence incorrectly confuses the location and coverage of the GMP CRC fields. Specifically, it says that the CRC8 is found in JC1-3 and the CRC4 is found in JC4-6. The CRC8 is located in JC3 and the CRC4 is located in JC6.

SuggestedRemedy

Change the last sentence of the paragraph to read: "The CRC8 value in JC3 provides error detection coverage for the information in JC1-JC3 and the CRC4 value in JC4 provides error detection coverage for the associated information fields in JC4-6."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.8** *P* **48** *L* **36** # 19

Gorshe, Steve — Microchip Technology

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

This sentence appears to incorrectly imply that the CRC8 is the sole protection against errors in JC1-3. Although G.709 provides the details, it may be worthwhile expanding this statement somewhat.

SuggestedRemedy

In conjunction with the change proposed in the previous comment, add the following sentence to the end of the paragraph: "The JC1-2 field information is also protected by limits on how the JC1-2 fields can change in successive multi-frames and the coding technique for indicating these changes, which combine with the CRC8 in JC3 to provide error correction capability for bit and burst errors impacting JC1-3."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.2.5.10** *P* **48** *L* **53** # 477

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **D** *PCS decoder*

The PCS receives decode blocks

SuggestedRemedy

The PCS receive function decodes blocks ?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.1** *P* **49** *L* **3** # 135

Nicholl, Gary — Cisco Systems

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

The first several sub-sections of 155.3.1appear to repeat the same format as section 155.1. It appears that this overview information for the PCS sublayer is in 155.1 and the same overview information for the PMA sublayer is in 155.3.

SuggestedRemedy

I would propose to delete section 155.1., and put all of the corresponding overview information into either the PCS section (155.2) or the PMA section (155.3) respectively.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.1.1** P **49** L **9** # 262

Law, David — Hewlett Packard Enterprise

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

Since [1] the subclause of 156.5 'PMD functional specifications' lists more than just a transmit and receive function, and [2] to parallel the text 'The PMA allows the 400GBASE-ZR PCS (specified in 155.2) ...', suggest that '... media-independent way to a coherent transmitter and receiver specified in Clause 156.' should be changed to read '... media-independent way to the 400GBASE-ZR PMD (specified in 156).'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.1.1** P **49** L **11** # 478

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *PMA description*

The interfaces for the inputs of

SuggestedRemedy

The interfaces of ?

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.1.2** P **49** L **16** # 481

Dawe, Piers — Nvidia

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

relationship with

SuggestedRemedy

relationship to Also 156.1

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.1.3** P **49** L **23** # 75

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **X** *PMA description*

The term "symbol" seems to be overloaded in the PMA subclause, sometimes meaning bit, other times an element of the set {-3, -1, +1, +3}, and other times a pair of such elements (DP-16QAM symbol).

This is confusing.

SuggestedRemedy

Define a clear terminology (e.g. bits, quaternary symbols, DP-16QAM symbols) and apply it across 155.3.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.1.3** P **49** L **51** # 344

Zimmerman, George — CME Consulting/APL Group, Cisco, Commscope, Ma

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

Figure 155-10 is separated from the text which describes it, by the intervening description of the service interface.

SuggestedRemedy

Beat on frame, and move the figure 155-10 be after 155.3.1.3 and before 155.3.2 (one way to do this may be forcing a page break before 155.3.2)

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.1.3** P **51** L **3** # 479

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *PMA block diagram*

"m is ... the number of bits of resolution of the DP-16QAM symbols"

SuggestedRemedy

Is a symbol for one polarisation or both? Is this off by 2?

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.1.3** *P* **51** *L* **13** # 480

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *PMA block diagram*

Align CFEC and FAW/TS symbols (X) remove

SuggestedRemedy

Align CFEC and remove FAW/TS symbols (X) ?

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.1.3** *P* **51** *L* **26** # 345

Zimmerman, George — CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type **TR** *Comment Status* **X** *PMA block diagram*

This figure is supposed to be a functional block diagram, not an implementation diagram. There are no characteristics for the DAC blocks defined in the specification. The closest thing in the text is 155.3.3.4 which are called the 16QAM encode and signal drivers. However, most other 802.3 PHY clauses leave out signal drivers, DACs and the like, and there are no specific requirements in 155.3.3.4, so deleting the blocks seems the right approach to making a functional block diagram.

SuggestedRemedy

Preferably, delete the "DAC" blocks from Figure 155-10 (going straight to the output is fine) Alternatively, Relabel "16QAM Encoder and Signal Driver" (probably drawing as 2 blocks since you show I&Q paths)

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **50** *L* **1** # 263

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **D** *PMA service interface*

Subclause 155.2.4.11 'Hamming SD-FEC encoder' says that 'The 128-bit code words are sent as 8-bit symbols to the 400GBASE-ZR PMA sublayer on the PMA:IS_UNITDATA_0.request to PMA:IS_UNITDATA_7.request inter-sublayer signals.'. Further, subclause 155.2.5.1 'Hamming SD-FEC decoder' says 'The incoming DP-16QAM symbols are digitized to an m-bit resolution by the PMA sublayer receive direction (see 155.3.3.5) and provided to the PCS receive direction by PMA:IS_UNITDATA_0.indication to PMA:IS_UNITDATA_m-1.indication inter-sublayer signals.' and that 'The Hamming SD-FEC decoder is a soft decision decoder and so requires a higher resolution than 2 bits / 4 levels for each of the signals XI, XQ, YI, and YQ.'. Finally, Figure 155-10 '400GBASE-ZR PMA functional block diagram' says 'm is implementation dependent and is the number of bits of resolution of the DP-16QAM symbols.'

Rather than operating as n parallel asynchronous PCS lanes that carry alignment markers and lane numbers that enable the original data to be restored or n lanes to be multiplex into m lanes, it appears the 400GBASE-ZR PMA service interface between the PCS and the PMA operates as an n-bit synchronous data path, transferring a single DP-16QAM symbol during each operation. This seems to be confirmed by subclause 155.2.4.3 'GMP mapper' that says '... 400GBASE-ZR frames are not mapped to 16 PCS lanes ...'. In the case of the transmit path, the DP-16QAM symbols are encoded as 8-bit words, 2 bits representing the 4 levels for each of the in-phase and quadrature components of the X and Y polarizations. In the case of the receive path, the DP-16QAM symbols are encoded as p bits representing q levels, where p and q are implementation dependant.

It, therefore, doesn't seem correct to define the 400GBASE-ZR PMA service interface through reference to the lane-based PMA service interface definition in 116.3 when it doesn't support the features of a lane-based service interface. Based on this, suggest that the 400GBASE-ZR PMA service interface be defined using a single .request and .indicate primitive, with a tx_symbol and rx_symbol parameter respectively, to reflect the synchronous data path nature of the interface.

SuggestedRemedy

Specify the 400GBASE-ZR PMA as a single .request and .indicate primitive, with a tx_symbol and rx_symbol parameter respectively as follows:

- Change the three instances of 'PMA:IS_UNITDATA_i.request' to read 'PMA_UNITDATA.request' in subclause 155.2.1 'Functions within the PCS'.

- Change subclause 155.1.4.2 'Physical Medium Attachment (PMA) service interface' to read as follows:

The 400GBASE-ZR PMA service interface provided by the 400GBASE-ZR PMA for the 400GBASE-ZR PCS is described in an abstract manner and does not imply any particular implementation. The 400GBASE-ZR PMA Service Interface supports the exchange of

encoded DP-16QAM symbols between the PCS and PMA sublayer. The 400GBASE-ZR PMA service interface is defined in 155.3.2.

- Change the last paragraph of subclause 155.2.4.11 'Hamming SD-FEC encoder' to read:

The 128-bit code words are sent as 8-bit encoded DP-16QAM symbols to the 400GBASE-ZR PMA sublayer using sixteen PMA_UNITDATA.request messages.

- Change the text '... by PMA:IS_UNITDATA_0.indication to PMA:IS_UNITDATA_m-1.indication inter-sublayer signals.' to read '... by the PMA_UNITDATA.indication primitive.' in subclause 155.2.5.1 'Hamming SD-FEC decoder'.

- Change subclause 155.3.2 '400GBASE-ZR PMA service interface', adding new subclauses 155.3.2.1 through 155.3.2.2.3, to read:

155.3.2 400GBASE-ZR PMA service interface

The 400GBASE-ZR PMA Service Interface supports the exchange of encoded DP-16QAM symbols between the PCS and PMA sublayer. The inter-sublayer 400GBASE-ZR PMA service interface is described in an abstract manner and does not imply any particular implementation. The inter-sublayer service interface primitives are defined as follows:

PMA_UNITDATA.request
PMA_UNITDATA.indication
PMA_SIGNAL.indication

The PMA_UNITDATA.request primitive is used to define the transfer of a DP-16QAM symbol from the 400GBASE-ZR PCS to the 400GBASE-ZR PMA. The PMA_UNITDATA.indication primitive is used to define the transfer of a DP-16QAM symbol from the 400GBASE-ZR PMA to the 400GBASE-ZR PCS. The PMA_SIGNAL.indication primitive is used to define the transfer of signal status from the 400GBASE-ZR PMA to the 400GBASE-ZR PCS.

155.3.2.1 PMA_UNITDATA.request

This primitive defines the transfer of encoded DP-16QAM symbols in the tx_symbol parameter from the 400GBASE-ZR PCS to the 400GBASE-ZR PMA.

155.3.2.1.1 Semantics of the primitive

PMA_UNITDATA.request (tx_symbol)

During transmission, the PMA_UNITDATA.request simultaneously conveys 8 bits of a 128-bit code word generated by the SD-FEC encoder (see 155.2.4.11) representing an encoded DP-16QAM symbol to the PMA. The encoding used for the in-phase and quadrature-phase components of the X and Y polarization is defined in subclause 155.3.3.1.

155.3.2.1.2 When generated

The PCS generates sixteen PMA_UNITDATA.request messages for each 128-bit code word from the PCS SD-FEC encoder. The messages convey the least significant octet C<7:0> first, most significant octet C<127:120> last, with code word bits C<n+7:n> mapped to tx_symbol<7:0>. The nominal rate of PMA_UNITDATA.indication messages is 57.78 GBd.

155.3.2.1.3 Effect of receipt

The PMA continuously forms the tx_symbol parameters received in sixteen consecutive PMA_UNITDATA.indication messages into 128-bit code words that are passed to the PMA Gray mapping and polarization distribution function (see 155.3.3.1).

155.3.2.2 PMA_UNITDATA.indication

This primitive defines the transfer of encoded DP-16QAM symbols in the rx_symbol parameter from the 400GBASE-ZR PMA to the 400GBASE-ZR PCS.

155.3.2.2.1 Semantics of the primitive

PMA_UNITDATA.indication (rx_symbol)

During reception, the PMA_UNITDATA.indication simultaneously conveys m bits of an n-bit code word generated by the symbol de-interleaving function (see 155.3.3.8) representing an encoded DP-16QAM symbol to the 400GBASE-ZR PCS where m is implementation dependent, representing the number of bits of the encoded DP-16QAM symbol, and n = 16 x m.

155.3.2.2.2 When generated

The PMA generates sixteen PMA_UNITDATA.indication messages for each n-bit code word generated by the PMA symbol de-interleaving function. The messages convey the least significant m bits of the n-bit code word first. The nominal rate of PMA_UNITDATA.indication messages is 57.78 GBd.

155.3.2.2.3 Effect of receipt

The PCS continuously forms the rx_symbol parameters received in sixteen consecutive PMA_UNITDATA.indication messages into n-bit code words that are passed to the PCS Hamming SD-FEC decoder function (see 155.2.5.1).

155.3.2.3 PMA_SIGNAL.indication

This primitive defines the transfer of the status of the PMA receive process in the SIGNAL_OK parameter from 400GBASE-ZR PMA to the 400GBASE-ZR PCS.

155.3.2.3.2 When generated

The PMA generates a PMA_SIGNAL.indication message whenever there is change in the value of the SIGNAL_OK parameter (see 155.3.3.9).

155.3.2.2.3 Effect of receipt

The PCS Synchronization process monitors the PMA_SIGNAL.indication primitive for a change in the SIGNAL_OK parameter (see 155.2.1).

- Move the last paragraph of the current subclause to a new subclause 155.3.3.9 titled 'Signal Indication Logic (SIL)'.

- Change the last paragraph of subclause 155.3.3.8 'Polarization combining and symbol de-interleaving' to read:

The sixteen encoded DP-16QAM symbols are transferred to the 400GBASE-ZR PCS sublayer as m-bit DP-16QAM symbols using sixteen PMA_UNITDATA.indication messages.

- Change 'PMA:IS_UNITDATA_0.request to PMA:IS_UNITDATA_7.request' to read 'PMA_UNITDATA.request' and 'PMA:IS_UNITDATA_0.indication to PMA:IS_UNITDATA_m-1.indication' to read ' PMA_UNITDATA.indication' in Figure 155-2 'Functional block diagram'.

- Change 'PMA:IS_UNITDATA_0.request to PMA:IS_UNITDATA_7.request' to read 'PMA_UNITDATA.request' and 'PMA:IS_UNITDATA_0.indication to PMA:IS_UNITDATA_m-1.indication' to read ' PMA_UNITDATA.indication' in Figure 155-10 '400GBASE-ZR PMA functional block diagram'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.2** *P* **50** *L* **3** # 264

Law, David — Hewlett Packard Enterprise

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

Since subclause 155.3.2 only summarizes the primitives, a cross reference to where they are defined should be added.

SuggestedRemedy

Suggest that 'The 400GBASE-ZR PMA service interface is provided ...' should be changed to read 'The 400GBASE-ZR PMA service interface (see 155.1.4.2) is provided ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **50** *L* **11** # 76

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **X** *PMA service interface*

"The primitives are defined for i = 0 to 7, and for j = 0 to m-1, where m is the number of bits of resolution of the received digitized DP-16QAM symbols"

The next paragraph says the nominal signaling rate is approximately 57.78 Gb/s in the transmit side and 57.78 GBd in the receive side.

Each DP-16QAM symbol corresponds to 4 bits, so with this definition, the rate of the receive direction DP-16QAM symbols should be a quarter of the transmit direction bit rate.

Alternatively m should be the number of bits of resolution per bit of information.

The meaning of tx_symbol and rx_symbol is unclear in this subclause, and may be changed e.g. if the tx_symbols are defined as Gray-coded PAM4 symbols or SD-FEC encoder codewords (suggested by another comments).

SuggestedRemedy

Rewrite this subclause as necessary such that the meaning of tx_symbol and rx_symbol is clear, and the rates match the meaning.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **50** *L* **16** # 265

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *PMA service interface*

Subclause 155.3.2 says '... sends eight parallel bit streams to the PMA, each at a nominal signaling rate of ...'. Since this is a signalling rate, the unit of measurement should be in Bd rather than Hz (see the following paragraph).

SuggestedRemedy

Suggest that '... ~50.212875 Gb/s +/-20 ppm (~57.78 Gb/s).' should read '... ~50.212875 GBd +/-20 ppm (~57.78 GBd).' (where +/- is a plus-minus symbol).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.2** *P* **50** *L* **16** # 482

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **X** *PMA service interface*

* ~50.212875 Gb/s: ~ too vague, signaling rate should be in GBd

SuggestedRemedy

Specify the rate without approximation

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **50** *L* **16** # 136

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **X** *PMA service interface*

Why is the approximate sign used in the term " (512/511) x (5485/5140) x (5488/5485) x (128/119) x ~50.212875 Gb/s ?20 ppm" . Isn't the nominal signalling rate known exactly ? I don't remember seeing the "approximate" sign used in other IEEE standards when referring to the nominal signaling rate?

SuggestedRemedy

This is more of a question of clarification ?

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **18** # 266

Law, David — Hewlett Packard Enterprise

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

There is a rectangle to the right of the 'Carrier phase recovery', 'PMD equalizer' and 'chromatic dispersion equalizer' within the 400GBASE-ZR PMA sublayer box in Figure 155-10 '400GBASE-ZR PMA functional block diagram' that is unlabelled.

SuggestedRemedy

Either label the rectangle or delete it.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **19** # 15

Bruckman, Leon — Huawei

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

Empty box without any fuction

SuggestedRemedy

Remove empty fbox from figure 155-10

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **28** # 267

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *PMA block diagram*

Subclause 155.3.3.4.1 says that 'All of the coherent signal to physical lane mappings in Table 155-7 are allowed for the Tx signal. This is because receivers can determine which physical lane is carrying which signal based on the contents of the FAW.'. As a result, it seems that the in-phase and quadrature-phase components of the X and Y polarizations can be mapped to the receive PMD service interface primitives in any of the eight ways listed in Table 155-7.

Further, subclause 155.3.3.7 'FAW, TS, and PS symbol removal' says 'The 400GBASE-ZR PMA receive path attains alignment lock to the 22-symbol FAW that is transmitted on each of the two transmission polarizations on the in-phase and quadrature-phase lanes.' and 'When the X and Y polarization symbol streams are identified and aligned to the super-frame format of Figure 155-12, the FAW, TS, and PS symbols are removed ...'. As a result, it seems the X and Y polarizations identification is performed by the FAW lock function, and pilot removal occurs after the FAW lock function.

SuggestedRemedy

[1] Suggest that the labels 'IX', 'QX', 'IY' and 'QY' be removed from below the 'ADC' block in Figure 155-10.

[2] Suggest that the Pilot removal (X) Pilot removal (Y) block be removed from Figure 155-10.

[3] Suggest that the label 'Align CFEC and FAW/TS symbols (X) remove' be changed to read:

FAW alignment
Remove FAW, PS, TS symbols

[4] Suggest that the label 'Align CFEC and FAW/TS symbols (Y) remove' be changed to read:

FAW alignment
Remove FAW, PS, TS symbols

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **31** # 385

Wienckowski, Natalie — General Motors

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

It's hard to see the text with the line through it.

SuggestedRemedy

Add a box around "400GBASE-ZR PMA sublayer" so the line is "behind" it.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **31** # 12

Lewis, Jon — Dell Technologies

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

Text and arrow intersect.

SuggestedRemedy

Remove intersection of text and arrow to make the figure more legible.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **48** # 268

Law, David — Hewlett Packard Enterprise

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

Suggest that '... through a signal indication logic (SIL) that reports ...' should read '... through a signal indication logic (SIL) function that reports ...'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **49** # 77

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *PMD:IS_SIGNAL*

Signal health should not be "based on receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer" because this indication is always OK.

SuggestedRemedy

Delete "receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer," and the comma after "functions".

In Figure 155-10 delete PMD:IS_SIGNAL.indication as input to the SIL.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.2** *P* **51** *L* **49** # 269

Law, David Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **D** *PMA block diagram*

Subclause 155.3.2 '400GBASE-ZR PMA service interface' says that 'The PMA:IS_SIGNAL.indication primitive is generated through a signal indication logic (SIL) that reports signal health based on receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer, data being processed successfully by the signal processing functions, and symbols being sent to the PCS on all of the output lanes.' however subclause 156.5.4 'PMD global signal detect function' says that 'The PMD global signal detect function shall set the state of the SIGNAL_DETECT parameter to a fixed OK value.' and that 'The presence of a valid signal is determined only by the 400GBASE-ZR PCS (see 155.2.1).'. In addition, subclause 155.2.1 says 'The PCS Synchronization process continually monitors PMA:IS_SIGNAL.indication(SIGNAL_OK). When SIGNAL_OK indicates OK, then the PCS synchronization process accepts the streams of symbols via the PMA:IS_UNITDATA_i.indication primitive.'.

Based on the signal indication logic (SIL) contained in the PMA sublayer described in subclause 155.3.2, and subclause 155.2.1 describing only the use of the SIGNAL_DETECT parameter in the PCS sublayer, it doesn't seem correct to say in subclause 156.5.4 that a valid signal is determined only by the PCS sublayer. And based on subclause 156.5.4 setting the SIGNAL_DETECT parameter of the PMD:IS_SIGNAL.indication to a fixed 'OK' value, it doesn't seem correct to say that the SIL will report signal health based on the PMD:IS_SIGNAL.indication primitive since it is fixed.

SuggestedRemedy

Suggest that:

[1] The PMD:IS_SIGNAL.indication primitive is disconnected from the SIL box in figure 155-10 and is shown as not used by the PMA sublayer.

[2] In subclause 155.3.2 the text '... reports signal health based on receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer, data being processed successfully by the signal ...' be changed to read '... reports signal health based on data being processed successfully by the signal ...'.

[3] In subclause 156.5.4 the text 'The presence of a valid signal is determined only by the 400GBASE-ZR PCS (see 155.2.1).' should be changed to read 'The presence of a valid signal is determined only by the SIL function in the PMA (see 155.3.2).'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.2** *P* **51** *L* **53** # 233

Law, David — Hewlett Packard Enterprise

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

SIGNAL_OK is a parameter that is passed by the PMA:IS_SIGNAL.indication primitive.

SuggestedRemedy

Suggest that '... the SIGNAL_OK primitive has the value FAIL.' should be changed to read '... the SIGNAL_OK parameter has the value FAIL.'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.3** *P* **52** *L* **3** # 213

Huber, Thomas — Nokia

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

Awkward grammar in the first sentence

SuggestedRemedy

Change ". adapt between the PCS layer digital symbols to and from the four analog signals." to ". adapt the PCS layer digital signals to and from the four analog signals."

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3** *P* **52** *L* **5** # 483

Dawe, Piers — Nvidia

Comment Type **T** *Comment Status* **X** *PMA description*

I don't see any loopback here. The only test signal comes from the PCS.

SuggestedRemedy

Delete "and optionally to provide test signals and loop-back"

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3** *P* **52** *L* **5** # 234

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *PMA description*

Subclause 155.3.3 'Functions within the PMA' says 'The purpose of the PMA is to ... and optionally to provide test signals and loop-back.'.
There, however, doesn't appear to be any subclauses under subclause 155.3 'Physical Medium Attachment (PMA) sublayer, type 400GBASE-ZR' that define test signals or loop-back.

SuggestedRemedy

Either add definitions defining test signals and loop back within the PMA or remove this text from subclause 155.3.3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.3** *P* **52** *L* **5** # 214

Huber, Thomas — Nokia

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

In the rest of 802.3, loopback is not hyphenated

SuggestedRemedy

Change loop-back to loopback

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.3** *P* **52** *L* **9** # 235

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *PMA description*

Subclause 155.3.3 'Functions within the PMA' says '... elements of a symbol, namely IX, QX, IY, or QY, ...', referencing IX, QX, IY, and QY as 'elements' of a DP-16QAM symbol.
Subclause 155.3.3.1 'Gray mapping and polarization distribution' says '- (c8i, c8i+1) maps to the in-phase (I) component of the X-polarization of si' referencing IX, QX, IY, and QY as 'components' of a DP-16QAM symbol.

SuggestedRemedy

Suggest that either 'element' or 'component' be used consistently to describe IX, QX, IY, and QY used to form a DP-16QAM symbol.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.3.1** P **52** L **15** # 78

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *Gray mapping*

It is not clear how the "Gray-coded symbol" defined here is used in the remainder of the process - the subsequent DP-16QAM mapping is defined in terms of bits, not symbols.

SuggestedRemedy

Consider defining the Gray code mapping as a function from bit-pairs to bit-pairs, instead of the set {-3, -1, +1, +3}, or removing it completely since it is embedded it in the mapping defined in Table 155-2.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.3.1** P **52** L **20** # 79

Ran, Adee Cisco

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

"Gray-coded signals" should be "Gray-coded symbols".

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** SC **155.3.3.1** P **52** L **21** # 484

Dawe, Piers Nvidia

Comment Type **TR** *Comment Status* **X** *PMA description*

This says the PMA does Gray de-mapping then it says it doesn't the PCS does it.

SuggestedRemedy

Remove lines 20-25, add apprpriate material to PCS section.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.3.1** P **52** L **27** # 80

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *Gray mapping*

"Note that the receive process mapping of Gray-coded signals is applicable only after the SD-FEC decoder process in the 400GBASE-ZR PCS"

This means that the Gray de-mapping function is not part of the PMA but part of the PCS; indeed, the service interface of the PMA is based on ADC samples, not bits, and the Gray de-mapping does not appear in Figure 155-10, because it cannot be performed until SD-FEC decoding (in the PCS) is completed.

Similarly, the Gray mapping in the Tx direction logically belongs in the PCS, because its output is Gray-coded symbols.

SuggestedRemedy

Possibly, move the content of the Gray mapping function to the PCS (retaining the polarization distribution in the PMA).

Or find another way to cleanly separate these functions.

Proposed Response *Response Status* **O**

Cl **155** SC **155.3.3.1** P **52** L **28** # 342

Zimmerman, George CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type **TR** *Comment Status* **X** *PMA description*

"The received symbol signals are digitized into more than 4 discrete levels by the analog to digital converters (ADC) in the PMA sublayer and the number of bits for each signal is m/4 bits." This is a description of an implementation and is inappropriate for an interoperability standard. If some description is needed, one could rewrite this more generally, as is suggested in the remedy. Further, it appears that the "m/4 bits" is a detail that is unused in the draft (I searched). If it is used somewhere, please provide a pointer to where it is relevant. Otherwise delete the unnecessary detail which looks like a specification but isn't.

SuggestedRemedy

Preferably - delete the indicated sentence.
Alternatively, change the indicated sentence to read "The received symbol signals are sampled and quantized in the PMA sublayer."
If the m/4 bits is used somewhere, provide a reference.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.1** *P* **52** *L* **32** # 236

Law, David — Hewlett Packard Enterprise

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

The terms 'DP-16QAM symbol' (e.g., page 52, line 32 and line 48), 'Gray-coded signals' (e.g., page 52, line 44) and 'Gray mapped' symbols (e.g., page 54, line 29) seem to be used interchangeably in the subclauses of 155.3.3 'Functions within the PMA'. For example, subclause 155.3.3.2 Symbol interleaving' says 'The DP-16QAM symbols are time interleaved ...' yet the following subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says '... the stream of Gray mapped, interleaved symbols are ...'. It, however, appears the 'symbols' in both cases are the same.

SuggestedRemedy

Suggest that a consistent terminology should be used for DP-16QAM symbols.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.1** *P* **52** *L* **32** # 81

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **X** *Symbol distribution*

"Each 128-bit code word from the SD-FEC encoder c = [c0, c1,.,c127], is mapped to sixteen DP-16QAM symbols (S)"

Does the PMA have to be aligned with the SD-FEC encoder codewords?

If so, the alignment function is not defined; it may be more appropriate to define the service interface in the Tx direction in terms of 128-bit codewords instead of bits on 8 lanes, such that the alignment is inherent.

If not, please clarify that the 128-bit blocks start point within the SD-FEC codeword is arbitrary.

A similar question holds for the Rx direction (based on the text in 155.3.3.8) - is the alignment of SD-FEC defined as a PMA function or a PCS function?

SuggestedRemedy

From 155.3.3.2 it seems that alignment is necessary, so the service interface should be defined with 128-element vectors (instead of lanes), and perhaps use tx_word instead of tx_symbol and rx_word instead of rx_symbol.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.1** *P* **52** *L* **32** # 237

Law, David — Hewlett Packard Enterprise

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

The terms '128-bit code word' (e.g., page 52, line 32), 'FEC codeword' (e.g., page 52, line 44), SD-FEC codewords (e.g., page 53, line 36), 'Hamming code words' (e.g., page 52, line 53), and just 'code word' (page 53, line 32) seem to be used interchangeably to describe the 128-bit code word that is passed across the 8 lane PMA service interface to the PMA sublayer as 16 groups of 8

SuggestedRemedy

Suggest that the term 'SD-FEC codeword' be used consistently in subclause 155.3.3 to describe the 128-bit code word passed across the PMA service interface.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.3.2** *P* **52** *L* **53** # 238

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *PMA description*

Doesn't the symbol interleaving operate on groups of sixteen DP-16QAM symbols, mapped from the 128-bit SD-FEC codewords passed across the PMA service interface, as described in subclause 155.3.3.1.

SuggestedRemedy

Suggest that the text 'The symbol interleaver performs an 8-way interleaving of symbols from Hamming code words ...' be changed to read 'The symbol interleaver performs an 8-way interleaving of groups of sixteen symbols mapped from SD-FEC codewords ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.3.2** *P* **52** *L* **54** # 239

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *PMA description*

On page 52, line 54, the symbol number is in normal font whereas it is in subscript font in the remainder of subclause 155.3.3.2.

SuggestedRemedy

Suggest that, based on page 52, line 54, the symbol number should be in normal rather than subscript font in the rest of the subclause to make it clear the two numbers following 'S' separated by a comma are the code word number followed by the symbol number in the code word. Alternatively, perhaps it should be stated that two numbers following 'S' separated by a comma are the code word number followed by the symbol number in the code word.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.2** *P* **53** *L* **33** # 240

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *PMA description*

According to 155.3.3.1 Gray mapping and polarization distribution the 'S' code word is an array of DP-16QAM symbols (page 52, line 35). As a result, aren't 'Symbols from eight code words [S0, ...,S7] ...' (page 52, line 54) a total of 128 DP-16QAM symbols? This seems to be confirmed by Figure 155-11 'Eight-way Hamming code interleaver' which shows symbols S0,0 through S7,15 which is 128 symbols.

SuggestedRemedy

Suggest the text 'When the 64-symbol buffer is full ...' be changed to read 'When the 128-symbol buffer is full ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.2** *P* **53** *L* **34** # 215

Huber, Thomas — Nokia

Comment Type **TR** *Comment Status* **X** *symbol interleaving*

The intended interleaving is that first symbol of each of 16 codewords is transmitted, then the second symbol, etc. The example is not consistent with that - S(1,1) should follow S(0,1) rather than S(0,2) (as seen in figure 155-11).

SuggestedRemedy

Change S0,2 to S1,1

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.2** *P* **54** *L* **11** # 216

Huber, Thomas — Nokia

Comment Type **T** *Comment Status* **X** *Hamming code interleaver*

There is a horizontal line missing between the second and third sets of symbols in Figure 155-11

SuggestedRemedy

Add the missing line

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **54** *L* **27** # 241

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *DSP frame*

There is no specification of how the output from PAM symbol interleaving function is mapped into the payload fields of the sub-frame of a super-frame.

SuggestedRemedy

Add a subclause to describe how the output of the PAM symbol interleaving function is mapped into the payload fields of the sub-frame of a super-frame.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **54** *L* **31** # 242

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *DSP frame*

Subclause 155.3.3.3 'Insert FAW, TS and PS symbols' however says 'A super-frame is defined as a set of 181 888 symbols in each of the X and Y polarizations including ....'. Since a separate super-frame for each of the X and Y polarizations, the 'symbols' seem to be 16QAM symbols rather than DP-16QAM symbols.

SuggestedRemedy

Suggest that the text 'A super-frame is defined as a set of 181 888 symbols in each of the X and Y polarizations including 175 616 payload symbols and 6272 additional symbols.' be changed to read 'A super-frame is defined as a set of 181 888 16QAM symbols for each of the X and Y polarizations including 175 616 payload 16QAM symbols and 6272 additional 16QAM symbols.'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **54** *L* **32** # 137

Nicholl, Gary — Cisco Systems

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

The sentence states " Each super-frame is
made up of 49 sub-frames . ". This is unusual terminolgy as a super-frame (or mutli-frame) is usually made of n frames (and not -sub-frames). This also begs the question as to why "super-frame" is used instead of the more usual "multi-frame"

SuggestedRemedy

Propose changing "super-frame" to "multi-frame" and "sub-frame" to "frame" throughout this section. An alternative would be to use "frame" and "sub-frame".

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **54** *L* **37** # 243

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *DSP frame*

The second paragraph of subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says 'The first sub-frame of a super-frame includes ... 76 reserved symbols (rsvd<0:75>) ...', however, there is no specification of what 16QAM symbol should be transmitted for these reserved symbols.

SuggestedRemedy

Define the 16QAM symbol to be transmitted for these 76 reserved symbols.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **55** *L* **4** # 244

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *DSP frame*

The contents of the sub-frame 0 between P4 and P115, and sub-frame 1 and 48 between P2 and P115, are not defined in Figure 155-12.

For sub-frame 0, the number of symbols shown in Figure 155-12 after P0, P1, P2, P3 and P115 is 31. A sub-frame is 3712 symbols long, and there are 116 PS symbols, and since 3712/32 = 116 it seems reasonable to assume that there are 31 symbols after every PS symbol for sub-frame 0, but this needs to be specified.

For sub-frame 1, the number of symbols shown in Figure 155-12 after P0 is 31, after P1 is 31, however, after P115 it is 32. Similarly, for sub-frame 48, the number of symbols shown in Figure 155-12 after P0 is 42, after P1 is 31, and after P115 it is 32. It is therefore difficult to make an assumption about the number of symbols after each PS between P2 and P115, so this needs to be specified.

SuggestedRemedy

Specify the contents of the sub-frame 0 between P4 and P115, and sub-frame 1 and 48 between P2 and P115.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **55** *L* **10** # 245

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *DSP frame*

The third paragraph of subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says that 'The next 48 sub-frames of the super-frame have an 11-symbol TS (ts<0:10>), 116 PS symbols [P0, .,P115], and 3586 payload symbols.' which seems to imply that sub-frames 1 through 48 are all the same formats. Figure 155-12, however, shows 31 symbols after P0 for sub-frame 1, yet 42 symbols after P0 for sub-frame 48. Similarly, Figure 155-12 shows 31 symbols after P1 for sub-frame 1, yet 32 symbols after P1 for sub-frame 48. And if sub-frame 1 and sub-frame 48 are different formats, what are the formats for sub-frames 2 through 47.

The 31 symbols after P0 shown for sub-frame 1 in Figure 155-12 are ts<0:10>, but P0 overlaps ts<0>, so this is 10 bits, followed by m<3488:3508> which is 21 bits resulting in a total of 31 bits. The 42 symbols after P0 shown for sub-frame 48 in Figure 155-12 are ts<0:10>, but P0 overlaps ts<0>, so this is 10 bits, followed by m<172 030:172 061> which is 32 bits, resulting in a total of 42 bits. The 31 symbols after P1 shown for sub-frame 1 in Figure 155-12 are m<3509:3539>, the 32 symbols after P1 shown for sub-frame 48 in Figure
155-12 are m<172 062:172 093>.

SuggestedRemedy

If sub-frames 1 through 48 are not the same format, specify which sub-frames are in what format. If they are in the same format, correct the figure to show the correct number of bits.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **55** *L* **11** # 270

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *DSP frame*

While sub-frames 1 and 48 are annotated with 3 and 0 in P0, sub-frames 0 doesn't have this annotation. In addition, it isn't clear what the 3 to 0 signifies, perhaps that each DP-16QAM symbol has four components, but subclause 155.3.3.3 (page 54, line 29) says 'For each polarization, the stream of Gray mapped, interleaved symbols are assembled into a frame format suitable for transmission over ...' which seems to imply a sperate frame for each polarization.

SuggestedRemedy

Either remove the 3 to 0 annotation for sub-frames 1 and 48 or add to sub-frames 0 and define the meaning.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3** *P* **55** *L* **25** # 271

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *DSP frame*

Subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says 'The super-frame and sub-frame formats are shown in Figure 155-12.', however the title of Figure 155-12 'Transmission frame and sub-frame organization and bit ordering' and there doesn't seem to be any illustration of a super-frame.

SuggestedRemedy

[1] Suggest the title of Figure 155-12 be changed to read 'Super-frame and sub-frame organization and bit ordering'.
[2] Suggest that the transmission order of the sub-frame and sub-frames to from a super-frame be added to the figure.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.1** *P* **55** *L* **40** # 485

Dawe, Piers — Nvidia

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

split table (not properly indicated). Also Table 155-6-PS

SuggestedRemedy

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **3** # 82

Ran, Adee — Cisco

Comment Type **T** *Comment Status* **X** *PS generator*

"The PS is a fixed PRBS10 sequence mapped to 16QAM symbols with different seed values for X and Y polarizations. The generator for the pilot sequence is shown in Figure 155-13"

Is it two separate PRBS sequences with different seeds?

Also it is unclear how bits are mapped to the I and Q values in Table 155-6.

SuggestedRemedy

Rewrite to clarify.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **8** # 273

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *PS generator*

There is no specification of how the PRBS10 sequence is mapped to 16QAM symbols. From review of Table 155-6 it appears that the generator in Figure 155-13 is used to produce 232 bits. The even bits are mapped to the in-phase component of the 16QAM symbol, odd bits mapped to the quadrature-phase component of the 16QAM symbol, with a 0 mapped to a '-3' and a 1 mapped to a '3'.

SuggestedRemedy

Suggest that the second paragraph of subclause 155.3.3.3.3 be changed to read:

The seed is reset at the start of every sub-frame, so that the same 116 symbols, [P0, ...,P115] are inserted into every sub-frame of the same polarization. For each polarization X and Y, the generator produces 232 bits PRBS[231:0] that are mapped to 116 16QAM symbols,

[P0, ...,P115]

where for i = 0 to 115,

- PSBR[2i] maps to the in-phase (I) component of the 16QAM symbol [Pi] for the respective polarization
- PSBR[2i+1] maps to the quadrature-phase (Q) component of the 16QAM symbol [Pi] for the respective polarization

and where,

- 0 maps to -3 for the respective 16QAM symbol component
- 1 maps to +3 for the respective 16QAM symbol component

The generator polynomial and seed values are listed in Table 155-6 and the complete PS sequence is shown in Table 155-6.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **8** # 272

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *PS generator*

Subclause 155.3.3.3.3 'Pilot sequence (PS)' says that 'The seed is reset at the start of every sub-frame ...'. Isn't it the generator that is reset at the start of every sub-frame using the seed value?

SuggestedRemedy

Suggest that the text 'The seed is reset at the start of every sub-frame, so that the same ...' be changed to read 'The generator is initialized using the seed at the start of every sub-frame, so that the same ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **10** # 274

Law, David — Hewlett Packard Enterprise

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

Since the abbreviation 'PS' is 'pilot sequence' the text '... PS sequence ...' expands to '... pilot sequence sequence ...'.

SuggestedRemedy

Suggest the text '... the complete PS sequence is ...' be changed to read '... the complete PS is ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **12** # 275

Law, David — Hewlett Packard Enterprise

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

Add an arrow head to the line from P8, P4 and P3 where they connect to the XOR logic operator symbol.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **14** # 486

Dawe, Piers — Nvidia

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

Missing arrowheads on 3 vertical paths

SuggestedRemedy

Add them

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **32** # 487

Dawe, Piers — Nvidia

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

Table 155-6--PS

SuggestedRemedy

Use whole words. Pilot sequence

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.3.3** *P* **57** *L* **33** # 276

Law, David — Hewlett Packard Enterprise

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

There appear to be two separate tables number 155-6, the first labelled 'Table 155-5-PS generator polynomial and seed values', the second labelled 'Table 155-6-PS'.

SuggestedRemedy

[1] Suggest that the second Table 155-6 'PS' be renumbered to be 155-7, with subsequent tables renumbered, and its title should be
[2] Suggest that the title of the second Table 155-6 should be changed from 'PS' to read 'Pilot sequence'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.4** *P* **58** *L* **30** # 277

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *PMA description*

The title of subclause 155.3.3.4 is '16QAM encode and signal drivers' however I don't think IEEE P802.3cw specifies a physical instantiation of the PMD service interface, and I don't see any text related to signal drivers in subclause 155.3.3.4. Perhaps it would be better to reference the DAC (see Figure 155-10) to parallel the title of subclause 155.3.3.5 below.

SuggestedRemedy

Suggest that the title of subclause 155.3.3.4 is changed to read '16QAM encode and DAC'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.4** *P* **58** *L* **32** # 138

Nicholl, Gary — Cisco Systems

Comment Type **TR** *Comment Status* **X** *signals per polarization*

The first sentence states " On each polarization, the stream of symbols is converted to four analog signals per symbol: IX, QX, IY, and
QY,.....". This makes it sound like that they are four analog signals per symbol per polarization (making 8 in total) .

I thought IX and QX formed one 16QAM symbol on one polarization (the X polarization) and IY and QY formed one 16QAM symbol for the other polarization (the Y polarization).

SuggestedRemedy

Rewrite the text to make it clear that there are not four analog signals (IX, QX, IY, QY) for each polarization (which would mean 8 analog signals in total), but instead there are two analog signals (IX, QX) per symbol for the X polarization and two analog signals (IY, QY) per symbol for the Y polarization.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.4.1** *P* **58** *L* **38** # 83

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *symbol mapping*

The title says "Symbol mapping to physical lanes", but in the text it is "coherent signal to physical lane mappings".

The conversion of symbols to signals is done in the PMD.

SuggestedRemedy

Change "All of the coherent signal to physical lane mappings" to "All options for symbol mapping to physical lanes". Change Table 155-7 title accordingly.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.4.1** *P* **58** *L* **39** # 191

D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

This sentence appears to include unnecessary information -
Note that interleaving of signals by polarization is not allowed since this would add a non-essential
level of complexity to the Rx digital processing.

SuggestedRemedy

modify sentence to
Note that interleaving of signals by polarization is not allowed.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.3.4.1** *P* **58** *L* **42** # 139

Nicholl, Gary Cisco Systems

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

The last sentence states ". which correspond to the inter-sublayer signals PMD:IS_UNITDATA_0.request ..". I presume in this case we are talking about the inter-sublayer signals below the PMA (PMD service interface) and not the inter-sublayer signals above the PMA. (PMA service interface).

SuggestedRemedy

Update the text to make it clear that the "inter-sublayer signals" being referred to are below the PMA, or alternatively just refer to the PMD service interface directly.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.3.3.5** *P* **58** *L* **45** # 343

Zimmerman, George CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type **TR** *Comment Status* **X** *PMA description*

"The signals are sampled by an ADC on each lane at a sampling rate." "The details of the ADC . are implementation specific". This is a description of an implementation, not appropriate for an interoperability specification. If someone could do the signal processing optically, analog, or by magic, it would still comply with the standard. The fact that an ADC is used, isn't a part of the interoperability standard, or even any of the characteristics of the ADC. Hence the mention is inappropriate and should be deleted. The sentence works just fine anyways and describes the processing without the "by an ADC".

SuggestedRemedy

Change header of 155.3.5 to Receive signal sampling.
On line 50, Delete "by an ADC"
Change line 54 to "The details of the sampling, including any quantization and the chosen sampling rate are implementation specific."
Replace "ADC" with "Sampler" in figure 155-10.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.5** *P* **58** *L* **45** # 341

Zimmerman, George CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type **TR** *Comment Status* **X** *PMA desciption*

"The signals are sampled by an ADC on each lane at a sampling rate." "The details of the ADC . are implementation specific". This is a description of an implementation, not appropriate for an interoperability specification. If someone could do the signal processing optically, analog, or by magic, it would still comply with the standard. The fact that an ADC is used, isn't a part of the interoperability standard, or even any of the characteristics of the ADC. Hence the mention is inappropriate and should be deleted. The sentence works just fine anyways and describes the processing without the "by an ADC".

SuggestedRemedy

Change header of 155.3.5 to Receive signal sampling.
On line 50, Delete "by an ADC"
Change line 54 to "The details of the sampling, including any quantization and the chosen sampling rate are implementation specific."
Replace "ADC" with "Sampler" in figure 155-10.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.5** *P* **58** *L* **47** # 84

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *Received signals*

The signals IX/QX/IY/QX are just signals (per 155.3.3.4 and 156.1), and are not "coherent" by themselves. The coherency is part of the PMD.

SuggestedRemedy

Change "Four coherent signals" to "Four continuous signals".

In 155.3.3.4.1 and in Table 155-7 change "coherent signal" to "symbol".

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.6** *P* **59** *L* **22** # 85

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *Receive signals*

"The encoding of 16QAM symbols is based on Table 155-2"

This table does not define any encoding of input symbols - it defines mapping of bits tuples to output symbols.

"but with a higher resolution than 4 bits"

Resolution is for the digital representation of each analog value. The resolution here should be more than two bits (per dimension). The resolution seems to be left open to implementation.

This should be written more clearly. The suggested remedy is my attempt, but other text may be used.

SuggestedRemedy

Change from
"The encoding of 16QAM symbols is based on Table 155-2 but with a higher resolution than 4 bits to enable the SD-FEC decoder to detect and correct symbol errors"

to "The 16QAM symbols should be sampled with more than two bits per dimension, in order to enable the SD-FEC decoder to correct errors and recover the bits from the symbols based on the mapping in Table 155-2".

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.3.3.6** *P* **59** *L* **40** # 86

Ran, Adee Cisco

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

The hyphen in "-12" should be an en-dash (or minus sign).

SuggestedRemedy

Per comment

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.3.7** *P* **59** *L* **41** # 278

Law, David Hewlett Packard Enterprise

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

Suggest that '... frames with minimum interpacket ...' should read '... frames with a minimum interpacket ...'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.3.7** *P* **59** *L* **42** # 279

Law, David Hewlett Packard Enterprise

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

Subclause 155.3.3.6 'Receive signal processing' says 'Implementations are required to have a frame loss ratio (see 1.4.275) of less than 1.7 x 10-12 for 64-octet frames with minimum interpacket gap when additionally processed according to this clause.'. It's not clear what the additionally processed is in reference to as there is no other processing referenced.

SuggestedRemedy

Suggest that '... when additionally processed according to this clause.' should read '... when processed according to this clause.'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.3.3.8** *P* **60** *L* **4** # 87

Ran, Adee Cisco

Comment Type **T** *Comment Status* **X** *Pol combining*

"comprising sixteen symbols encoded as shown in Table 155-2 but at a higher resolution than 8 bits"

SD-FEC codewords are by definition 128 bits; and table 155-2 shows mapping of bit tuples into output symbols.

Also, according to the next paragraph, the output of the process is a single stream of samples, not codewords.

This text seems to specify that the input to the decoder should be four streams of samples (combinations of X/Y and I/Q) with more than two bits per sample.

SuggestedRemedy

Rewrite to clarify.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2** *P* **60** *L* **22** # 88

Ran, Adee Cisco

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

The subclause hierarchy below "State variables" is unnecessary, and includes subclauses that are not about state variables (155.4.2.2 through 155.4.2.4)

SuggestedRemedy

Delete 155.4.2 and move its subclauses upper in the hierarchy (to become 55.4.2 through 155.4.5).

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **26** # 280

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

Assuming this is a boolean variable, suggest this should be noted in the variable description, as with other boolean variables.

SuggestedRemedy

Suggest that 'A variable set by the ...' should read 'A boolean variable set by the ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **29** # 281

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

The description of the 'pma_enable_deskew' variable says 'A boolean variable that enables and disables the PMA deskew process.'. Is this correct as 'pma_enable_deskew' is an output of the Figure 155 15 'PMA deskew state diagram' that doesn't appear to be used anywhere else.

SuggestedRemedy

Suggest the description of the 'pma_enable_deskew' variable should be changed to read 'A Boolean variable that set to true when deskew is enabled and set to false when deskew is disabled. Received symbols may be discarded whenever deskew is enabled.'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **30** # 282

Law, David Hewlett Packard Enterprise

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

Since Boolean is named after George Boole, I believe that it should always be Boolean (and not boolean).

SuggestedRemedy

Change all instances of 'boolean' to 'Boolean'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **34** # 140

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **D** *PMA lanes*

Definiton of "pma_alignment _valid" variable. Reading the previous text it is not clear exactly what consititues a PMA lane, and how many PMA lanes there are, and how each PMA lane is assigned a unique lane number ? The definition also refers to "PMA lanes are deskewed". I don't see any mention of PMA lane deskew in the functional block diagram in Figure 155-10.

SuggestedRemedy

Maybe this is all clearly defined earlier in the document. If so then the editors can reject this comment with a reference to the appropriate section of text. If not then the variable description needs to be updated to better refelct thefunctional descriptions earlier in this clause. This comment also applies to other variables defined in 155.4.2.1, that refer to "PMA lanes".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **40** # 283

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **D** *state variables*

The description of the 'reset' variable says that it is 'A boolean variable that controls the resetting of the PCS and PMA sublayers' and that 'It is true whenever a reset is necessary including when reset is initiated from the MDIO ... and when the MDIO has put the PCS and PMA sublayers into low-power mode.'.

The PMA and PCS are separate MMDs (see Table 45-1). The PMA/PMD reset bit is 1.0.15 and the low power bit is 1.0.11, both found in PMA/PMD control 1 register. The PCS reset bit is 3.0.15 and the low power bit is 3.0.11, both found in the PCS control 1 register. Since these registers are in separate MMDs, and since their state is not communicate across the PMA service interface, the PMA and PCS resets can operate independently.

SuggestedRemedy

[1] Rename the 'reset' variable used in Figure 155-14 'Frame alignment word (FAW) lock state diagram' to be 'pma_reset'.

[2] Rename the 'reset' variable used in Figure 155-15 'PMA deskew state diagram' to be 'pma_reset'.

[3] Rename the 'reset' variable used in Figure 155-16 'Alignment marker lock state diagram' to be 'pcs_reset'.

[4] Rename the 'reset' variable defined in subclause 155.4.2.1 'Variables' to be 'pma_reset' and change the description to read 'A Boolean variable that controls the resetting of the PMA sublayer. It is true whenever a reset is necessary including when reset is initiated from the MDIO, during power on, and when the MDIO has put the PMA sublayer into low-power mode.

[5] Add a definition of the 'pcs_reset' variable to subclause 155.4.2.1 'Variables' with the description 'A Boolean variable that controls the resetting of the PCS sublayer. It is true whenever a reset is necessary including when reset is initiated from the MDIO, during power on, and when the MDIO has put the PCS sublayer into low-power mode.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **44** # 284

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

The description of the 'signal_ok' variable says 'A boolean variable that is set based on the most recently received value of PMA:IS_SIGNAL.indication(SIGNAL_OK).' however that is generated by the PMA, see last paragraph of subclause 155.3.2 400GBASE-ZR 'PMA service interface'.

SuggestedRemedy

[1] Rename the 'signal_ok' variable used in Figure 155-14 'Frame alignment word (FAW) lock state diagram' to be 'pma_signal_ok'.

[2] Rename the 'signal_ok' variable used in Figure 155-16 'Alignment marker lock state diagram' to be 'pcs_signal_ok'.

[3] Rename the 'signal_ok' variable defined in subclause 155.4.2.1 'Variables' to be 'pcs_signal_ok' and change the description to read 'A Boolean variable that is set based on the most recently received SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primative. It is true if the value was OK and false if the value was FAIL.'.

[4] Add a new variable 'pma_signal_ok' with the description 'A Boolean variable that is set by the signal indication logic (see 155.3.2.). It is true when symbols received from the PMD are being processed successfully by the signal processing, false otherwise.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **44** # 285

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

Subclause 155.4.2.1 'Variables' says 'The PMA:IS_SIGNAL.indication primitive is generated through a signal indication logic (SIL) that reports signal health based on ... symbols being sent to the PCS on all of the output lanes.'. The SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive is, however, used to derive the signal_ok variable (page 60, line 45) which is used as an 'open arrow' entry condition to the 'LOCK_INIT' state of the Figure 155-14 Frame alignment word (FAW) lock state diagram.

As a result, it appears that if the SIGNAL_OK parameter is ever set to FAIL, setting 'signal_ok' to FALSE, the figure 155-14 Frame alignment word (FAW) lock state diagram will enter the 'LOCK_INIT' state. I assume this will mean that symbols will not be sent to the PCS since the PMA will not have FAW alignment. This in turn will mean the condition 'symbols being sent to the PCS' for the SIL to set the SIGNAL_OK parameter to OK will not be met.

The PMA will then be locked in this condition permanently. The SIL cannot set the SIGNAL_OK parameter to OK until symbols are sent to the PCS. Yet symbols won't be sent to the PCS until the SIGNAL_OK parameter is set to OK.

SuggestedRemedy

Please clarify the operation of the signal indication logic. Suggest, based on Figure 155-10, and the dotted line from the 'Carrier phase recovery block to the SIL, that the 'signal_ok' variable used by the Frame alignment word (FAW) lock state diagram should be based on the status of the blocks below the 'Pilot removal' blocks while the SIGNAL_OK parameter sent to the PCS should also use the FAW alignment status.

See also my other comment suggest separate 'pma_signal_ok' and 'pcs_signal_ok' variables.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **60** *L* **51** # 405

Slavick, Jeff — Broadcom

Comment Type **T** *Comment Status* **X** *state variables*

Definition of restart_lock begins by talking about how it affects all lanes, then states it activates when 15 FAWs fail to match, but doesn't clearly define that's 15 failures in a row on a single PMA lane.

SuggestedRemedy

Change "fail to match" to "fail to match on a given PMA lane"

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **3** # 141

Nicholl, Gary — Cisco Systems

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

Defintion of variable "faws_lock<x>". A number of issues here. Firstly the text states that "...receiver has detected the location of the FAW for a
given lane on the PMA service interface .". There is no "FAW" on the "PMA service interface" (i.e. the interface above the PMA sublayer) as the FAW is inserted/removed by the PMA sublayer itself. I tihnk what is meant here is the "PMD service interface" and not the "PMA service interface"? Secondly the description states "..where x=0:3". This suggests that there are four separate FAWs being locked to, whereas according to section 155.3.3.3 and Figure 155-10 there is only a single FAWs inserted per polarization, so one FAW for X polarization and one FAW for Y polarization.

SuggestedRemedy

Correct the reference to the PMD service interface (if the assumption in the comment is correct) and explain why there are 4 "faws_lock<x>" boolean variables when according to section 155.3.3.3 there are only two FAWs (one for X polarization and one for Y polarization)

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **11** # 142

Nicholl, Gary — Cisco Systems

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

Definiton of "faw_valid". The references to "Table 155-3" and section "155.3.3.3.1" are not active cross-references.

SuggestedRemedy

Correct cross-references.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **11** # 287

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *state variables*

The description of the 'faw_valid' variable says 'The FAW consists of one of the sequences listed in Table 155-3.' but then 'The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.3.1.'. The sequence listed in Table 155-3, and the candidate sequences received over the PMD service interface, are both 22 DP-16QAM symbols, not 44 bits. Based on slide 4 of the contribution 'faw_valid analysis' from Mike Sluyski <https://www.ieee802.org/3/cw/public/22_0523/sluyski_3cw_01a_220523.pdf#page=4> referencing a 'QPSK FAW' value of 44 in the spreadsheet, I assume the reference to 36 bits matching the 44 known bits should be to 36 16QAM symbols matching the 44 16QAM symbols (which form the 22 DP-16QAM symbol FAW sequence), defined in Table 155-3.

Additionally, isn't it the case that the four components of the DP-16QAM symbols of the candidate 22 symbol block received over the four-lane PMD service interface can be mapped to the four lanes in any of eight ways defined in Table 155-7? If that is the case, suggest that this is also addressed in the description of the 'faw_valid' variable.

SuggestedRemedy

Suggest that the 'faw_valid' variable description should be changed to read:

A Boolean variable that is set to true if the candidate 22 DP-16QAM symbol block received over the four-lane PMD service interface is a valid FAW sequence. The candidate 22 DP-16QAM symbol block is compared to the FAW sequence defined in Table 155-3, considering all permitted PMD service interface lanes mappings defined in Table 155-7. The candidate 22 DP-16QAM symbol block is considered to be a valid FAW sequence if at least 36 of its component 16QAM symbols match, in value, sequence position, and the 44 known 16QAM symbols of the FAW sequence defined in Table 155-3.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **11** # 288

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *state variables*

The definition of the 'faw_valid' variable says '... set to true if the received 22-symbol block is a valid FAW.'. According to the super-frame format defined in subclause 155.3.3.3 the 22 FAW symbols are transmitted over a total of 23 symbols, as Pilot Sequence index P1 is inserted between the symbols faw<20> and faw <21> (see figure 155-12). As a result, a valid FAW will never be found in a received 22-symbol block, only in a received 23-symbol block after the 22nd symbol is deleted.

SuggestedRemedy

If needed, clarify the definition of the 'faw_valid' variable to account for the P1 symbol inserted between the faw<20> and faw <21> symbols.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **14** # 13

Bruckman, Leon — Huawei

Comment Type **T** *Comment Status* **X** *state variables*

Clause 155.3.3.3.1 defines FAW as a 22 symbols sequence, "bits" are not mentioned there

SuggestedRemedy

For consistency replace: "The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.3.1.", with: "The sequence is considered to be valid if at least 18 symbols match the 22 known symbols of the FAW pattern described in 155.3.3.3.1."

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **14** # 404

Slavick, Jeff — Broadcom

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

The reference to 155.3.3.3.1 is not hyperlinked in faw_valid

SuggestedRemedy

make it a link

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **18** # 289

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

Subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says that 'A super-frame is defined as .... including 175 616 payload symbols and 6272 additional symbols.' and that 'The first sub-frame of a super-frame includes ... a 22-symbol FAW (faw<0:21>) ... and 3488 payload symbols (m<0:3487>).'. Based on this it seems that the FAW is not considered part of the payload.

SuggestedRemedy

Since the title of subclause 155.3.3.3.1 'Frame alignment word (FAW) sequence', suggest that the four instances of '... FAW payload ...' (page 61, lines 16, 18, 20 and 23) be changed to read '... FAW sequence ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **19** # 290

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *state variables*

The description of the variable 'current_pmal' says 'The PMA lane number is determined by the FAW payloads based on the mapping defined in 155.3.3.3.1.' and the description of the variable 'pma_lane' says 'The PMA lane number is determined by matching the received 22-symbol sequence to the values in one of the columns of Table 155-3 ...'. Subclause 155.3.3.3.1, nor Table 155-3, provide any lane numbers.

The PMA lane number is not referenced outside the state diagrams, other than in Table 155-9 where pma_lane_mapping<x> is mapped to register 3.400 through 3.403, which doesn't seem correct as these are PCS lane registers, not PMA lane registers (see my other comment on this). As a result, rather than add PMA lane numbers to subclause 155.3.3.3.1 and/or Table 155-3, suggest references to 'PMA lane numbers' be changed to 'PMA lane identifiers' with the values 'Ix', 'Qx', 'Iy' and 'Qy'. The state diagram can compare PMA lane identifiers to see if they match and can test for a unique PMA lane identifier for each PMA lane as easily as it can for PMA lane numbers.

In addition, the description of the 'faw_valid' variable says 'The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.3.1.'. The description of the variable 'current_pmal' however says 'The PMA lane number is determined by the FAW payloads based on the mapping defined in 155.3.3.3.1.'. Similarly, the description of the variable 'pma_lane' says 'The PMA lane number is determined by matching the received 22-symbol sequence to the values in one of the columns of Table 155-3 ...'. Neither mention the '36 out 44' approach used for the 'faw_valid' variable.

The 'current_pmal' description could imply a requirement for a full match to a column of Table 155-3, and the 'pma_lane' description requires a full match to a column of Table 155-3. Since the entry into states where 'current_pmal' is used is based on faw_valid = TRUE, doesn't this mean that the use of the '36 out 44' approach, which permits 8 16QAM symbols to not match, needs to be considered when determining 'current_pmal' and 'pma_lane'. As a worst-case example, couldn't a faw_valid = TRUE result from eight 16QAM symbols not matching due to errors on just one phase of just one of polarization. This would seem to imply that the compare for the values received on a lane with the columns of Table 155-3 also needs to permit eight values not matching.

In the case of 'current_pmal' and 'pma_lane', as there are only 22 values in a column of Table 155-3, it would seem a match would have to be valid if at least 14 values received on the lane match the 22 known values defined in a column to address the worst-case of all eight errors on one phase of one of polarization. It seems there may, however, be another approach to determine 'current_pmal' and 'pma_lane'. Doesn't the PMD lane mapping row selected from Table 155-7 to achieve faw_valid = TRUE inherently provide the 'current_pmal' and 'pma_lane' values (see my comment on faw_valid)?

Finally, as this variable is used by a state diagram within the PMA, which sits above the PMD, the text '... is recognized on a given lane of the PMA service interface.' should read '... is recognized on a given lane of the PMD service interface.'.

SuggestedRemedy

[1] Change the description of the first_pmal variable to read as follows (note my other comment to change the coherent signal labels in Table 155-7 would impact this item if accepted):

A variable that holds the PMA lane identifier corresponding to the first FAW sequence that is recognized on a given lane of the PMD service interface. It is compared to the PMA lane identifier corresponding to the next FAW payload that is tested. The PMA lane identifier is the value for the given lane in the row of Table 155-7 that defines the PMD service interface lane mapping used to find the match for the current FAW sequence as described in the faw_valid variable.

Values:
Ix: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is XI.
Qx: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is XQ.
Iy: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is YI.
Qy: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is YQ.

[2] Change the description of the current_pmal variable to read as follows:

A variable that holds the PMA lane identifier corresponding to the current FAW sequence that is recognized on a given lane of the PMD service interface. It is compared to the variable first_pmal to confirm that the location of the FAW sequence has been detected. The PMA lane identifier is the value for the given lane in the row of Table 155-7 that defines the PMD service interface lane mapping used to find the match for the current FAW sequence as described in the faw_valid variable.

Values:
See first_pmal.

[3] Change the description of the pma_lane variable to read as follows:

pma_lane

A variable that holds the PMA lane identifier received on lane x of the PMA service interface when faws_lock<x> = TRUE. The PMA lane identifier is determined by matching the received 22-symbol FAW sequence to the values in one of the columns of Table 155-3. The PMA lane identifier is the value for the given lane in the row of Table 155-7 that defines the PMD service interface lane mapping used to find the match for the current FAW sequence as described in the faw_valid variable.

Values:

See first_pmal.

[4] Change all instances of '... PMA lane number ...' to '... PMA lane identifier ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **28** # 143

Nicholl, Gary Cisco Systems

Comment Type **TR** *Comment Status* **D** *PMA lanes*

Defintion of variable "pma_lane". The defintion states that there can be 4 PMA lane numbers on the PMA service interface. But if I look at Figure 155-10 there are 8 lanes on the PMA sevice interface. There are however 4 lanes on the PMD service interface. I suspect the editor meant "PMD service interface (i.e. the interface below the PMA sublayer) and not the PMA service interface (the interface above the PMA sublayer).

Also the reference to Table 155-3 is not an active cross reference.

SuggestedRemedy

Change "PMA service interface" to "PMD service interfce".

Fix the cross-reference to Table 155-3.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.4.2.1** *P* **61** *L* **33** # 291

Law, David Hewlett Packard Enterprise

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

There are nine instances of 'super-frame' and two instances of 'DSP super-frame'. Suggest that one term is used consistently.

SuggestedRemedy

Suggest that the two instances of '... DSP super-frame ...' (page 61, line 33 and page 63 and line 4) be changed to read '... super-frame ...'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **62** *L* **1** # 349

Maniloff, Eric Ciena

Comment Type **T** *Comment Status* **X** *state variables*

A bad CW can be detected either by detecting errors after FEC decoding or by CRC errors. This should be clarified in the counter definition.

SuggestedRemedy

Add the following to the definition of cw_bad: An uncorrected codeword is detected if either errors remain after FEC correction or if the CRC32 check fails.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.1** *P* **68** *L* **26** # 409

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **X** *MDIO mapping*

FEC high SER is not a feature of 400GBASE-ZR

SuggestedRemedy

Remove the FEC high SER row fromo Table 155-9

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.2** *P* **62** *L* **28** # 292

Law, David — Hewlett Packard Enterprise

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

The description of the 'FAW_COMPARE' function in subclause 155.4.2.2 'Functions' says that 'If current_pmal and first_pmal both found a match and ... faw_match is set to true.'. Since faw_valid '... is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern ...'. I assume rather than a 'match', this really should say something along the lines of 'if at least 36 symbols of the current receive 22-symbol block match the 44 known bits of the FAW pattern'.

It however seems simpler to just add faw_valid is TRUE as a condition to enter the COMP state, which would become 'faw_counter_done * faw_valid', and have a path from the 'COUNT_2' state to the 'INVALID_FAW' state if 'faw_counter_done * !faw_valid' is FALSE. This would also mirror the similar use of the 'FAW_COMPARE' function in the 'COMP_2ND' state where the condition to transition to the state is 'faw_counter_done * faw_valid' and 'faw_counter_done * !faw_valid' results in a transition to the 'FAW_SLIP' state.

SuggestedRemedy

[1] Change the text 'If current_pmal and first_pmal both found a match and indicate the same PMA lane number, faw_match is set to true' in the description of the FAW_COMPARE function to read 'If current_pmal and first_pmal indicate the same PMA lane number, faw_match is set to true'.

[2] Change the condition on the transition from the 'COUNT_2' state to the 'COMP' state in Figure 155-14 'Frame alignment word (FAW) lock state diagram' to read 'faw_counter_done * faw_valid'.

[3] Add a transition from the 'COUNT_2' state to the 'INVALID_FAW' state in Figure 155-14 'Frame alignment word (FAW) lock state diagram' that reads 'faw_counter_done * !faw_valid'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.3** *P* **62** *L* **40** # 293

Law, David — Hewlett Packard Enterprise

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

Subclause 155.4.2.3 'Counters' defines the 'cw_bad_count' counter, however this counter is not reference anywhere else in the draft.

SuggestedRemedy

Delete the 'cw_bad_count' counter definition.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **60** *L* **48** # 286

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

The description of the 'restart_lock' variable says 'A boolean variable that is set by the frame alignment word (FAW) lock process to reset the synchronization process on all PMA lanes. It is set to TRUE when 15 FAWs in a row fail to match (15_BAD state).'. While the restart_lock variable is used in the frame alignment word (FAW) lock process described in Figure 155-14, it is also used in the Alignment marker lock process described in Figure 155-16.

SuggestedRemedy

[1] Rename all instances of the 'restart_lock' variable used in Figure 155-14 'Frame alignment word (FAW) lock state diagram' to be 'pma_restart_lock'.

[2] Rename all instances of the 'restart_lock' variable used in Figure 155-16 'Alignment marker lock state diagram' to be 'pcs_restart_lock'.

[3] Rename 'restart_lock' variable in subclause 155.4.2.1 'Variables' to be 'pma_restart_lock'.

[4] Add a definition of the 'pcs_restart_lock' variable to subclause 155.4.2.1 'Variables'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **63** *L* **4** # 14

Bruckman, Leon — Huawei

Comment Type **T** *Comment Status* **X** *state diagrams*

Text on FAW synchronization seems to imply that there is a FAW synchronization process for each lane, for a total of 4 independent FAW synchronization processes. Actually there are 2 FAW synchronization processes, one per polarization (see figure 115.10 and clause 155.3.3.7)

SuggestedRemedy

Replace: "The synchronization process operates independently on each lane" with: "The synchronization process operates independently on each polarization"

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **63** *L* **7** # 294

Law, David — Hewlett Packard Enterprise

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

As the PMA is 'above' the PMD, the PMA would detect alignment in the symbols for a given lane of the PMD service interface.

SuggestedRemedy

Change the text '... the PMA service interface.'. to read '... the PMD service interface.'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **63** *L* **12** # 295

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state diagrams*

Subclause 155.4.2.4 'State diagrams' says that 'The PCS shall implement the alignment marker lock process as shown in Figure 155-16 to identify the AM sequence at the start of each 400GBASE-ZR frame by observing data from the SC-FEC decoder output.', however Figure 155-2 (page 35, line 20) shows the 'AM/OH detect & removal' block after the 'CRC32 checking' block and subclause 155.2.5.7 'AM and OH detect and removal' says '.... after removal of CRC32, MBAS, and pad, ...'.

SuggestedRemedy

Suggest that the text '... by observing data from the SC-FEC decoder output.' be changed to read '... by observing data from the CRC32 check and error marking output.'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **1** # 89

Ran, Adee — Cisco

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

The state diagram has several blocks in which text of assignment statements wraps to the next line. There is enough room to prevent that.

SuggestedRemedy

Resize blocks (changing layout if required) to prevent wrapping lines.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **3** # 296

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *state diagrams*

Based on the description of the 'faw_valid' variable, and slide 4 of the contribution 'faw_valid analysis' from Mike Sluyski <https://www.ieee802.org/3/cw/public/22_0523/sluyski_3cw_01a_220523.pdf#page=4> referencing a 'QPSK FAW' value of 44, it seems a valid FAW sequence can only be detected across all four lanes. As a result, it will only be possible to achieve FAW lock on all lanes, or no lanes. There is no case where some lanes can be FAW locked, and others are not. There, therefore, seems no need to have four instances of the Frame alignment word lock state diagram (page 63, line 3). If there were, they wouldn't operate independently on each lane (page 63, line 5), and instead would operate in lock step.

It therefore seems that the four Frame alignment word lock state diagram can be collapsed in to one if the first_pmal and current_pmal variables hold the mapping number found in table 155-7 to achieve faw_valid rather than the lane number. The PMA deskew state diagram can then be removed.

SuggestedRemedy

[1] Delete the variables 'pma_alignment_valid', 'all_locked', and PMA_lane_mapping<x> from subclause 155.4.2.1 'Variables' and Figure 155-14.

[2] Change the description of the 'faws_lock<x>' variable (page 61, line 1) to read:

faws_lock
A Boolean variable that is set to true when the receiver has detected the location of the FAW.

[3] Change the description of the faw_valid as suggested in my comment about faw_valid.

[4] Change the description of the first_pmal to read (this overrides my other comment about first_pmal):

A variable that holds the PMA lane mapping number found in the first column of Table 155-7 corresponding to the PMD service interface lane mapping used to find the match for the first FAW sequence. It is compared to the PMA lane mapping number corresponding to the next FAW payload that is found.

[5] Change the description of the current_pmal to read (this overrides my other comment about current_pmal):

A variable that holds the PMA lane mapping number found in the first column of Table 155-7 corresponding to the PMD service interface lane mapping used to find the match for the current FAW sequence. It is compared to the variable first_pmal to confirm that the location of the FAW sequence has been detected.

[6] Change all instances of '... PMA lane number ...' to '... PMA lane mapping number ...'.

[7] Change the text '... of the next FAW on a PMA lane.' to read '... of the next FAW.' in the 'faw_counter' description.

[8] Change the first paragraph of subclause 155.4.2.4 'State diagrams' to read 'The PMA shall also implement the deskew process as shown in Figure 155-14.

[9] Delete the second paragraph of subclause 155.4.2.4.

[10] Add the assignment 'pma_align_status <= FALSE' to the 'LOCK_INIT' state of Figure 155-14.

[14] Add the assignment 'pma_align_status <= TRUE' to the '2_GOOD' state of Figure 155-14.

[15] Delete Figure 155-15.

[16] Change the 'Value/Comment' filed of PICS item SM1 in subclause 155.7.4.4 'State diagrams' to read 'Meets the requirements of Figure 155-14'.

[17] Delete the SM2 row from subclause 155.7.4.4 and renumber following items.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **15** # 217

Huber, Thomas Nokia

Comment Type **TR** *Comment Status* **X** *state diagrams*

In the GET_BLOCK state, the variable slip_done should be faw_slip_done

SuggestedRemedy

Change slip_done to faw_slip_done

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **15** # 297

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state variables*

The 'slip_done' variable assigned to FALSE in the GET_BLOCK state of the Frame alignment word (FAW) lock state diagram is not defined. Suspect it should read 'faw_slip_done' so that it is set to FALSE before the FAW_SLIP function, which sets it TRUE, is called in the FAW_SLIP state.

SuggestedRemedy

Change the text 'slip_done <= FALSE' in the GET_BLOCK state in Figure 155-14 to read 'faw_slip_done <= FALSE'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **19** # 299

Law, David Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state diagrams*

The description of the 'first_pmal' variable says it '... the PMA lane number that corresponds to the first FAW payload ...' however, it is updated by the assignment 'first_pmal <= current_pmal' every cycle through the '2_GOOD' and 'GOOD_FAW' states. With that said, the assignment 'first_pmal <= current_pmal' in the '2_GOOD' and 'GOOD_FAW' states appear to be redundant since the only way to enter these states is if 'faw_match' is TRUE and for 'faw_match' to be TRUE the first_pmal and current_pmal variables have to be equal (see FAW_COMPARE function, page 62, line 28).

SuggestedRemedy

Consider removing the assignment 'first_pmal <= current_pmal' from the '2_GOOD' and 'GOOD_FAW' states.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **19** # 298

Law, David Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *state variables*

There is no definition of the 'prev_pmal' variable used in the 'INVALID_FAW' state of figure 155-14 'Frame alignment word (FAW) lock state diagram', and there is no use or reference to the 'prev_pmal' variable elsewhere in the IEEE P802.3cw draft.

SuggestedRemedy

Delete the assignment ' prev_pmal <= prev_pmal + 4) mod 252' from the 'INVALID_FAW' state.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **22** # 300

Law, David — Hewlett Packard Enterprise

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

Subclause 155.4.2.3 'Counters' defines the 'faws_bad_count' whereas the Figure 155-14 'Frame alignment word (FAW) lock state diagram' uses 'faw_bad_count' ('faw' vs 'faws').

SuggestedRemedy

Suggest that:

[1] The transition from the 'INVALID_FAW' state to the '15_BAD' state be changed to read 'faws_bad_count = 15'.
[2] The transition from the 'INVALID_FAW' state to the 'COUNT_2' state be changed to read 'faws_bad_count < 15'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **24** # 301

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state diagrams*

The 'restart_lock' variable is set to TRUE on entry to the '15_BAD' state. This will cause the state diagram to transition to the 'LOCK_INIT' state because 'restart_lock' is one of the OR conditions in the 'open arrow' entry to that state. The actions in the 'LOCK_INIT' state will be executed, but since 'restart_lock' remains set to TRUE, and 'open arrow' transitions are evaluated continuously whenever any state is evaluating its exit conditions (see 21.5.3), on exit the state diagram will loop back to the 'LOCK_INIT' state. The state diagram will then be locked in this loop permanently.

SuggestedRemedy

Suggest that either the action 'restart_lock <= FALSE' be added to the 'LOCK_INIT' state or the 'restart_lock' be deleted and a 'UCT' be added from the '15_BAD' state to the 'LOCK_INIT' state.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **41** # 302

Law, David — Hewlett Packard Enterprise

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

Complete the line under '2_GOOD'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **42** # 303

Law, David — Hewlett Packard Enterprise

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

The variable 'PMA_lane_mapping' in the 2_GOOD state of the Frame alignment word (FAW) lock state diagram should read 'pma_lane_mapping' based on the definition in subclause 155.4.2.1 (page 61, line 34).

SuggestedRemedy

Change the text 'PMA_lane_mapping<x> <= current_pmal' in the 2_GOOD state in Figure 155-14 to read 'pma_lane_mapping<x> <= current_pmal'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **64** *L* **48** # 304

Law, David — Hewlett Packard Enterprise

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

Since the title of Figure 155-15 is 'PMA deskew state diagram' suggest that PMA should be added to the title of Figure 155-14 and PCS to the title of Figure 155-16.

SuggestedRemedy

Suggest that:

[1] The title of Figure 155-14 should be changed to read 'PMA Frame alignment word (FAW) lock state diagram'.
[2] The title of Figure 155-16 should be changed to read 'PCS Alignment marker lock state diagram'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **66** *L* **8** # 305

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state diagrams*

There are two instances of amps_lock and one of amps_lock<x> in figure 155-16 Alignment marker lock state diagram. Since subclause 155.2.4.3 'GMP mapper' says '... 400GBASE-ZR frames are not mapped to 16 PCS lanes ...', and since subclause 155.4.2.1 'Variables' defines amps_lock without an index, it seems that 'amps_lock<x>' should read 'amps_lock'.

SuggestedRemedy

Change 'amps_lock<x> <= FALSE' in the LOCK_INIT state to read 'amps_lock <= FALSE'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **66** *L* **11** # 306

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state diagrams*

The figure 155-16 PCS alignment marker lock state diagram uses the variable 'pma_align_status', however that variable is generated by the figure 155-14 PMA frame alignment word (FAW) lock state diagram, and it is not passed across the PMA service interface from the PMA to the PCS. As a result, it is not available to be used in the figure 155-16 PCS alignment marker lock state diagram.

Suggest that 'pma_align_status' being 'TRUE' be used as a condition to set the SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive to OK and therefore communicate it across the PMA service interface. Since 'signal_ok', derived from the SIGNAL_OK parameter, is already used as an 'open arrow' entry to the 'LOCK_INIT' state of the figure 155-16 PCS alignment marker lock state diagram, 'pma_align_status' can be deleted as an exit condition from that state.

SuggestedRemedy

[1] Add 'pma_align_status' being 'TRUE' as a condition to set the SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive to OK in subclause 155.3.2 '400GBASE-ZR PMA service interface'
[2] Delete that exit condition 'pma_align_status' from the LOCK_INIT state in figure 155-16.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **66** *L* **18** # 307

Law, David — Hewlett Packard Enterprise

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

Typo, amps_... should be amp_... based on counter definition, see page 62, line 37.

SuggestedRemedy

Change the action 'amps_bad_count <= 0' to read 'amp_bad_count <= 0' in the 'GOOD_AM' state of the Figure 155-16 'Alignment marker lock state diagram'.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **66** *L* **24** # 308

Law, David — Hewlett Packard Enterprise

Comment Type **T** *Comment Status* **X** *state diagrams*

The 'restart_lock' variable is set to TRUE on entry to the '5_BAD' state. This will cause the state diagram to transition to the 'LOCK_INIT' state because 'restart_lock' is one of the OR conditions in the 'open arrow' entry to that state. The actions in the 'LOCK_INIT' state will be executed, but since 'restart_lock' remains set to TRUE, and 'open arrow' transitions are evaluated continuously whenever any state is evaluating its exit conditions (see 21.5.3), on exit the state diagram will loop back to the 'LOCK_INIT' state. The state diagram will then be locked in this loop permanently.

SuggestedRemedy

Suggest that either the action 'restart_lock <= FALSE' be added to the 'LOCK_INIT' state or the 'restart_lock' be deleted and a 'UCT' be added from the '5_BAD' state to the 'LOCK_INIT' state.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.4.2.4** *P* **66** *L* **39** # 309

Law, David — Hewlett Packard Enterprise

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

Complete the line under '2_GOOD'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.5** *P* **67** *L* **3** # 488

Dawe, Piers — Nvidia

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

The following objects apply to: objects?

SuggestedRemedy

Reword

Proposed Response *Response Status* **O**

Cl **155** SC **155.5** P **67** L **3** # 310

Law, David — Hewlett Packard Enterprise

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

Strictly speaking, protocol agnostic management 'objects' are defined in Clause 30, with protocol specific 'objects' defined in IEEE Std 802.3.1 and IEEE Std 802.3.2.

SuggestedRemedy

Since the title of subclause 45.2 in IEEE Std 802.3-2022 is 'MDIO Interface registers', suggest that the text 'The following objects apply ...' in subclause 155.5 ne changed to read 'The following registers apply ...'.

Proposed Response *Response Status* **O**

Cl **155** SC **155.5** P **67** L **10** # 311

Law, David — Hewlett Packard Enterprise

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

Subclause 155.5 '400GBASE-ZR PCS and PMA management' uses the term 'provided' yet the following subclause 155.5.1 'PCS and PMA MDIO function mapping' uses 'implemented' about the MDIO interface.

SuggestedRemedy

Suggest that in subclause 155.5 '400GBASE-ZR PCS and PMA management' the text 'If an MDIO interface is provided ...' is changed top read 'If an MDIO interface is implemented ...'.

Proposed Response *Response Status* **O**

Cl **155** SC **155.5.1** P **67** L **9** # 33

Marris, Arthur — Cadence Design Systems

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

Insert correct cross reference

SuggestedRemedy

Replace 45 with a subcluse number or a cross reference to Clause 45

Proposed Response *Response Status* **O**

Cl **155** SC **155.5.1** P **67** L **9** # 489

Dawe, Piers — Nvidia

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

in 45

SuggestedRemedy

in Clause 45 and why green when line 4 has black?

Proposed Response *Response Status* **O**

Cl **155** SC **155.5.1** P **67** L **15** # 144

Nicholl, Gary — Cisco Systems

Comment Type **TR** *Comment Status* **X** *FEC degrade*

In Table 155-8 there are several MDIO control variables associated with "FEC degraded SER" processing, but I can find no description of FEC degraded SER processing in the draft ? For 400GBASE-R the FEC degrade SER processing is associated with the RS544 FEC and based on monitoring for RS symbol errors within a given time interval (as described in section 119.2.5.3).

If we want to do something similar for 400GBASE-ZR then the "FEC degrade" monitoring should be based on monitoring a combination of the SD-FEC and SC-FEC.

This appears to be completely missing from the current draft.

SuggestedRemedy

Define a FEC degrade monitoring scheme for 400GBASE-ZR (similar to what was done in section 119.2.5.3 for 400GBASE-R).

Proposed Response *Response Status* **O**

Cl **155** SC **155.5.1** P **67** L **28** # 490

Dawe, Piers — Nvidia

Comment Type **TR** *Comment Status* **X** *MDIO mapping*

FEC degraded SER activate threshold register should be PCS FEC degraded SER activate threshold register, but it's for Clause 119 PCS RS(544,514) FEC and there is no FEC degraded SER feature in this draft.

SuggestedRemedy

Delete the four FEC degraded SER rows

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **67** *L* **37** # 145

Nicholl, Gary — Cisco Systems

Comment Type **TR** *Comment Status* **X** *SD FEC error count*

Table 155-9 provides FEC coorected and uncorrected codeword counts for the SC-FEC ? Should there be similar monitoring for the SD-FEC ? This is missing in the current draft ?

SuggestedRemedy

Define FEC monitoring for the SD-FEC.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **67** *L* **37** # 146

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **X** *AM lock*

Table 155-9 has a MDIO variable called "SC-FEC AM lock, which referes to a PCS/PMS variable "amps_locked". However when I look in section 155.4.2 (state variables), "amps_lock" is based on locking onto the aignment marker (AM). But then in Figure 155-2 it appears that the "AM detect" block appears after the "SC-FEC decoding" block, so how can "amps_lock" be used to lock onto the SC-FEC frame ? Are the AM frames and the SC-FEC frames aligned, and is the AM used by the SC-FEC decoding block to lock onto the SC-FEC frame .

SuggestedRemedy

This is simply a question for clarification. Depending on the answer changes may or may not be requred in the draft.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **67** *L* **46** # 407

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **X** *MDIO mapping*

The corrected bit and total bit MDIO registers refer to Clause 153 only but are being used in Clause 155 now.

SuggestedRemedy

Add the following sub-clauses:
155.5.1.x FEC_total_bits_counter

See 153.2.5.3 for the definition of this counter.

155.5.1.y FEC_corrected_bits_counter

See 153.2.5.4 for the definition of this counter.

Bring in 45.2.1.229 and 45.2.1.230 and add appropriate references to these new sub-clauses

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **67** *L* **46** # 406

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **X** *MDIO mapping*

The MDIO references for corrected and uncorrected codeword counters only point to the Clause 45 register, which then points you back to Clause 153 for the definition of the counter. In Clause 153 it refers to "fec_align_status" which does not exist in Clause 155.

SuggestedRemedy

Add sub-clauses for corrected and uncorrected codeword counters:

155.5.1.x FEC_corrected_cw_counter

A corrected FEC codeword is a codeword that contained errors and was corrected.

The FEC_corrected_cw_counter is a 32-bit counter that counts once for each corrected FEC codeword processed when pma_alignment_valid is TRUE. This variable is mapped to the registers defined in 45.2.1.227 (1.2276, 1.2277).

153.5.1.y FEC_uncorrected_cw_counter

An uncorrected FEC codeword is a codeword that contains errors that were not corrected, including FEC codewords that may have been mis-corrected or not completely corrected.

The FEC_uncorrected_cw_counter is a 32-bit counter that counts once for each uncorrected FEC codeword processed when pma_alignment_valid is TRUE. This variable is mapped to the registers defined in 45.2.1.228 (1.2278, 1.2279).

Bring in 45.2.1.227 and 45.2.1.228 and references to the newly added sub-clauses in Clause 155.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **67** *L* **47** # 491

Dawe, Piers — Nvidia

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

broken variable names

SuggestedRemedy

Widen the right column width until they fit

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **155** *SC* **155.5.1** *P* **68** *L* **1** # 147

Nicholl, Gary — Cisco Systems

Comment Type **T** *Comment Status* **X** *FEC degrade*

Table 155-9 mentions the MDIO status variable "FEC degraded SER", but as pointed out in an earlier comment the draft provides no description as to how the "FEC degraded SER" status variable is set.

SuggestedRemedy

The description for "FEC degraded SER" is missing from the draft.

Define a FEC degrade monitoring scheme for 400GBASE-ZR (similar to what was done in section 119.2.5.3 for 400GBASE-R).

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **68** *L* **27** # 312

Law, David — Hewlett Packard Enterprise

Comment Type **TR** *Comment Status* **X** *MDIO mapping*

Register bits 3.52.3:0 (IEEE Std 802.3-2022 subclause 45.2.3.25) are PCS lane alignment lock status registers, yet they are mapped to PMA lane alignment lock variables (faw_lock<3:0>). Similarly, register bit 3.50.12 is the PCS alignment status, yet it is mapped to the PMA alignment status variable (pma_align_status).

If there was a 400GBASE-ZR framing issue on a link where the PMA framing was operating correctly, the faws_lock<3:0> bits and the pma_align_status would all be true based on the respective frame alignment word (FAW) lock state diagrams, while the PCS would not be aligned based on the alignment marker lock state diagram. In that case, the current regsiter mapping would indicate that all the PCS lanes were aligned, and the overall PCS was aligned, when in fact this is not the case. This would seem to be misleading information to provide in the management registers in such a case.

Further, register 3.400 (IEEE Std 802.3-2022 subclause 45.2.3.49) through 3.419 are the 'PCS lane mapping registers, lanes 0 through 19' and these registers report the PCS lane number provide by the alignment marker for the respective PMA service interface lane. Table 155-9, however, maps these PCS lane mapping registers to the PAM lane mapping variable 'pma_lane_mapping<x>' output by Figure 155-14, the 'Frame alignment word (FAW) lock state diagram'.

Subclause 155.2.4.3 'GMP mapper' says 'The first 1920 bits of the frame contain alignment markers (AM).' and that 'These are identical to the 16 x 120b markers defined for 400GBASE-R in 119.2.4.4.2.'. Since the 16 different 400GBASE-R PCS lane alignment markers are all placed in a single 400GBASE-ZR alignment marker (see 155.2.4.4.1) it seems that 400GBASE-ZR frames are not mapped to 16 PCS lanes. This seems to be confirmed in subclause 155.2.4.3 'GMP mapper' which says '... 400GBASE-ZR frames are not mapped to 16 PCS lanes ...'. As a result, there are no PCS lanes across the PMA service interface, therefore there is no PCS lane alignment lock status nor PCS Lane mapping.

Finally, register bits 3.52.3:0, 3.50.12, and 3.400 through 3.403, which are all PCS register bits defined for MMD 3 (see IEEE Std 802.3-2022 Table 45-1), are mapped to variables found in the PMA. As illustrated in Figure 120A-9 (page 103), MMD 3 does not have access to the PMA (or PMD) as they are in MMD 1.

Based on the above, suggest that two new subclauses are added to say that registers 3.52, 3.53 and 3.400 through 3.403 are not used by the 400GBASE-ZR PCS because the 400GBASE-ZR PCS does not use PCS lanes across the PMA service interface. Require all PCS lane alignment bits to be set to zero. The content of the PCS lane mapping registers does not need to be defined because their content is only valid when the respective PCS lane alignment bit is set to one. In addition, suggest that the PCS lane alignment status bit be mapped from the 'amps_lock' variable generated by the Figure 155-16, the PCS alignment marker lock state diagram.

SuggestedRemedy

Suggested changes:

[1] Delete the antepenultimate row of Table 155-9.

[2] Add a new subclause 155.5.1 as follows:

155.5.1 PCS lane alignment registers

The PCS lane alignment registers (registers 3.52 and 3.53) are not used as the 400GBASE-ZR PCS does not use PCS lanes across the PMA service interface (see 155.2.4.3). A 400GBASE-ZR PCS shall return a zero for all bits in these registers.

[3] Change the variable 'pma_align_status' in the 'ZR-PCS/PMA variable' column of the penultimate row of Table 155-9 to 'amps_lock'.

[4] Delete the last row of Table 155-9.

[5] Add a new subclause 155.5.2 as follows:

155.5.2 PCS lane mapping registers

The PCS lane mapping registers (registers 3.400 through 3.419) are not used as the 400GBASE-ZR PCS does not use PCS lanes across the PMA service interface.

Proposed Response *Response Status* **O**

Cl **155** *SC* **155.5.1** *P* **68** *L* **30** # 194

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

Comment Type **TR** *Comment Status* **D** *MDIO mapping*

Why is there a reference to a PCS lane alignment status? There are no PCS lanes in the 400GBASE-ZR PHY

SuggestedRemedy

Looks like this was intended to be PMA lane alignment status

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Cl **155** *SC* **155.7.4.1** *P* **70** *L* **24** # 346

Zimmerman, George — CME Consulting/APL Group, Cisco, Commscope, Ma

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

This is a general comment on the requirements. I am attaching it to these PICS because this is where it became apparent. The style of IEEE SA standards (and IEEE Std 802.3) is that requirements use the term "shall". Each PICS item should have an associated "shall" and each "shall" should have a PICS. However, 155.7.4.1 is a list of the subclauses for the most part. Further, looking at the subclauses, they are largely without "shalls". Most of the items in clause 155 are descriptive of an implementation, and do not use the term shall. They use "is" or other descriptive language. The PICS are a list of the functional blocks described, but most of those functional blocks are lacking actual requirements. Instead they often describe an implementation or, worse yet, sometimes try to require a particular implementation ("an implementation shall"). What needs to happen is that the clause needs to be rewritten carefully considering what requirements are needed for interoperability, and deleting the unnecessary implementation description. This is a big job, and, in my opinion, means the draft is not technically complete, and should not have begun initial working group ballot. I truly regret having to make a comment like this, but I believe this is a great example of why we have working group ballots in 802.

SuggestedRemedy

Unfortunately, the draft is so far from complete that I cannot propose a specific remedy for the systematic problem. I can suggest that the TF look at each subblock, determine what the observed behavior is, determine which parts matter to interoperability, and write "shall" statements in the subclauses. Then those shall statements can be made as PICS. Additionally, this will highlight where there is implementation description that can be deleted. When this is done, restart working group ballot.

Proposed Response *Response Status* **O**

Cl **156** *SC* **156.1** *P* **73** *L* **20** # 192

D'Ambrosia, John — Fuuturewei, US Subsidiary of Huawei

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

associated clauses include the 400GBASE-R PCS, 400GBASE-4 PMA, and all AUI's. These clauses are referenced via the extender sublayer, so they should not be noted here.

SuggestedRemedy

Delete table entries Clause 119, 120, and all AUI related clauses.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.1** *P* **73** *L* **33** # 90

Ran, Adee — Cisco

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

Font size mismatch in "120C"

SuggestedRemedy

Reduce size to match surrounding text, here and elsewhere if necessary

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Correct the font as required with editorial license

Cl **156** *SC* **156.1** *P* **73** *L* **48** # 492

Dawe, Piers — Nvidia

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

Clause 116 and the purpose

SuggestedRemedy

comma

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "Clause 116 and the purpose" to "Clause 116, and the purpose

Cl **156** *SC* **156.1** *P* **92** *L* **44** # 557

Dawe, Piers — Nvidia

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

Should be under 156.9.10

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

It is common to point to locations outside the same subclause for additional information, see 156.9.3 as an example.

Cl **156** *SC* **156.1.1** *P* **74** *L* **39** # 493

Dawe, Piers — Nvidia

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

PMA (Clause 155)

SuggestedRemedy

PMA (155.3)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments

Cl **156** *SC* **156.1.1** *P* **74** *L* **39** # 91

Ran, Adee — Cisco

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

"The bit error ratio (BER) when processed by the 400GBASE-ZR PMA (Clause 155) shall be less than 1.25 × 10^–2…"

The output of the PMA is not bits but samples that are fed into the SD-FEC in the PCS. A BER cannot be defined at this interface before SD-FEC decoding, so this normative requirement is meaningless.

Maybe the intent was after the SD-FEC decoder (which is in the PCS)?

Perhaps the PMD/PMA BER should not be specified for this PHY.

SuggestedRemedy

Consider removing this requirement and defining only the PCS output frame loss ratio.

Otherwise, rewrite to create a well-defined requirement.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments

Cl **156** *SC* **156.1.1** *P* **74** *L* **41** # 314

Law, David — Hewlett Packard Enterprise

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

Suggest that '... frames with minimum interpacket ...' should read '... frames with a minimum interpacket ...'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments

Cl **156** *SC* **156.1.1** *P* **74** *L* **41** # 313

Law, David — Hewlett Packard Enterprise

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

Subclause '156.1.1 Bit error ratio' says '... for 64-octet frames with minimum interpacket gap when additionally processed by the CFEC (Clause 155).'. The text '... the CFEC (Clause 155)' seems to imply a function but isn't CFEC '... a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer Hamming code SD-FEC' to quote subclause 155.2.1.

SuggestedRemedy

Suggest that the text '... for 64-octet frames with minimum interpacket gap when additionally processed by the CFEC (Clause 155).' should be changed to read '... '... for 64-octet frames with a minimum interpacket gap after CFEC error correction (see 155.2.1).'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments

Cl **156** *SC* **156.2** *P* **74** *L* **52** # 315

Law, David — Hewlett Packard Enterprise

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

Suggest that '... PMA entity that resides just above the PMD, and the PMD entity.' should read '... PMA sublayer that resides just above the PMD, and the PMD sublayer.'.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **3** # 92

Ran, Adee — Cisco

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

The service interface of this PMD is not consistent with 116.3 because as it's written, the inputs and outputs are analog signals, not streams of discrete symbols.

SuggestedRemedy

Rewrite the text without referring to 116.3 (or make it "similar to 116.3 but…")

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **11** # 93

Ran, Adee — Cisco

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

"The 400GBASE-ZR PMD has four analog streams, in which case i = 0 to 3."

why "in which case"?

SuggestedRemedy

change "in which case" to "hence".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **13** # 94

Ran, Adee — Cisco

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

As described here the PMA sends digital symbols (discrete and sampled) from a set of 4 levels), not "analog streams" (which is an undefined term).

Also applies to 156.5.2 which contains very similar text.

SuggestedRemedy

Change "In the transmit direction, the PMA continuously sends four analog streams to the PMD"
to
"In the transmit direction, the PMA continuously sends four streams of quaternary symbols to the PMD".

Change "The PMD then converts these four analog streams"
to
"The PMD then converts these streams of symbols".

Apply in 156.5.2, if it is retained.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **14** # 95

Ran, Adee — Cisco

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

The values listed are not binary.

Also applies in 156.5.2

SuggestedRemedy

Delete "binary".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **14** # 494

Dawe, Piers
Nvidia

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

3, 1, -1, and -3

SuggestedRemedy

Please count forwards in the usual way: -3, -1, 1, and 3, and in next paragraph and 156.5.2 and 156.5.3

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **14** # 316

Law, David
Hewlett Packard Enterprise

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

Subclause '155.3.3 Functions within the PMA' says that 'The purpose of the PMA is to adapt between the PCS layer digital symbols to and from the four analog signals ...' and subclause 155.3.3.4 '16QAM encode and signal drivers' says that '... stream of symbols is converted to four analog signals ...' and that 'The analog signals are sent to the 400GBASE-ZR PMD sublayer over the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request sublayer signals.'. It, therefore, appears that the PMD service interface is a set of analogue signals. Finally, Figure 155-10 shows a DEC block above the PMD service interface.

Subclause 156.2 'Physical Medium Dependent (PMD) service interface', however, says ' In the transmit direction, the PMA continuously sends four analog streams to the PMD ... with binary values of 3, 1, -1, and -3 using the PMD:IS_UNITDATA_i.request primitive.'. Is it correct to say '... with binary values ...'.

SuggestedRemedy

[1] Suggest that in subclause 156.2 (page 75, line 14) the text '... X and Y polarizations with binary values of 3, 1, -1, and -3 using the ...' should be changed to read '... X and Y polarizations with the values of 3, 1, -1, and -3 using the ...'.

[2] Suggest that in subclause 156.5.2 (page 77, line 39) the text '... X and Y polarizations with binary values of 3, 1, -1, and -3.' should be changed to read '... X and Y polarizations with the values of 3, 1, -1, and -3.'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **18** # 96

Ran, Adee
Cisco

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

As described here the PMD sends analog signals (continuous, to be sampled and digitized in the PMA).
"Analog streams" is an undefined term and is not used in other clauses (previous instances of this term have been removed by 802.3dc and earlier revision projects).

Also applies to 156.5.3 which contains very similar text.

SuggestedRemedy

Change "the PMD continuously sends four analog streams to the PMA, corresponding to the signals received from the MDI"
to
"the PMD continuously sends four analog signals to the PMA, corresponding to the optical signal received from the MDI".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.2** *P* **75** *L* **22** # 495

Dawe, Piers
Nvidia

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

"the variable SIGNAL_DETECT parameter": 156.5.4 says it's a parameter, this and that say not variable

SuggestedRemedy

Delete variable

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 318

Cl **156** *SC* **156.2** *P* **75** *L* **26** # 97

Ran, Adee Cisco

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

The NOTE about signal detect is out of place since the value is always OK. "sufficient light" and "meeting the BER" are irrelevant for this PMD, since signal detect is not a function of light intensity and the PMD does not detect bits.

SuggestedRemedy

Delete the NOTE.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Same note is in IEEE Std 802.3-2022 clause 154 and was specifically added to clarity

Cl **156** *SC* **156.2** *P* **75** *L* **26** # 496

Dawe, Piers Nvidia

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

"poor quality link to provide sufficient light for a SIGNAL_DETECT = OK": this note isn't relevant if the parameter is fixed

SuggestedRemedy

Change the note to explain the situation

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Current wording is consistent with multiple subclauses in IEEE Std 802.3-2022 and 802.3db D3.2

Cl **156** *SC* **156.3.1** *P* **75** *L* **35** # 497

Dawe, Piers Nvidia

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

2048 bit times

SuggestedRemedy

8192 bit times

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "no more than 2048 bit times (4 pause_quanta or 20.48 ns)" to "no more than 8192 bit times (16 pause_quanta or 20.48 ns)"

Cl **156** *SC* **156.3.2** *P* **75** *L* **41** # 98

Ran, Adee Cisco

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

I suspect that skew variation cannot exist at SP2 (PMD service interface), because the PCS and PMA are defined as operating in one clock domain, not as multiple lanes with separate logic. This may be worth mentioning (as done in other cases where skew variation can't exist, e.g. 140.3.2).

Is skew variation (as opposed to static skew) relevant on a single-lane, but coherent, PMD output?

If there is no skew variation between SP2 and SP3 then skew variation need not be specified at all.

SuggestedRemedy

Add a statement that that there is no skew variation at TP2.

If skew variation between the PMDs isn't relevant, change also the text about skew variation at SP3 and SP4, as in 140.3.2.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.3.2** *P* **75** *L* **44** # 193

D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

It is unclear if the skew constraints need to be revisited in light that the part is not part of 400GBASE-R family, but current pointer is to 80-8, which is for 100G

SuggestedRemedy

Revisit skew constraints as needed.
The diagram reference should be 116-4.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.3.2** *P* **75** *L* **44** # 99

Ran, Adee — Cisco

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

Figure 80-8 applies to 100GBASE-R PHYs. The diagram for skew points for 400GBASE-R PHYs is in Figure 116–5.

Also, there SP0 and SP7 are not defined for 400GBASE-R PHYs.

SuggestedRemedy

Change "at the points SP0 to SP7 shown in Figure 80-8" to "at the points SP1 to SP6 shown in Figure 116–5".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.3.2** *P* **75** *L* **46** # 317

Law, David — Hewlett Packard Enterprise

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

Subclause 156.3.2 'Skew constraints' says that 'The Skew (relative delay) between the lanes is kept within limits so that the information on the FEC lanes can be reassembled by the FEC.'. On review of Clause 155, 400GBASE-ZR doesn't seem to mention FEC lanes anywhere else. Further, subclause 155.2.4.3 'GMP mapper' says '... 400GBASE-ZR frames are not mapped to 16 PCS lanes ...'. As far as I can see, the 8-bit PMA service interface carries an 8-bit word that describes an DP-16QAM symbols based on the mapping defined in Table 155-2. As a result, the only lanes seem to be the PMD service interface which has four lanes which carry four analogue streams representing the in-phase and quadrature-phase component of the two polarizations (page 75, line 13).

Table 156-6 specifies a maximum polarization skew of 5 ps (page 82, line 45) and a maximum quadrature skew is 0.75 ps (page 83, line 6). Subclause 156.3.2, however, says The Skew at SP3 (the transmitter MDI) shall be less than 54 ns and the Skew Variation at SP3 is limited to 600 ps'. I suspect that the former values are correct. And based on this, assuming no retiming in the PMD, the other values in subclause 156.3.2 don't seem correct either.

SuggestedRemedy

Since 400GBASE-ZR doesn't seem to support FEC lanes, and says it doesn't support PCS lanes, suggest that subclause 156.3.2 is deleted.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.3.2** *P* **75** *L* **52** # 498

Dawe, Piers — Nvidia

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

Are these Skew and SV limits plausible? What does the PMA need? This is a hybrid of "parellel" and "serial", needs new numbers.

SuggestedRemedy

Revise to limits that are appropriate to DP-16PAM technology and the channel.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.4** *P* **76** *L* **38** # 318

Law, David — Hewlett Packard Enterprise

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

There is no description of how the PMD_global_signal_detect variable, defined in subclause 156.4, should be driven. Subclause 156.5.4 'PMD global signal detect function' says that SIGNAL_DETECT is set to a fixed OK value, hence there is in effect no signal detect to report in the PMD.

SuggestedRemedy

Suggest that:

[1] The PMD_global_signal_detect row in Table 156-3 (page 76, line 38) should be deleted.
[2] A change to subclause 45.2.1.9.7 'Global PMD receive signal detect (1.10.0)' be added to the draft that adds 'This bit is not supported by the 400GBASE-ZR PMDs.' to subclause 45.2.1.9.7.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Current wording aligns with IEEE Std 802.3-2022 subclause 154.4 and 802.3db D3.2 subclause 167.4, for comment resolution group (CRG) consideration.

Cl **156** SC **156.4** P **76** L **40** # 319

Law, David — Hewlett Packard Enterprise

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

There are no references to describe the use of the variables Tx_index_ability_0 to Tx_index_ability_63 and Rx_index_ability_0 to Rx_index_ability_63 defined in Table 156–3 in the draft. What happens if a value is selected in Tx optical channel index or Rx optical channel index register (page 76, line 25) corresponding to an index value in the Tx index ability 0 to Tx index ability 63 or Rx index ability 0 to Rx index ability 63 registers, respectively, that is false. Is the write to the Tx optical channel index or Rx optical channel index register ignored and operation continues on the existing value? Or is the value accepted, but then transmission of reception ceases, as the index value is not supported?

SuggestedRemedy

Suggest that the last paragraph of 164.5, that already discusses Tx_optical_channel_index and the Rx_optical_channel_index be update the describe how Tx_optical_channel_index and the Rx_optical_channel_index interacts with the Tx_index_ability_0 to Tx_index_ability_63 and Rx_index_ability_0 to Rx_index_ability_63 variables.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For CRG discussion. Same situation for 100ZR used in IEEE Std 802.3-2022 subclause 154.4.

Cl **156** SC **156.4** P **79** L **52** # 325

Law, David — Hewlett Packard Enterprise

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

The two references to the variable 'Tx_optical_frequency_index' in this subclause should be to ' Tx_optical_channel_index', see page 76, line 22.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement suggested remedies with editorial license

Cl **156** SC **156.4** P **79** L **52** # 324

Law, David — Hewlett Packard Enterprise

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

The reference to the variable 'Rx_optical_frequency_index' here and on page 81 line 44 should be to 'Rx_optical_channel_index', see page 76, line 25.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement suggested remedies with editorial license

Cl **156** SC **156.4** P **79** L **53** # 326

Law, David — Hewlett Packard Enterprise

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

The reference to the variable 'Tx_Rx_diff_opt_freq_ability' should be to 'Tx_Rx_diff_opt_chan_ability', see page 76, line 44.

SuggestedRemedy

See comment.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Implement suggested remedies with editorial license

Cl **156** SC **156.5.1** P **77** L **18** # 320

Law, David — Hewlett Packard Enterprise

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

Since subclause 156.5.4 'PMD global signal detect function' says that 'The PMD global signal detect function shall set the state of the SIGNAL_DETECT parameter to a fixed OK value.' it doesn't seem correct to show the SIGNAL_DETECT emanating from the 'Optical receiver' block in Figure 156-2 'Block diagram for 400GBASE-ZR transmit/receive paths'.

SuggestedRemedy

Suggest that SIGNAL_DETECT be removed from Figure 156-2.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 318

Cl **156** *SC* **156.5.1** *P* **77** *L* **30** # 499

Dawe, Piers — Nvidia

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

blank line(s)

SuggestedRemedy

Remove

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** *SC* **156.5.2** *P* **77** *L* **35** # 100

Ran, Adee — Cisco

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

The text in this subclause practically repeats a paragraph in 156.2.

Similarly for 156.5.3.

SuggestedRemedy

Apply any changes to these two paragraphs in 156.2 to these subclauses too.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.5.2** *P* **77** *L* **35** # 321

Law, David — Hewlett Packard Enterprise

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

Rather than being requested by the PMD service interface messages, messages are passed across the PMD service interface, either from the PMA to the PMD or from the PMD to the PMA. In addition, abstract service interfaces pass data in the parameters of primitives. In the case of the inter-sublayer service interface primitives defined in subclause 116.3 referenced by IEEE P802.3cw, these parameters are tx_symbol (see 116.3.3.1.1) and rx_symbol (see 116.3.3.2.1).

SuggestedRemedy

Suggest:

[1] The text ' The PMD Transmit function shall convert the four analog streams requested by the PMD service interface messages PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request into ...' (page 77, line 35) should be changed to read ' The PMD Transmit function shall convert the four analog streams from the PMA passed across the PMD service interface in the tx_symbol parameters of the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request primitives into ...'.

[2] The text ' The PMD Receive function shall convert the composite optical signal received from the MDI into four analog streams for delivery to the PMD service interface using the messages PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication, all according ...' (page 77, line 45) should be changed to read 'The PMD Receive function shall convert the composite optical signal received from the MDI into four analog streams passed across the PMD service interface to the PMA in the rx_symbol parameters of the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication primitives, all according ...'.

[3] The text 'The analog signals are sent to the 400GBASE-ZR PMD sublayer over the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request sublayer signals.' in subclause 155.3.3.4 (page 58, line 33) is changed to read 'The four analog signals are passed across the PMD service interface to the PMD in the tx_symbol parameters of the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request primatives.'.

[4] The text 'Four coherent signals IX, QX, IY, and QY are supplied by the receive function of the 400GBASE-ZR PMD and input to the 400GBASE-ZR PMA over the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication.' in subclause 155.3.3.5 (page 58, line 47) is changed to read 'Four coherent signals IX, QX, IY, and QY received by the PMD are passed across the PMD service interface to the PMA in the rx_symbol parameters of the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication primitives.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.5.2** *P* **77** *L* **39** # 218

Huber, Thomas — Nokia

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

"Binary values 3, 1, -1, -3" doesn't seem to be correct since there are four values listed.

SuggestedRemedy

Change "binary values" to "symbol values".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.5.2** *P* **77** *L* **40** # 219

Huber, Thomas — Nokia

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

Table 155-2 is mapping the value of a pair of FEC-encoded bits to the symbol values.

SuggestedRemedy

Change the last sentence of the paragraph to read "The mapping of FEC bits to symbol amplitudes is listed in Table 155-2."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** *SC* **156.5.2** *P* **77** *L* **40** # 500

Dawe, Piers — Nvidia

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

The mapping of the analog values to the symbol amplitudes is listed in Table 155-2.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 219

Cl **156** *SC* **156.5.2** *P* **77** *L* **41** # 322

Law, David — Hewlett Packard Enterprise

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

Subclause 156.5.2 'PMD transmit function' says 'The mapping of the analog values to the symbol amplitudes is listed in Table 155–2.'. Is this correct, Table 155–2 seems to provide the mapping between the 128-bit digital code word from the SD-FEC encoder to the in-phase (I) and quadrature-phase (Q) components of the 16QAM symbols.

SuggestedRemedy

Change reference if required.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 219

Cl **156** *SC* **156.5.4** *P* **78** *L* **3** # 501

Dawe, Piers — Nvidia

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

No SD!

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.6** *P* **78** *L* **49** # 323

Law, David — Hewlett Packard Enterprise

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

Subclause 156.6 'The DWDM channel over a DWDM black link' says '... the medium associated with the 400GBASE-ZR PMD, over which the PHY operates at a single optical frequency ...'. Dpoesn't the PHY to operate over two different optical frequencies when the Tx Rx different optical channel ability is true?

SuggestedRemedy

Suggest that the text '... over which the PHY operates at a single optical frequency ...' in subclause 156.6 be changed to read '... over which the PHY transmits at a single optical frequency ...'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For CRG discussion. Current wording for 100ZR used in IEEE Std 802.3-2022 subclause 154.6

Cl **156** *SC* **156.6** *P* **79** *L* **10** # 328

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

It would be helpful on figure 156-3 to also add TP2_0, TP2_n, TP3_0, and TP3_n

SuggestedRemedy

add TP2_0, TP2_n, TP3_0, and TP3_n

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The 0 and n-1 PMDs connecting to TP2 and TP3 are included in the diagram. Figure matches same 100ZR figure in IEEE Std 802.3-2022 154.6

Cl **156** *SC* **156.6** *P* **79** *L* **18** # 502

Dawe, Piers — Nvidia

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

misuse of TP2

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.6** *P* **79** *L* **38** # 503

Dawe, Piers — Nvidia

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

blank line

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** *SC* **156.6** *P* **79** *L* **48** # 101

Ran, Adee — Cisco

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

"Tx" and "Rx" should not be used as abbreviations of the terms "transmitter" and "receiver" (except in variable and register names, in diagram labels, or as qualifiers).

SuggestedRemedy

Change to "transmitter" and "receiver" here and in other places as appropriate.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "Tx" to "transmitter" and change "Rx" to "receiver" through the document. With editorial license.

Cl **156** *SC* **156.6** *P* **79** *L* **52** # 504

Dawe, Piers — Nvidia

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

Rx_optical_frequency_index Tx_optical_frequency_index Tx_Rx_diff_opt_freq_ability

SuggestedRemedy

Tables 156-2, 3 and a later sentence have Tx_optical_channel_index Rx_optical_channel_index Tx_Rx_diff_opt_chan_ability

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comments 324, 325 and 326

Cl **156** *SC* **156.6** *P* **80** *L* **1** # 505

Dawe, Piers Nvidia

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

blank lines 1 to 3

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** *SC* **156.6** *P* **80** *L* **7** # 506

Dawe, Piers Nvidia

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

f not defined

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

fi is defined on page 79, line 31 as "all channel frequencies fi." and is consistent with figure 154-3 in IEEE Std 802.3-2022

Cl **156** *SC* **156.6** *P* **80** *L* **28** # 507

Dawe, Piers Nvidia

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

square or round brackets

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Use of [ ] brakets consistent with Table 154-5 in IEEE Std 802.3-2022

Cl **156** *SC* **156.7** *P* **84** *L* **22** # 334

Ghiasi, Ali Ghiasi Quantum/Marvell

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

The receiver must tolerate 26 dB OSNR and meet the requried error rate, it is not clear what receive OSNR (min) of 29 dB provides

SuggestedRemedy

Need discustions on the intent

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Receiver OSNR tolerance is measured without line immpairments, see 156.9.24, which is different than Receiver OSNR which includes line impairment, see 156.9.23

Cl **156** *SC* **156.7** *P* **84** *L* **24** # 333

Ghiasi, Ali Ghiasi Quantum/Marvell

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

Receive OSNR tolerance is not defined at point till one reads section 156.9.24

SuggestedRemedy

Please add reference to 156.9.24

Proposed Response *Response Status* **W**

PROPOSED REJECT.

All specifications in Tables 156-7, -8 and -9 including Receive OSNR tolerance are defined in 156.9 which is after the tables but consistent with multiple clauses in IEEE Std 802.3-2022.

Cl **156** *SC* **156.7.1** *P* **82** *L* **23** # 102

Ran, Adee Cisco

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

"+/– 20ppm"
Also in Table 156–7

SuggestedRemedy

Change to "±20 ppm" (symbol and space)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change as suggested through the document. With editorial license.

Cl **156** *SC* **156.7.1** *P* **82** *L* **23** # 508

Dawe, Piers
Nvidia

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

Why 59.84375?

SuggestedRemedy

59.84375

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Values per adopted baselines and no suggested remedy

Cl **156** *SC* **156.7.1** *P* **82** *L* **23** # 509

Dawe, Piers
Nvidia

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

Why +/-20 ppm?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Values per adopted baselines and no suggested remedy

Cl **156** *SC* **156.7.1** *P* **82** *L* **27** # 510

Dawe, Piers
Nvidia

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

Average channel output power

SuggestedRemedy

Average launch power as for single-wavelength duplex fibre PMDs such as 100GBASE-DR, 100GBASE-FR1, and 100GBASE-LR1

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Use of "Average channel output power" consistent with Table 154-7 in IEEE Std 802.3-2022

Cl **156** *SC* **156.7.1** *P* **82** *L* **30** # 354

Maniloff, Eric
Ciena

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

When adding the Tx output power tuning, its accuracy should be defined as well

SuggestedRemedy

Add an entry "Transmit output power control absolute accuracy" with Min = -1.0 dB and Max = 1.0 dB

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.7.1** *P* **82** *L* **30** # 353

Maniloff, Eric
Ciena

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

Limiting Adjacent channel crosstalk penalty requires a reduction in the power deltas between channels. To ensure this, adjustable power must be specified.

SuggestedRemedy

Add an entry "Adjustable Range of Tx Output Power" with Min limited to -13 to -9 dBm

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** SC **156.7.1** P **82** L **35** # 103

Ran, Adee Cisco

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

"RRC Roll-Off" is not a unit. It is unclear what it means in this context.

Similarly for the (min) row.

The spectral mask is specified in 156.9.4 - reading this subclause it becomes clear that the "Value" in the table are the beta parameter values for the two masks.

Instead of listing numbers that are meaningless without reading the subclause text, simply point to the subclause.

SuggestedRemedy

Change "Value" to "See 156.9.4" and use em-dash for "Unit" in both rows.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 359

Cl **156** SC **156.7.1** P **82** L **35** # 511

Dawe, Piers Nvidia

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

RRC Roll-Off

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 359

Cl **156** SC **156.7.1** P **82** L **35** # 329

Ghiasi, Ali Ghiasi Quantum/Marvell

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

RRC is introudced for 1st time in table 156-6 with not reference

SuggestedRemedy

Add reference to 156.9.4

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 359

Cl **156** SC **156.7.1** P **82** L **48** # 337

Ghiasi, Ali Ghiasi Quantum/Marvell

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

For full interoperability using EVM may need additional constrains based on the data in rahn_3cw_01a_220223 and way_3cw_01a_220523

SuggestedRemedy

Need more data to prove that EVM will provide the IEEE level of interoperability

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** SC **156.7.1** P **82** L **49** # 350

Maniloff, Eric Ciena

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

I-Q is an insufficient name for this spec

SuggestedRemedy

Change spec name to "I-Q Offset per Polarization (Max Instantaneous)"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In Tables 156-6, table 156-11 and 156.9.11 change "I-Q (max instantaneous)" to "I-Q offset per polarization (max instantaneous)"

Cl **156** SC **156.7.1** P **82** L **49** # 512

Dawe, Piers Nvidia

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

I-Q (max instantaneous), I-Q (mean)

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comment 350 and 351

Cl **156** SC **156.7.1** P **82** L **50** # 351

Maniloff, Eric Ciena

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

I-Q is an insufficient name for this spec

SuggestedRemedy

Change spec name to "I-Q Offset per Polarization (Mean)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In Table 156-6, table 156-11 and 156.9.12 change "I-Q (mean)" to "I-Q offset per polarization (mean)"

Cl **156** SC **156.7.1** P **82** L **53** # 513

Dawe, Piers Nvidia

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

Several things with max and min, others without. Definition of 156.9.14 in I-Q phase error doesn't define its sign

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In table 156-6 delete "I-Q phase error (min)", change "I-Q phase error (max)" to "I-Q phase error" with a value of +/-5. with editorial license

Cl **156** SC **156.7.1** P **82** L **54** # 514

Dawe, Piers Nvidia

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

bottom line of table

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** SC **156.7.1** P **83** L **8** # 515

Dawe, Piers Nvidia

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

Transmitter In-band OSNR

SuggestedRemedy

Change In to in

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 352

Cl **156** SC **156.7.1** P **83** L **8** # 104

Ran, Adee Cisco

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

dB(12.5 GHz) is not a unit.
Also in Table 156–7.

SuggestedRemedy

Change to dB and move the 12.5 GHz to the description or add a footnote to explain if necessary.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Same unit in IEEE Std 802.3-2022 clause 154 table 154.7

Cl **156** SC **156.7.1** P **83** L **8** # 352

Maniloff, Eric Ciena

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

In-band should not be capitalized

SuggestedRemedy

change In to in

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** *SC* **156.7.1** *P* **83** *L* **16** # 330

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

Transmit output power stability can't be negative

SuggestedRemedy

Remove the negative line

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comments 353 and 354

Cl **156** *SC* **156.7.1** *P* **83** *L* **16** # 331

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

Transmit ouptut power stability max=1 dB does not define the time interval

SuggestedRemedy

Is the time interval 1 us, 1 ms, 1 s, or 1 hour. Suggest that the power stability is measured over 1 s period where optical power is sampled every 10 ms time interval.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Power stability is independent of time interval.

Cl **156** *SC* **156.7.1** *P* **83** *L* **18** # 332

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

Transmit ouptut power absolute accuracy has to be in dBm. Also not clear if this line remain dB what is different with power stability?

SuggestedRemedy

Need discustions on the intent

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Accuracy is measured in dB not dBm.

Cl **156** *SC* **156.7.1** *P* **83** *L* **20** # 106

Ran, Adee — Cisco

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

RIN average and RIN peak are not designated as maximum. I asssume they should be.

SuggestedRemedy

Add "(max)" in both descriptions.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** *SC* **156.7.2** *P* **83** *L* **16** # 105

Ran, Adee — Cisco

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

"Average receive power (max)" does not depend on the receiver, but on the channel output. So it can't be a receiver specification (as the text above the table states).

Maybe it should be "Average receive power tolerance (min)"?

Similarly for "Average receive power (min)" which may be a tolerance requirement.

Similarly for Receiver OSNR (also defined in Table 156-8 for the channel, with the same value).

SuggestedRemedy

Change parameter names and/or add explanations in footnotes.

Consider moving parameters to the black link characteristics in Table 156-8 or deleting duplicates.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

"Average receive power (max)" is a receive characteristic in multiple IEEE Std 802.3-2022 subclauses including Table 151-8, Table 154-8 and 802.3db D3.2 Table 167.8.

Cl **156** *SC* **156.7.2** *P* **84** *L* **24** # 516

Dawe, Piers Nvidia

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

says that receiver OSNR tolerance "is informative and compliance is not required"

SuggestedRemedy

Table needs a footnote. Example of current wording from 140: Receiver sensitivity (OMAouter) (max) for 100GBASE-DR is optional and is defined for a transmitter with a value of SECQ up to 3.4 dB. 140.7.12.1 Receiver sensitivity for 100GBASE-DR The receiver sensitivity for 100GBASE-DR is optional and is defined for a transmitter with a value of SECQ up to 3.4 dB. Receiver sensitivity for 100GBASE-DR should meet Equation (140-1), which is illustrated in Figure 140-9. The normative requirement for the 100GBASE-DR receiver is stressed receiver sensitivity.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add note in Table 156-7 for Receiver OSNR tolerance stating "OSNR tolerance is informative and compliance is not required."

Cl **156** *SC* **156.8** *P* **84** *L* **33** # 517

Dawe, Piers Nvidia

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

Are these specs for "black link" or for "DWDM channel"?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.8** *P* **84** *L* **34** # 327

Law, David Hewlett Packard Enterprise

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

Subclause 156.8 '400GBASE-ZR DWDM black link transfer characteristics' says 'Some clarification of the requirements in Table 156–8 is provided in informative Annex 156A, as well as examples of compliant DWDM black links.' however there don't appear to be any clarification of the requirements in Table 156–8 in annexe 156A, just two examples of 400GBASE-ZR compliant DWDM black links.

SuggestedRemedy

Suggest that the text 'Some clarification of the requirements in Table 156–8 is provided in informative Annex 156A, as well as examples of compliant DWDM black links.' in subclause 156.8 be changed to read 'Some examples of compliant DWDM black links are provided in Annex 156A.'.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** *SC* **156.8** *P* **84** *L* **35** # 518

Dawe, Piers Nvidia

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

Some clarification of the requirements in Table 156-8 is provided in informative Annex 156A, as well as examples of compliant DWDM black links.

SuggestedRemedy

Leftover from 100GBASE-ZR (154.8). Delete? refer to 154A?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 327

Cl **156** *SC* **156.8** *P* **85** *L* **5** # 519

Dawe, Piers Nvidia

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

Average output power at TP3

SuggestedRemedy

each / per channel?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.8** *P* **85** *L* **8** # 355

Maniloff, Eric Ciena

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

Text for OSNR… should not be present

SuggestedRemedy

Delete text "for OSNR at TP3 (12.5 GHz)"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In Table 156-8 change "Average output power at TP3 (min): for OSNR at TP3 (12.5 GHz)" to "Average output power at TP3 (min)"

Cl **156** *SC* **156.8** *P* **85** *L* **13** # 356

Maniloff, Eric Ciena

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

Text for OSNR… should not be present

SuggestedRemedy

Delete text "for OSNR at TP3 (12.5 GHz)"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In Table 156-8 change "Optical path OSNR penalty (max), for OSNR at TP3 (12.5 GHz)" to "Optical path OSNR penalty (max)"

Cl **156** *SC* **156.8** *P* **85** *L* **22** # 520

Dawe, Piers Nvidia

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

DGD-max

SuggestedRemedy

Is there a spec to make the Rx tolerate it?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.8** *P* **85** *L* **28** # 521

Dawe, Piers Nvidia

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

Adjacent channel isolation

SuggestedRemedy

? see G.671

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.8** *P* **85** *L* **29** # 522

Dawe, Piers Nvidia

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

Interferometric crosstalk at TP3

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.8** *P* **85** *L* **35** # 523

Dawe, Piers Nvidia

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

Only relevant

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.8** *P* **85** *L* **44** # 524

Dawe, Piers
Nvidia

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

why is the table like this, high? isolation at 0 and +/-75?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided and table is per adopted baseline

Cl **156** *SC* **156.8** *P* **85** *L* **45** # 107

Ran, Adee
Cisco

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

"+/-"

SuggestedRemedy

Change to "±" (symbol) across the table

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change symbol as suggested throughout the document. With editorial license

Cl **156** *SC* **156.9.1** *P* **86** *L* **35** # 108

Ran, Adee
Cisco

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

82.2.11 defines a 100GBASE-R test pattern, which is irrelevant.
The 400GBASE-ZR PCS has a test pattern mode specified in 155.2.1.

SuggestedRemedy

Change "82.2.11, Clause 155" to "155.2.1".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.9.1** *P* **86** *L* **35** # 525

Dawe, Piers
Nvidia

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

Scrambled idle encoded by CFEC

SuggestedRemedy

and not SD-FEC?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Use of CFEC is correct as per 155.2.1 "The transmit data is encoded
with a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer
Hamming code SD-FEC"

Cl **156** *SC* **156.9.1** *P* **86** *L* **42** # 526

Dawe, Piers
Nvidia

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

valid 400GBASE-R

SuggestedRemedy

400GBASE-ZW

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** SC **156.9.1** P **86** L **42** # 109

Ran, Adee Cisco

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

It is unclear why some parameters have pattern "valid 400GBASE-R signal, 5" while other have only 5 (which is the only test pattern defined in this clause, and sufficient for measurement of all parameters).

"valid 400GBASE-R signal" is inadequate here - 400GBASE-R usually refers to the data created by a clause 119 PCS; but ZR is a special case - any 400GBASE-R data has to be processed by the full ZR stack.

SuggestedRemedy

Change pattern to either "5" in all rows, or "valid 400GBASE-ZR signal" in all rows.

Consider removing the pattern column and just stating in text that all parameters are specified with test pattern 5.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** SC **156.9.1** P **87** L **8** # 357

Maniloff, Eric Ciena

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

I-Q is an insufficient name for this spec

SuggestedRemedy

Change spec name to "I-Q Offset per Polarization (Max Instantaneous)"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 350

Cl **156** SC **156.9.1** P **87** L **10** # 358

Maniloff, Eric Ciena

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

I-Q is an insufficient name for this spec

SuggestedRemedy

Change spec name to "I-Q Offset per Polarization (Mean)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 351

Cl **156** SC **156.9.1** P **87** L **13** # 527

Dawe, Piers Nvidia

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

I-Q phase error (max), I-Q phase error (min)

SuggestedRemedy

Combine, as for Average receive power

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 513

Cl **156** SC **156.9.1** P **87** L **25** # 528

Dawe, Piers Nvidia

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

Is Average receive power a kind of sensitivity/overload? If not, why not any 400GBASE-ZW signal? Same for Ripple? which is a channel (black link) property

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.9.4** *P* **87** *L* **52** # 529

Dawe, Piers — Nvidia

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

Compliant transmitters ... are required to ... by applying minimum and maximum masks to the spectrum acquired using an optical spectrum analyzer.

SuggestedRemedy

Not

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.9.4** *P* **88** *L* **1** # 530

Dawe, Piers — Nvidia

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

As this mask is a normative spec

SuggestedRemedy

Write out the frequency-domain equations for a RRC response with a damping factor of 0.4

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 359

Cl **156** *SC* **156.9.4** *P* **88** *L* **1** # 110

Ran, Adee — Cisco

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

The damping factor is denoted by the German "Eszett" symbol ß, it should be the Greek "beta" β.

SuggestedRemedy

Replace to the β character (Greek beta) here and elsewhere as necessary.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change character as suggested. Replace through the document as required. With editorial licesne.

Cl **156** *SC* **156.9.4** *P* **88** *L* **8** # 531

Dawe, Piers — Nvidia

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

set at -9 dB up to the -9 dB of an RRC

SuggestedRemedy

set at -9 dB up to 30.8 GHz offset for an RRC

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "is set at –9 dB up to the –9 dB of an RRC with ß of 0.05." to "is set at -9 dB up to 30.8 GHz offset and follows a RRC ß of 0.05 for higher frequencies."

Cl **156** *SC* **156.9.4** *P* **88** *L* **40** # 532

Dawe, Piers — Nvidia

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

Blank line

SuggestedRemedy

Remove

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** *SC* **156.9.5** *P* **88** *L* **1** # 359

Maniloff, Eric — Ciena

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

This clause defines the transmit mask as following a RRC. The RRC definition should be included.

SuggestedRemedy

Add an equation to 156.9.4 defining the RRC function and Beta used to define the mask, or a reference to a definition elsewhere in 802.3

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add footnote for RRC Roll-Off "Root raised cosine (RRC) is the square root of the root cosine which is calculated as (see piecewise-defined function at https://en.widipedia.org/wiki/raised-cosine_filter)"

With editorial license

Cl **156** SC **156.9.5** P **88** L **45** # 533

Dawe, Piers
Nvidia

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

within the limits

SuggestedRemedy

below the limit?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

"within the limits" is correct as the compliant region is between the lower and upper mask.

Cl **156** SC **156.9.6** P **88** L **48** # 534

Dawe, Piers
Nvidia

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

frequency noise

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** SC **156.9.6** P **88** L **50** # 111

Ran, Adee
Cisco

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

"The laser frequency noise mask is the laser frequency noise measured at a resolution between 10^-1 and 10^-6 times the frequency of interest"

The mask is not the measured noise; it is the specified maximum.

The paragraph is not phrased in typical standard language and can be improved. The text in the suggested remedy may be used (or corrected if it contains any error).

SuggestedRemedy

Change the first paragraph from
"The laser frequency noise mask is the laser frequency noise measured at a resolution between 10^-1 and 10^-6 times the frequency of interest. The frequency sweep relative to the laser center frequency shall be from less than 100 Hz to fbaud/2. With the exception of spurs, the measured frequency noise at any frequency shall be below the mask formed by interpolating between the points listed in Table 156–12 and illustrated in Figure 156–5"
to
"The laser frequency noise mask is the maximum allowed laser frequency noise and is formed by interpolating between the points listed in Table 156–12 and illustrated in Figure 156–5. The mask frequencies are relative to the laser center frequency from less than 100 Hz to fbaud/2. Measurement resolution should be between 10^-1 and 10^-6 times the frequency of interest. With the exception of spurs, the measured frequency noise at any frequency shall be below the mask".

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change as suggested but in the second sentence change "than 100 Hz to fbaud/2" to "than 100 Hz to half the operating baud rate". See response to comment 112

Cl **156** SC **156.9.6** P **88** L **51** # 535

Dawe, Piers
Nvidia

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

the frequency of interest

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided.

Cl **156** *SC* **156.9.6** *P* **88** *L* **52** # 112

Ran, Adee
Cisco

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

"fbaud" is not defined in this clause.

SuggestedRemedy

Either define it (with a numberical value) or use the numerical value here.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "fbaud" to "half the operating baud rate"

Cl **156** *SC* **156.9.6** *P* **88** *L* **52** # 536

Dawe, Piers
Nvidia

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

fbaud

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 112

Cl **156** *SC* **156.9.6** *P* **89** *L* **3** # 168

Abbott, John
Corning Incorporated

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

Table 156-12 and figure 156-6. Table 93-8 for example has units of V^2 / Hz and just want to check that the power density here really has units of Hz^2 / Hz. . I think this is the first time a one-side spectral power density with these units shows up in 802.3 standard, but this is not my area and I'm just trying to help. Thank you!

SuggestedRemedy

Check that correct units are Hz^2 / Hz and maybe consider explaining the units if indeed this is the first time such units appear in 802.3 standard.

Proposed Response *Response Status* **W**

PROPOSED REJECT.

The power spectral density of frequency noise has units of Hz^2 / Hz

Cl **156** *SC* **156.9.6** *P* **89** *L* **3** # 166

Abbott, John
Corning Incorporated

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

IN TABLE 156-12 Everywhere else in the 802.3 standard "1-sided" is spelled out as "one-sided". For example table 93.8, table 110-11, table 136-18, table 137 -6, table 83D-6, table 93A-1, section 93A.1.6, table 120D-8.

SuggestedRemedy

Spell out "1-sided" as "one-sided" IN TABLE 156-12

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** *SC* **156.9.6** *P* **89** *L* **3** # 537

Dawe, Piers
Nvidia

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

1-sided noise power spectral density [Hz^2/Hz]

SuggestedRemedy

but noise power should be in watts, or dBc. Figure title has "spectral power density"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 168

Cl **156** *SC* **156.9.6** *P* **89** *L* **20** # 113

Ran, Adee
Cisco

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

Figure 156-5 is cluttered.

This figure does not add any information beyond Table 156-12 (which is normative, whereas the figure is an illustration).

SuggestedRemedy

Remove the marker labels (e.g. "X:1 x 10^4, Y: 1 x 10^9") and change "Hz2" to "Hz^2" in the y axis label.

Alternatively, delete the figure.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Retain table 156-5 and change "Hz2" to "Hz^2" in the y axis label.

Cl **156** SC **156.9.6** P **89** L **20** # 167

Abbott, John — Corning Incorporated

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

FIGURE 156-6 Everywhere else in the 802.3 standard “1-sided” is spelled out as “one-sided”. For example table 93.8, table 110-11, table 136-18, table 137 -6, table 83D-6, table 93A-1, section 93A.1.6, table 120D-8.

SuggestedRemedy

Spell out “1-sided” as “one-sided” in FIGURE 156-6.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** SC **156.9.10** P **90** L **13** # 114

Ran, Adee — Cisco

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

The abbreviation EVM should be introduced before it is used.

SuggestedRemedy

Insert "(EVM") after the first instance of "error vector magnitude" (which may be in a different paragraph, based on another comment).

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add "EVM: error vector magnitude" to 1.5. In the usage in theh body of the document state "error vector magnitude (EVM)". In all other usages in the document replace "error vector magnitude" with "EVM". With editorial license

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Cl **156** SC **156.9.10** P **90** L **20** # 115

Ran, Adee — Cisco

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

The last paragraph defines EVMmax, but the specified value in Table 156-6 is for EVM (max). It does not seem to be the same thing.

Should the specification be for EVMmax (max)?

SuggestedRemedy

Move the first paragraph (containing the "shall") after the last one (which defines EVMmax), and hinge the specifications to be EVMmax instead of EVM.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For comment resolution group (CRG) consideration.

Cl **156** SC **156.9.11** P **90** L **24** # 360

Maniloff, Eric — Ciena

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

I-Q is an insufficient name for this spec

SuggestedRemedy

Change spec name to "I-Q Offset per Polarization (Max Instantaneous)"

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 350

Cl **156** SC **156.9.11** P **90** L **24** # 361

Maniloff, Eric — Ciena

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

Add a definition for I-Q Offset Measurement

SuggestedRemedy

Add the following Specification:

IQoffset(Max) = 10log10[(Imean^2 + Qmean^2)/Psignal]

with a measurement interval of 1 us

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change 156.9.11 to "The I-Q offset per polarization (max instantaneous) is the peak value per polarization, shall be within the limits given in Table 156–6. The I-Q offset per polarization (max instantaneous) is calculated as Iqoffset(Max) = 10log10[(Imean^2 + Qmean^2)/Psignal] with a measurement interval of 1 us"

Cl **156** SC **156.9.11** P **90** L **26** # 117

Ran, Adee Cisco

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

The definition of I-Q (max instantaneous) is unclear. "peak value" of what per polarization? is it peak power?

Assuming it is not the difference between I and Q, the current name is confusing. Should it be "Max instantaneous power per polarization"?

Also, having the definition and the "shall" in the same sentence create poor language.

SuggestedRemedy

Consider renaming this parameter.
Rewrite the definition to make it clear, even if the name is not changed.
Make the "shall" statement separate from the definition.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comments 350 and 361

Cl **156** SC **156.9.11** P **90** L **26** # 116

Ran, Adee Cisco

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

Font size is inconsistent in the text, also in 156.9.12.

SuggestedRemedy

Make it consistent.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Ensure consistent font in 156.9.11 and 156.9.12. With editorial license

Cl **156** SC **156.9.11** P **90** L **26** # 538

Dawe, Piers Nvidia

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

I-Q (max instantaneous)

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 350

Cl **156** SC **156.9.11** P **90** L **28** # 362

Maniloff, Eric Ciena

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

I-Q is an insufficient name for this spec

SuggestedRemedy

Change spec name to "I-Q Offset per Polarization (Mean)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 351

Cl **156** SC **156.9.12** P **90** L **28** # 363

Maniloff, Eric Ciena

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

Add a definition for I-Q Offset Measurement

SuggestedRemedy

Add the following Specification:

IQoffset(Mean) = 10log10[(Imean^2 + Qmean^2)/Psignal]

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #362. Change 156.9.12 to "The I-Q offset per polarization (mean) is the mean value per polarization, shall be within the limits given in Table 156–6. The IQ offset (mean) is calculated as Iqoffset(Mean) = 10log10[(Imean^2 + Qmean^2)/Psignal]." With editorial license.

Cl **156** SC **156.9.12** P **90** L **30** # 119

Ran, Adee Cisco

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

The definition of I-Q (mean) is unclear. "mean value" of what per polarization? is it mean power?

Assuming it is not the difference between I and Q, the current name is confusing. Should it be "mean power per polarization"?

What does "averaged over <=1 us" mean? Is averaging over only 1 ps acceptable? Should it perhaps be measured over at least 1 us?

In clause 154 there is a parameter with a different name, "I-Q offset (max)", and its definition refers to ITU-T G.698.2. This may create further confusion.

Also, having the definition and the "shall" in the same sentence create poor language.

SuggestedRemedy

Consider renaming this parameter.
Rewrite the definition to make it clear, even if the name is not changed.
Make the "shall" statement separate from the definition.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comments 362 and 364

Cl **156** SC **156.9.12** P **90** L **30** # 364

Maniloff, Eric Ciena

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

≤ 1us measurement interval applies to Max, not mean

SuggestedRemedy

Remove reference to ≤ 1 us from 156.9.12

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "mean value per polarization averaged over <=1 us" to "mean value per polarization"

Cl **156** SC **156.9.12** P **90** L **30** # 118

Ran, Adee Cisco

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

"<=" should be a symbol

SuggestedRemedy

change to the ≤ symbol

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** SC **156.9.12** P **90** L **30** # 539

Dawe, Piers Nvidia

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

I-Q (mean)

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See responses to comments 351 and 364

Cl **156** SC **156.9.13** P **90** L **35** # 540

Dawe, Piers Nvidia

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

I-Q amplitude imbalance (mean)

SuggestedRemedy

proportional amplitude difference?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.9.14** *P* **90** *L* **40** # 541

Dawe, Piers Nvidia

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

proportional phase difference

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.9.14** *P* **90** *L* **41** # 542

Dawe, Piers Nvidia

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

local oscillator

SuggestedRemedy

?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.9.15** *P* **90** *L* **45** # 543

Dawe, Piers Nvidia

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

ditto. why is this separate?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.9.17** *P* **91** *L* **3** # 545

Dawe, Piers Nvidia

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

shall with no PICS

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add "Optical signal-to-noise ratio (OSNR)" to 156.13.4.4. With editorial license

Cl **156** *SC* **156.9.17** *P* **91** *L* **3** # 544

Dawe, Piers Nvidia

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

who is supposed to act on this "shall"? Black link, as it points to Table 156-8. 156.8 has the necessary "shall". Don't write in the passive voice.

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided. Current language matches similar language in IEEE Std 802.3-2022 154.9.11

Cl **156** *SC* **156.9.17** *P* **91** *L* **4** # 365

Maniloff, Eric Ciena

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

Both in-band and out-of-band OSNR use the same definition for Signal Power. 156.9.17 refers to this as average signal power, 156.9.19 refers to this as the total signal power. These should be the same.

SuggestedRemedy

Change Average to Total on line 4

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "ratio of the average signal power" to "ratio of the total signal power within the signal's –20 dB spectral mask points".

Cl **156** SC **156.9.17** P **91** L **5** # 546

Dawe, Piers Nvidia

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

maximum spectral excursion

SuggestedRemedy

unused / undefined

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In 156.9.17 change the end of the second sentence from "plus and minus the maximum spectral excursion" to "plus and minus the maximum spectral excursion as defined in ITU-T G.698.2."

Cl **156** SC **156.9.18** P **91** L **15** # 547

Dawe, Piers Nvidia

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

in-band OSNR

SuggestedRemedy

Define in-band

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Approach of parameter Transmitter in-band OSNR being defined as OSNR consisent with IEEE Std 802.3-2022. Clause 156 adds new parameter Transmitter out-of-band OSNR. For CRG discussion.

Cl **156** SC **156.9.21** P **91** L **36** # 548

Dawe, Piers Nvidia

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

No verb

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** SC **156.9.22** P **91** L **41** # 549

Dawe, Piers Nvidia

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

The average receive power shall be within the limits given in Table 156-7.

SuggestedRemedy

Average output power at TP3, Table 156-8? sensivitity and overload? "shall" should not be here

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Same language used for Average optical power in IEEE Std 802.3-2022 clause 154. Other inforce clauses include "if measured per IEC 61280-1-3 or 61280-1-3". For CRG discussion

Cl **156** SC **156.9.24** P **92** L **4** # 552

Dawe, Piers Nvidia

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

pre-FEC BER level lower than the CFEC threshold

SuggestedRemedy

which is? and the SD-FEC?

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "while maintaining a pre-FEC BER level lower than the CFEC threshold" to "while maintaining a pre-FEC BER as defined in 156.1.1" Only applies to CFEC, see response to comment #525.

Cl **156** SC **156.9.24** P **92** L **5** # 551

Dawe, Piers Nvidia

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

has to be met with a worst-case compliant transmitter, but it does not have to be met

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Statement "but it does not have to be met" applies to the line impairments which are listed and not the transmitter

Cl **156** *SC* **156.9.24** *P* **92** *L* **9** # 120

Ran, Adee Cisco

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

"OSNR tolerance is informative and compliance is not required."

Informative text should not appear in normative clauses. 802.3dc did the work of removing "informative specifications" or turning them into recommendations.

This parameter seems to be loosely defined and unmeasurable in a deployed system (pre-FEC BER counters and test patterns are not specified). So maybe it should not even be a recommendation.

Also, the "Receiver OSNR" parameter have names that does not suggest their meaning. If this parameter is retained, the name should be changed, maybe to "Receiver OSNR tolerance without channel impairments"

SuggestedRemedy

Preferably delete this parameter (subclause text and table).

Otherwise change the "informative" paragraph to make it a recommendation, and change the parameter name to be more meaningful.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For comment resolution group (CRG) consideration. Same informative or optional approach taken in IEEE Std 802.3-2022 154.9.16.

Cl **156** *SC* **156.9.24** *P* **92** *L* **9** # 550

Dawe, Piers Nvidia

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

see earlier for table footnote and "optional"

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Intent of the comment is unclear, see response to comment 516

Cl **156** *SC* **156.9.25** *P* **92** *L* **13** # 553

Dawe, Piers Nvidia

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

insertion loss

SuggestedRemedy

channel response?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Cl **156** *SC* **156.9.26** *P* **92** *L* **18** # 554

Dawe, Piers Nvidia

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

[Optical path OSNR penalty, defined in Recommendation ITU-T G.698.2, qv]

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear, no suggested remedy provided and reference to ITU-T is consistent with IEEE Std 802.3-2022.

Cl **156** *SC* **156.9.29** *P* **92** *L* **33** # 555

Dawe, Piers Nvidia

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

[Adjacent channel isolation, defined in Recommendation ITU-T G.671, qv]

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear, no suggested remedy provided and reference to ITU-T is consistent with IEEE Std 802.3-2022.

Cl **156** *SC* **156.9.30** *P* **92** *L* **38** # 556

Dawe, Piers Nvidia

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

[Interferometric crosstalk at TP3, defined in Recommendation ITU-T G.698.2, qv]

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

Comment unclear, no suggested remedy provided and reference to ITU-T is consistent with IEEE Std 802.3-2022.

Cl **156** *SC* **156.10.1** *P* **92** *L* **49** # 558

Dawe, Piers Nvidia

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

Connect the 400 Gb/s DP-16QAM transmitter to

SuggestedRemedy

The 400GBASE-ZW transmitter is connected to

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.

Cl **156** *SC* **156.10.1** *P* **93** *L* **8** # 562

Dawe, Piers Nvidia

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

Digital Signal Processing

SuggestedRemedy

A to D and analysis? 156.10.1.2 says it's Offline

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.10.1** *P* **93** *L* **8** # 561

Dawe, Piers Nvidia

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

Calibrated Coherent Receiver

SuggestedRemedy

Calibrated coherent receiver and so on, also in other figures

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

In 156.10 ensure correct capitialization with editorial license

Cl **156** *SC* **156.10.1** *P* **93** *L* **9** # 559

Dawe, Piers Nvidia

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

It would be helpful to show the patch cord, between Tx and TP2

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Add patch cord and MDI point to figure 156-6 similar to figure 156-2, with editorial license

Cl **156** *SC* **156.10.1** *P* **93** *L* **9** # 560

Dawe, Piers Nvidia

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

TX

SuggestedRemedy

Tx

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "TX" to "Tx"

Cl **156** *SC* **156.10.1.1** *P* **93** *L* **44** # 336

Ghiasi, Ali — Ghiasi Quantum/Marvell

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

Assuming just 4 bits ENOB from 10 MHz to 29.9 MHz the reference receiver will have additional penalty than real receiver that has typically 6+ bits ENOB at low frequncies and about 4 bits at high frequncy

SuggestedRemedy

If there is interest I can bring a frequncy dependent ENOB mask

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.10.1.2** *P* **94** *L* **3** # 563

Dawe, Piers — Nvidia

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

blank line

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** *SC* **156.10.1.2.2** *P* **94** *L* **36** # 564

Dawe, Piers — Nvidia

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

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

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.10.1.2.4** *P* **94** *L* **44** # 121

Ran, Adee — Cisco

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

"3rd-order super Gaussian filter with RRC = 0.2"

This is an uncommon way to specify a filter, and it is unclear.

RRC seems to stand for is root raised cosine (0.2 may be the roll-off parameter beta), but this filter is not "super Gaussian" and it's unclear what "3rd-order" means for a raised cosine. Or is it a different filter?

Also, the cutoff frequency is not specified.

SuggestedRemedy

Rewrite to clarify.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "3rd-order super Gaussian filter with RRC = 0.2" to "RRC filter with beta = 0.2"

Cl **156** *SC* **156.10.1.2.4** *P* **94** *L* **45** # 567

Dawe, Piers — Nvidia

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

RRC

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 359

Cl **156** *SC* **156.10.1.2.4** *P* **94** *L* **45** # 565

Dawe, Piers — Nvidia

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

3rd-order super Gaussian filter with RRC = 0.2

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 121

Cl **156** *SC* **156.10.1.2.4** *P* **94** *L* **45** # 566

Dawe, Piers Nvidia

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

super Gaussian https://en.wikipedia.org/wiki/Gaussian_function#Higher-order_Gaussian_or_super-Gaussian_function

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 121

Cl **156** *SC* **156.10.1.2.5** *P* **94** *L* **47** # 568

Dawe, Piers Nvidia

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

IQ Offset

SuggestedRemedy

IQ offset (twice)

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "IQ Offset" to "IQ offset" with editorial license

Cl **156** *SC* **156.10.1.2.6** *P* **94** *L* **3** # 569

Dawe, Piers Nvidia

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

FIR filter with 15 real taps

SuggestedRemedy

Where is the cursor?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.10.1.2.6** *P* **94** *L* **4** # 570

Dawe, Piers Nvidia

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

using the signal with additive white Gaussian noise considering the Receiver OSNR(min)

SuggestedRemedy

do what?

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggested remedy provided

Cl **156** *SC* **156.10.1.2.6** *P* **95** *L* **3** # 335

Ghiasi, Ali Ghiasi Quantum/Marvell

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

Improve definition of the FIR

SuggestedRemedy

The signal is equalized using an FIR filter with 15 T spaced equalizer with real taps. The sum of all taps is equal to 1, and the main tap is allowed to varry from tap 1 to tap 8.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change the first sentence of 156.10.1.2.6 to "The signal is equalized using an FIR filter with a 15 T spaced equalizer with real taps. The sum of all taps is equal to 1 and the main tap is allowed to vary from tap 1 to tap 8."

Cl **156** *SC* **156.10.1.2.6** *P* **95** *L* **9** # 220

Huber, Thomas Nokia

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

The editor's note about TBDs is no longer relevant

SuggestedRemedy

Remove the editor's note.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 122

Cl **156** SC **156.10.1.2.6** P **95** L **9** # 366

Maniloff, Eric Ciena

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

Editor's Note should be removed

SuggestedRemedy

Remove Note

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 122

Cl **156** SC **156.10.1.2.6** P **95** L **9** # 122

Ran, Adee Cisco

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

I don't see any TBDs.

SuggestedRemedy

Delete the editor's note.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** SC **156.10.1.2.7** P **95** L **17** # 123

Ran, Adee Cisco

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

The equation label format seems unusual (hyphen instead of en dash, spaces).

Also, the equation labels are not on the same line as the equation.

SuggestedRemedy

Use the standard equation style.

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Update equation style to match style guide. With editorial license

Cl **156** SC **156.10.1.2.7** P **95** L **20** # 572

Dawe, Piers Nvidia

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

It would be better to count from 1 to K in the usual way

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggest remedy provided

Cl **156** SC **156.10.1.2.7** P **95** L **20** # 571

Dawe, Piers Nvidia

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

define k and K

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

For comment resolution group (CRG) consideration.

Cl **156** SC **156.10.1.2.7** P **95** L **25** # 573

Dawe, Piers Nvidia

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

I_delta and Q_delta not norm then norm

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggest remedy provided

Cl **156** SC **156.10.1.2.7** P **95** L **31** # 574

Dawe, Piers Nvidia

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

Do what with alpha_peak? add equation

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggest remedy provided

Cl **156** SC **156.10.1.2.7** P **95** L **45** # 575

Dawe, Piers Nvidia

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

n and eta are the same thing? Why not k?

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggest remedy provided

Cl **156** SC **156.10.1.2.7** P **95** L **49** # 576

Dawe, Piers Nvidia

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

starting at 0

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggest remedy provided

Cl **156** SC **156.10.1.2.7** P **95** L **51** # 577

Dawe, Piers Nvidia

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

N vs K vs 1000

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED REJECT.

No suggest remedy provided

Cl **156** SC **156.10.1.2.7** P **96** L **28** # 578

Dawe, Piers Nvidia

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

blank line

SuggestedRemedy

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl **156** SC **156.11.1** P **96** L **35** # 124

Ran, Adee Cisco

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

The text here does not match the common text for the "General safety" subclauses across the 2022 revision.

SuggestedRemedy

Change the text in this subclause to "Equipment subject to this clause shall conform to the general safety requirements in J.2."

Proposed Response *Response Status* **W**

PROPOSED ACCEPT.

Cl **156** *SC* **156.12** *P* **97** *L* **41** # 579

Dawe, Piers
Nvidia

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

(compare 156A)

SuggestedRemedy

Make it clear that there is one fibre per direction at the MDI even if there is bidirectional fibre between mux/demuxes

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Change "is coupled to the DWDM black link medium at the MDI" to "is coupled to the DWDM black link medium via one fiber per direction at the MDI"

Cl **156** *SC* **156.13.4.2** *P* **100** *L* **28** # 580

Dawe, Piers
Nvidia

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

PMD_global_transmit_disable _variable Tx_Rx_diff_opt_channel_abili ty variable

SuggestedRemedy

rogue underscore, column widths

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Correct underscore and column widths, with editorial license

Cl **156** *SC* **156.A.1** *P* **104** *L* **45** # 367

Maniloff, Eric
Ciena

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

Black Link examples should be expanded to include some specifications for Mux and Demux devices that would satisfy the black-link transfer funtion

SuggestedRemedy

Add a table to 156.A.1 including Mux and Demux example specifications. For example see https://www.ieee802.org/3/cw/public/22_0523/maniloff_3cw_01_220523.pdf#page=5

Proposed Response *Response Status* **W**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.