IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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<td>Status: A</td>
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<tr>
<td>&quot;IEEE Std 802.3-202x&quot; is no longer correct - we know it will be 2022 release</td>
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<td>SuggestedRemedy</td>
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<tr>
<td>Change all dated references to 802.3 from 202x to 2022</td>
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<tr>
<td>Text of the editorial instruction should be bolded and italics</td>
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<tr>
<td>Missing space between &quot;400GXS&quot; and &quot;=&quot;</td>
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<tr>
<td>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.</td>
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<td>SuggestedRemedy</td>
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<tr>
<td>Change title of Table 116-5 to &quot;PHY type and clause correlation (400GBASE-G optical)&quot; with appropriate editorial instruction and change formatting. Insert new Table 116-x &quot;PHY type and clause correlation (400GBASE-Z optical)&quot; and include the row for 400GBASE-ZR as provided in Table 116-5 in D2.0 with only the necessary columns.</td>
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<tr>
<td>ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>Change title of Table 116-5 to &quot;PHY type and clause correlation (400GBASE-G optical)&quot; and remove the table from the draft. With editorial license.</td>
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<tr>
<td>Insert new Table 116-x &quot;PHY type and clause correlation (400GBASE-ZR optical)&quot; and include the row for 400GBASE-ZR as provided in Table 116-5 in D2.0 with only the necessary columns. See response to comment 174.</td>
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<tr>
<td>The 400GBASE-ZR is part of the family of physical layer devices called 400GBASE-Z as defined in 1.4.144b, not 400GBASE-G. The editorial changes in 116.2.3 are therefore incorrect.</td>
<td></td>
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<tr>
<td>SuggestedRemedy</td>
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<tr>
<td>Rather than changing the first paragraph, add the following new paragraph at the end of 116.2.3: &quot;The term 400GBASE-Z refers to a specific family of Physical Layer devices using 400GBASE-G 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.&quot;</td>
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<td>ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>Delete existing text in D2.0 for 116.2.3</td>
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<td>Add a new last paragraph to 116.2.3</td>
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<tr>
<td>&quot;The 400GBASE-ZR PHY uses the PCS specified in Clause 155. The 400GBASE-ZR PCS performs encoding of data from the 400GMII to the 400GBASE-ZR PMA service interface.&quot;</td>
<td></td>
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</tbody>
</table>
Response

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.

"The 400GBASE-ZR PMA, which is a 400GBASE-Z PMA, is defined in Clause 155."
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.1.5 P 35 L 3 # 10
Brown, Matt Huawei
Comment Type E Comment Status A rewrite bucket
"400GBASE-Z" should be "400GBASE-ZR".
SuggestedRemedy
Change "400GBASE-Z" to "400GBASE-ZR".
Response Response Status C ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.2.5.1 P 46 L 14 # 11
Lewis, Jon Dell Technologies
Comment Type E Comment Status A bucket
need a non-breaking space between "Annex" and "D"
SuggestedRemedy
Add non-breaking space.
Response Response Status C ACCEPT.

Cl 155 SC 155.3.2 P 51 L 31 # 12
Lewis, Jon Dell Technologies
Comment Type E Comment Status A rewrite bucket
Text and arrow intersect.
SuggestedRemedy
Remove intersection of text and arrow to make the figure more legible.
Response Response Status C ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.4.2.1 P 61 L 14 # 13
Bruckman, Leon Huawei
Comment Type T Comment Status A rewrite bucket
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."
Response Response Status C ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.4.2.4 P 63 L 4 # 14
Bruckman, Leon Huawei
Comment Type T Comment Status A rewrite bucket
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"
Response Response Status C ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.3.2 P 51 L 19 # 15
Bruckman, Leon Huawei
Comment Type E Comment Status A rewrite bucket
Empty box without any fuction
SuggestedRemedy
Remove empty box from figure 155-10
Response Response Status C ACCEPT IN PRINCIPLE.
See response to comment #346.
### Comment #16

**Comment**

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 associated frequency tolerance.

**Suggested Remedy**

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

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

### Comment #17

**Comment**

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.

**Suggested Remedy**

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 SCn(t) nominally indicating the running remainder. Averaging the Cm(t) plus SCn(t) values across multiple multi-frames, the average represents the incoming serial rate as the number of information bytes arriving at the GMP encoder per multi-frame."

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

### Comment #18

**Comment**

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.

**Suggested Remedy**

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."

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

### Comment #19

**Comment**

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.

**Suggested Remedy**

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."

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Response #20

Cl 155 SC 155.2.1 P 36 L 22 # 20

Gustlin, Mark Cisco

Comment Type TR

Comment Status A rewrite bucket

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 refer 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 location of the codes in the concatenation.

Suggested Remedy

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

ACCEPT IN PRINCIPLE.

See response to comment #346.

Response #21

Cl FM SC FM P 1 L 23 # 21

Marris, Arthur Cadence Design Systems

Comment Type E

Comment Status A bucket

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

Suggested Remedy

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 802.3cc-202x, and IEEE Std 802.3cz-202x."

Response C

ACCEPT IN PRINCIPLE.

See response to comment #346.

Response #22

Cl FM SC FM P 10 L 34 # 22

Marris, Arthur Cadence Design Systems

Comment Type E

Comment Status A bucket

Section 9 goes up Clause 160

Suggested Remedy

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."

Response C

ACCEPT.

See response to comment #21.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

CI 30 SC 30.5.1.1.2 P 19 L 17 # 24
Marris, Arthur Cadence Design Systems
Comment Type TR Comment Status A
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"
Response
Response Status C
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".

CI 45 SC 45.2.1.22.13 P 22 L 1 # 25
Marris, Arthur Cadence Design Systems
Comment Type ER Comment Status A
bucket
Needs to reference modification made by 802.3db and change paragraph number to 45.2.1.22.1aa
SuggestedRemedy
Change editing 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:"
Response
Response Status W
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:".

CI 155 SC 155.1.1 P 32 L 14 # 26
Marris, Arthur Cadence Design Systems
Comment Type E Comment Status A
bucket
Missing space
SuggestedRemedy
Change "characters. The" to "characters. The"
Response
Response Status C
ACCEPT.

CI 155 SC 155.1.4.2 P 32 L 15 # 27
Marris, Arthur Cadence Design Systems
Comment Type E Comment Status A
bucket
Missing word "The"
SuggestedRemedy
Change to "The PMA service interface"
Response
Response Status C
ACCEPT.

CI 155 SC 155.2.1 P 36 L 35 # 28
Marris, Arthur Cadence Design Systems
Comment Type T Comment Status A
rewrite bucket
Should this be "128 bit"?
SuggestedRemedy
Consider changing "128-symbol" to "128 bit symbol". Similar issue with "119-symbol" on line 37.
Response
Response Status C
ACCEPT IN PRINCIPLE.

See response to comment #346."

CI 155 SC 155.2.1 P 36 L 41 # 29
Marris, Arthur Cadence Design Systems
Comment Type T Comment Status A
rewrite bucket
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.
Response
Response Status C
ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

### Comment #30

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

**Suggested Remedy**
Change "OH bytes" to "overhead (OH) bytes"

**Response**
ACCEPT.

### Comment #31

**Comment**
Is resetting the scrambler a functional requirement?

**Suggested Remedy**
Consider changing "resets" to "shall be reset"

**Response**
ACCEPT IN PRINCIPLE.

See response to comment #346.

### Comment #32

**Comment**
Change "119b" to "119-bit"

**Suggested Remedy**

**Response**
ACCEPT.

### Comment #33

**Comment**
Insert correct cross reference

**Suggested Remedy**
Replace 45 with a subclause number or a cross reference to Clause 45

**Response**
ACCEPT IN PRINCIPLE.

See response to comment #346.

### Comment #34

**Comment**
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.

**Suggested Remedy**
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.

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

**Response**
ACCEPT IN PRINCIPLE.

See responses to comments 1 and 21.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

---

**Cl 78 SC 116.4 P 26 L 1 # 35**

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

Ran, Adee  
Cisco

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.

**Suggested Remedy:**

- 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**

PROPOSED ACCEPT IN PRINCIPLE.

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

---

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

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

Ran, Adee  
Cisco

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.

**Suggested Remedy:**

- 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 116.4 P 29 L 35 # 37**

**Comment Type:** E  
**Comment Status:** A

Ran, Adee  
Cisco

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

Also, the table ruling should be cleaned up.

**Suggested Remedy:**

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

**Response**  
**Response Status:** C

ACCEPT IN PRINCIPLE.

See response to comment 4

---

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

**Comment Type:** E  
**Comment Status:** A

Ran, Adee  
Cisco

Clause 119 is included in this amendment.

**Suggested Remedy:**

- Make "Clause 119" an active cross reference.

**Response**  
**Response Status:** C

ACCEPT.

---

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

**Comment Type:** E  
**Comment Status:** A

Ran, Adee  
Cisco

Superfluous comma before "and"

**Suggested Remedy:**

- Delete the comma

**Response**  
**Response Status:** C

ACCEPT.
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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<td>34</td>
<td>2</td>
<td>40</td>
<td>Cisco</td>
<td>T</td>
<td>A</td>
<td>The nominal rate is a specific number, and should not include range (in ppm). Also in 155.3.2.</td>
<td>Either delete &quot;+/- 20 ppm&quot; or delete &quot;nominal&quot;, in both subclauses.</td>
<td>ACCEPT IN PRINCIPLE. At 155.1.4, delete +/- 20 ppm. At 155.3.2, delete +/- 20 ppm in two places.</td>
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<td>155.1.4</td>
<td>34</td>
<td>2</td>
<td>41</td>
<td>Cisco</td>
<td>E</td>
<td>A</td>
<td>The letter x should be replaced by the multiplication sign ( \times ) (twice)</td>
<td>Change per comment, and apply across the draft (search for &quot;X&quot; as a whole word)</td>
<td>ACCEPT.</td>
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<td>155</td>
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<td>2</td>
<td>42</td>
<td>Cisco</td>
<td>T</td>
<td>A</td>
<td>The &quot;rate&quot; 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.</td>
<td>Change to the per-lane rate (59.84375 ? 28/29 Gb/s on each of 8 PCS lanes).</td>
<td>ACCEPT IN PRINCIPLE.</td>
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<td>43</td>
<td>Cisco</td>
<td>E</td>
<td>A</td>
<td>The sentence &quot;The PCS can operate in normal mode or in test-pattern mode&quot; is out of place in the first paragraph. These modes are only discussed in the third paragraph.</td>
<td>Move the last sentence of the first paragraph to a separate paragraph before the current third paragraph.</td>
<td>ACCEPT IN PRINCIPLE.</td>
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<td>E</td>
<td>A</td>
<td>Line 5 says &quot;PCS Transmit and PCS Receive processes&quot;, but then in lines 7, 17, and 27 it is &quot;transmit channel&quot;, and line 35 &quot;receive channel&quot;. &quot;channel&quot; is an overloaded term, it is not defined in this clause and its other meanings are quite different.</td>
<td>Change &quot;transmit channel&quot; to &quot;Transmit process&quot;, 3 times. Change &quot;receive channel&quot; to &quot;Receive function&quot;.</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>155</td>
<td>155.2.1</td>
<td>36</td>
<td>20</td>
<td>45</td>
<td>Cisco</td>
<td>E</td>
<td>A</td>
<td>Missing space between &quot;20&quot; and the unit &quot;ppm&quot;.</td>
<td>Insert a space.</td>
<td>ACCEPT.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The scrambled idle pattern defined in 119.2.4.9 cannot be used here as is, because the PCS processes are different.

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

Response
ACCEPT IN PRINCIPLE.

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

Suggested Remedy
Add "bits" after "510 ? 512".

Response
ACCEPT.

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

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

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

Response
ACCEPT IN PRINCIPLE.

"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.

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

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.
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.

**Suggested Remedy**

Change "between \(\sim 10^{214.684}\) and \(\sim 10^{217.136}\)" to "between \(10^{214}\) and \(10^{218}\)". Alternatively keep the fractions and delete the space separators.

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.

---

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.

**Suggested Remedy**

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

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.

---

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

**Suggested Remedy**

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

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.
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.

Suggested Remedy
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.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

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).

Suggested Remedy
Add a reference in 1.3.
Response
ACCEPT.
Add an entry in 1.3 as follows:

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

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?

Suggested Remedy
Please rephrase to clarify.
Response
ACCEPT IN PRINCIPLE.
See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID** 62

<table>
<thead>
<tr>
<th>Cl 155</th>
<th>SC 155.2.4.5.3</th>
<th>P 40</th>
<th>L 17</th>
<th># 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran, Adee</td>
<td>Cisco</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comment Type** T  
**Comment Status** A  
**SuggestedRemedy**  
"OIF-400ZR-01.0, March 10, 2020, subclause 8.9"  
Add a reference in 1.3 with either dated or undated version, preferably 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).  

**Response**  Response Status C  
ACCEPT IN PRINCIPLE.  
See response to comment #346.

**Comment ID** 63

<table>
<thead>
<tr>
<th>Cl 155</th>
<th>SC 155.2.4.6</th>
<th>P 40</th>
<th>L 43</th>
<th># 64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran, Adee</td>
<td>Cisco</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comment Type** E  
**Comment Status** A  
"mapped to 5 successive SC-FEC blocks"  
"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.  

**Response**  Response Status C  
ACCEPT IN PRINCIPLE.  
See response to comment #346.

**Comment ID** 61

<table>
<thead>
<tr>
<th>Cl 155</th>
<th>SC 155.2.4.5.2</th>
<th>P 40</th>
<th>L 9</th>
<th># 61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran, Adee</td>
<td>Cisco</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comment Type** E  
**Comment Status** A  
"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).  

**Response**  Response Status C  
ACCEPT IN PRINCIPLE.  
See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

CI 155 SC 155.2.4.9  P 43   L  9 #  65
Ran, Adee   Cisco
Comment Type T  Comment Status A  rewrite bucket
*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?

Suggested Remedy
Rewrite as appropriate.

Response  Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

CI 155 SC 155.2.4.9  P 43   L 14 #  66
Ran, Adee   Cisco
Comment Type T  Comment Status A  rewrite bucket
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.

Suggested Remedy
Add a diagram (similar to e.g. Figure 49-8) and some portion of the sequence following the
initial 16 bits (0xFFFF).

Response  Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

CI 155 SC 155.2.4.10  P 43   L 21 #  67
Ran, Adee   Cisco
Comment Type T  Comment Status A  rewrite bucket
ITU-T G.709.3 seems to be a normative reference.

Suggested Remedy
Add a reference in 1.3.

Response  Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

CI 155 SC 155.2.4.10  P 43   L 21 #  68
Ran, Adee   Cisco
Comment Type T  Comment Status A  rewrite bucket
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.

Suggested Remedy
Preferably add the detailed definitions from the referenced document.
Otherwise, delete the whole subclause except for the quoted sentence.

Response  Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.
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.

Suggested Remedy
Preferably add the detailed definitions from the referenced document. Otherwise, delete the first two paragraphs, retaining the quoted sentence.

Response
ACCEPT IN PRINCIPLE. See response to comment #346.

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.

Suggested Remedy
Delete the third paragraph.

Response
ACCEPT IN PRINCIPLE. See response to comment #346.

“will” is deprecated.

Suggested Remedy
Change “will” to “has”.

Response
ACCEPT IN PRINCIPLE. See response to comment #346.

There are multiple state machines (diagrams) in 155.4.

Suggested Remedy
Change “follows the state machine in 155.4” to “is depicted by the state diagram in Figure 155-16”.

Response
ACCEPT IN PRINCIPLE. See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

[Comment 74]

Comment Type: T  Comment Status: A  rewrite bucket

"LF ordered sets" are not defined in this draft.

I assume it is the "Local Fault" RS ordered set.

Suggested Remedy

Change to "Local Fault ordered sets (see 81.3.4)"

(or another ordered set if so intended)

Response  Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

[Comment 75]

Comment Type: T  Comment Status: A  rewrite bucket

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.

Suggested Remedy

Define a clear terminology (e.g. bits, quaternary symbols, DP-16QAM symbols) and apply it across 155.3.

Response  Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

[Comment 76]

Comment Type: T  Comment Status: A  rewrite bucket

"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).

Suggested Remedy

Rewrite this subclause as necessary such that the meaning of tx_symbol and rx_symbol is clear, and the rates match the meaning.

Response  Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

[Comment 77]

Comment Type: T  Comment Status: A  rewrite bucket

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.

Suggested Remedy

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.

Response  Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.
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.

Suggested Remedy
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 in the mapping defined in Table 155-2.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

"Gray-coded signals" should be "Gray-coded symbols".

Suggested Remedy
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.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.
Each 128-bit code word from the SD-FEC encoder $c = [c_0, c_1, \ldots, c_{127}]$, 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?

**Suggested Remedy**

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 $tx_{\text{word}}$ instead of $tx_{\text{symbol}}$ and $rx_{\text{word}}$ instead of $rx_{\text{symbol}}$.

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.

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.

**Suggested Remedy**

Rewrite to clarify.

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment 155**

**SC 155.3.3.6**

**P 59**

**L 22**

Comment Type: T

Comment Status: rewrite bucket

Ran, Adee Cisco

*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."

**Response**

Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

**Comment 155**

**SC 155.3.8**

**P 60**

**L 4**

Comment Type: T

Comment Status: rewrite bucket

Ran, Adee Cisco

*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.

**Response**

Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

**Comment 155**

**SC 155.4.2**

**P 60**

**L 22**

Comment Type: E

Comment Status: rewrite bucket

Ran, Adee Cisco

*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).

**Response**

Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.4.2.4 P 64 L 1 # 89
Ran, Adee Cisco

Comment Type E Comment Status A rewrite bucket

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.

Response Response Status C

ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 156 SC 156.1 P 74 L 39 # 91
Ran, Adee Cisco

Comment Type T Comment Status A

"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.

Response Response Status C

ACCEPT IN PRINCIPLE.

Change the title of 156.1.1 to "Frame loss ratio"

Change the 1st paragraph of 156.1.1 to:

"The frame loss ratio (FLR), (see 1.4.275) after processing by the PMA and PCS shall be less than 1.7 × 10^-12 for 64-octet frames with a minimum interpacket gap."

Delete the 2nd paragraph.

In clause 155 add additional language to clarify the degrade function and SER target.

With editorial license.
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...")

**Response**
ACCEPT IN PRINCIPLE.

See response to comment #346.

---

"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**
PROPOSED ACCEPT IN PRINCIPLE.

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

---

The values listed are not binary.

Also applies in 156.5.2.

**SuggestedRemedy**
delete "binary".

**Proposed Response**
PROPOSED ACCEPT IN PRINCIPLE.

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

**Suggested Remedy**

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".

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

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.

**Suggested Remedy**

Add a statement 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.

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

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.

**Suggested Remedy**

Delete the NOTE.

**Response**

REJECT.

There was no consensus in the CRG to make a change at this time.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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 156.6 P 79 L 48 # 101
Ran, Adee Cisco
Comment Type E 
Comment Status A
"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.
Response Response Status C
ACCEPT IN PRINCIPLE.

Cl 156 SC 156.7.1 P 82 L 23 # 102
Ran, Adee Cisco
Comment Type E 
Comment Status A
"+/− 20 ppm" Also in Table 156–7
SuggestedRemedy
Change to "±20 ppm" (symbol and space)
Response Response Status C
ACCEPT IN PRINCIPLE.
Change as suggested through the document. With editorial license.

Cl 156 SC 156.7.1 P 83 L 8 # 103
Ran, Adee Cisco
Comment Type T 
Comment Status A
"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.
Response Response Status C
ACCEPT.

Cl 156 SC 156.7.1 P 82 L 35 # 103
Ran, Adee Cisco
Comment Type T 
Comment Status A
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.
Response Response Status C
ACCEPT IN PRINCIPLE.
Add a space between change "dB(12.5 GHz)" to "dB (12.5 GHz)"
Same unit in IEEE Std 802.3-2022 clause 154 table 154.7

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Comment ID
Page 23 of 128
"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).

Suggested Remedy
Change parameter names and/or add explanations in footnotes.

Consider moving parameters to the black link characteristics in Table 156-8 or deleting duplicates.

Response
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.

RIN average and RIN peak are not designated as maximum. I assume they should be.

Suggested Remedy
Add "(max)" in both descriptions.

Response
ACCEPT.
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.

Suggested Remedy
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.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

The damping factor is denoted by the German "Eszett" symbol ß, it should be the Greek "beta" β.

Suggested Remedy
Replace to the β character (Greek beta) here and elsewhere as necessary.

Response
ACCEPT IN PRINCIPLE.

Change character as suggested. Replace through the document as required. With editorial licesne.

"fbaud" is not defined in this clause.

Suggested Remedy
Either define it (with a numerical value) or use the numerical value here.

Response
ACCEPT IN PRINCIPLE.

Change "fbaud" to "signaling rate"
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.9.6 P 89 L 20 # 113
Ran, Adee Cisco

Comment Type: E  Comment Status: A

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).

Suggested Remedy
- Remove the marker labels (e.g. "X: 1 x 10^4, Y: 1 x 10^9") and change "Hz^2" to "Hz" in the y axis label.
- Alternatively, delete the figure.

Response  Response Status: C
ACCEPT IN PRINCIPLE.

Retain figure 156-5 and change "Hz^2" to "Hz" in the y axis label.

Cl 156 SC 156.9.10 P 90 L 13 # 114
Ran, Adee Cisco

Comment Type: E  Comment Status: A

The abbreviation EVM should be introduced before it is used.

Suggested Remedy
- Insert "EVM" after the first instance of "error vector magnitude" (which may be in a different paragraph, based on another comment).

Response  Response Status: C
ACCEPT IN PRINCIPLE.

Add "EVM: error vector magnitude" to 1.5. In the first usage in the 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
<table>
<thead>
<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment ID</th>
<th>Page 27 of 128</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 156</td>
<td>SC 156.9.11</td>
<td>P 90</td>
<td>L 26</td>
</tr>
<tr>
<td>Ran, Adee</td>
<td>Cisco</td>
<td># 117</td>
<td></td>
</tr>
</tbody>
</table>
| 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.  
Response
ACCEPT IN PRINCIPLE.  
See response to comments 361
| CI 156       | SC 156.9.12    | P 90       | L 30           |
| Ran, Adee    | Cisco          | # 118      |                |
| 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.  
Response
ACCEPT IN PRINCIPLE.  
See responses to comments 362 and 363

"<=" should be a symbol  
SuggestedRemedy
change to the ≤ symbol  
Response
ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID** 120

<table>
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<tr>
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<tr>
<td>156</td>
<td>156.9.24</td>
<td>92</td>
<td>9</td>
<td>120</td>
</tr>
</tbody>
</table>

Ran, Adee
Cisco

**Comment Type** T

**Comment Status** A

"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.

**Response**

ACCEPT IN PRINCIPLE.

In 156.9.24 change

"OSNR tolerance is informative and compliance is not required."

to

"OSNR tolerance is optional and compliance is not required."

In table 156-7, for parameter Receiver OSNR tolerance add a footnote "Receiver OSNR tolerance is optional"

---

**Comment ID** 121

<table>
<thead>
<tr>
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<th>L</th>
<th>#</th>
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<td>156</td>
<td>156.10.1.2.4</td>
<td>94</td>
<td>44</td>
<td>121</td>
</tr>
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</table>

Ran, Adee
Cisco

**Comment Type** T

**Comment Status** A

"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.

**Response**

ACCEPT IN PRINCIPLE.

Change "3rd-order super Gaussian filter with RRC = 0.2" to "RRC filter with beta = 0.2"

---

**Comment ID** 122

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
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<th>L</th>
<th>#</th>
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<td>156</td>
<td>156.10.1.2.6</td>
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<td>9</td>
<td>122</td>
</tr>
</tbody>
</table>

Ran, Adee
Cisco

**Comment Type** E

**Comment Status** A

I don't see any TBDs.

**SuggestedRemedy**

Delete the editor's note.

**Response**

ACCEPT.

---

**Comment ID** 123

<table>
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<td>17</td>
<td>123</td>
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</table>

Ran, Adee
Cisco

**Comment Type** E

**Comment Status** A

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.

**Response**

ACCEPT IN PRINCIPLE.

Update equation style to match style guide. With editorial license
<table>
<thead>
<tr>
<th>Cl</th>
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<th>#</th>
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<td>155</td>
<td>155.1.3</td>
<td>33/40</td>
<td>127</td>
<td>Nicholl, Gary</td>
</tr>
<tr>
<td>155</td>
<td>155.1.4</td>
<td>33/49</td>
<td>129</td>
<td>Nicholl, Gary</td>
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</table>

### Comment 124

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

**Comment:** The text here does not match the common text for the "General safety" subsections across the 2022 revision.

**Suggested Remedy:** Change the text in this subsection to "Equipment subject to this clause shall conform to the general safety requirements in J.2."

**Response:** ACCEPT.

### Comment 125

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Comment:** Use non-breaking hyphen for "400GBASE-ZR" throughout the document.

**Suggested Remedy:** Use non-breaking hyphen for "400GBASE-ZR" throughout the document.

**Response:** ACCEPT.

### Comment 126

<table>
<thead>
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</tr>
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<tbody>
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</table>

**Comment:** 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.

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

**Response:** ACCEPT IN PRINCIPLE.

See response to comment #346.

### Comment 127

**Comment Status:** D

**Response Status:** O

**Comment 128

<table>
<thead>
<tr>
<th>Comment Type</th>
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</thead>
<tbody>
<tr>
<td>ER</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Response:** ACCEPT IN PRINCIPLE.

See response to comment #346.

### Comment 129

**Comment Status:** D

**Response Status:** O

**Comment 130

<table>
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<th>Comment Type</th>
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<tbody>
<tr>
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</table>

**Comment:** This comment was WITHDRAWN by the commenter.

### Comment 131

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>ER</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

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

**Suggested Remedy:** This is just a question for clarification.

**Response:** REJECT.

This comment was WITHDRAWN by the commenter.
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.

**Suggested Remedy**

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.

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Nicholl, Gary, Cisco Systems

Comment ID 135

The first several sub-sections of 155.3.1 appear 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.

Suggested Remedy
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.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

Comment ID 136

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?

Suggested Remedy
This is more of a question of clarification.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

Comment ID 137

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"

Suggested Remedy
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".

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

Comment ID 138

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).

Suggested Remedy
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.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment Type: ER  Comment Status: A  rewrite bucket

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.

Response  Response Status: W

ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment Type: T  Comment Status: A  rewrite bucket

Definition of "pma_alignment_valid" variable. Reading the previous text it is not clear
exactly what constitutes 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 reflect the functional descriptions earlier in this
clause. This comment also applies to other variables defined in 155.4.2.1, that refer to
"PMA lanes".

Response  Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.
Comment Type TR
Comment Status A

Definition of variable "pma_lane". The definition 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 service 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.

Suggested Remedy
Change "PMA service interface" to "PMD service interface".

Response Response Status W

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

Comment Type TR
Comment Status A

Table 155-8 provides FEC corrected and uncorrected codeword counts for the SC-FEC. Should there be similar monitoring for the SD-FEC? This is missing in the current draft.

Suggested Remedy
Define FEC monitoring for the SD-FEC.

Response Response Status W

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

Comment Type TR
Comment Status A

In Table 155-9 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.

Suggested Remedy
Define a FEC degrade monitoring scheme for 400GBASE-ZR (similar to what was done in section 119.2.5.3 for 400GBASE-R).

Response Response Status W

ACCEPT IN PRINCIPLE.

See response to comment #346.
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.

**Suggested Remedy**

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).

**Response**  
**Response Status** C

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

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

**Suggested Remedy**

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

**Response**  
**Response Status** C

REJECT.

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

---

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

**Suggested Remedy**

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

**Response**  
**Response Status** C

REJECT.

"GMP" is included in 1.5 of IEEE Std 802.3-2022
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment ID 151
Cl FM SC FM P1 L2 # 151
Grow, Robert RMG Consulting
Comment Type E Comment Status A 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).
Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 1

Comment ID 152
Cl FM SC FM P1 L10 # 152
Grow, Robert RMG Consulting
Comment Type E Comment Status A bucket
I think P802.3cw is currently identified as Amendment 8.

SuggestedRemedy
Fill in assigned amendment number.
Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 21

Comment ID 153
Cl FM SC FM P1 L25 # 153
Grow, Robert RMG Consulting
Comment Type E Comment Status A 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.
Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 21

Comment ID 154
Cl FM SC FM P3 L18 # 154
Grow, Robert RMG Consulting
Comment Type ER Comment Status A 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.
Response Response Status W
ACCEPT.

Comment ID 155
Cl FM SC FM P7 L18 # 155
Grow, Robert RMG Consulting
Comment Type E Comment Status A bucket
The P802.3cw ballot group is now in own, 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.
Response Response Status C
ACCEPT.

Comment ID 156
Cl FM SC FM P11 L20 # 156
Grow, Robert RMG Consulting
Comment Type E Comment Status A 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).
Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 21
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Response #157
Cl FM SC FM P 11 L 32 # 157
Grow, Robert RMG Consulting

Comment Type E Comment Status A

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).

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 21

Response #158
Cl FM SC FM P 11 L 33 # 158
Grow, Robert RMG Consulting

Comment Type E Comment Status A

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

SuggestedRemedy
Number based on current designations from the WG Chair.

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 21

Response #159
Cl FM SC FM P 21 L 32 # 159
Grow, Robert RMG Consulting

Comment Type E Comment Status A

Incorrect subclause number.

SuggestedRemedy
Change to 45.2.1.22.

Response Response Status C
ACCEPT.

Response #160
Cl FM SC FM P 22 L 1 # 160
Grow, Robert RMG Consulting

Comment Type E Comment Status A

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.

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 25

Response #161
Cl FM SC FM P 22 L 11 # 161
Grow, Robert RMG Consulting

Comment Type E Comment Status A

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.

Response Response Status C
ACCEPT IN PRINCIPLE.

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

Response #162
Cl FM SC FM P 22 L 19 # 162
Grow, Robert RMG Consulting

Comment Type E Comment Status A

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:

Response Response Status C
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"
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<td>45.2.1.157a</td>
<td>E</td>
<td>22</td>
<td>19</td>
<td>163</td>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td>Insert point is after the subclauses of 45.2.1.157.</td>
<td>E</td>
<td>C</td>
<td>Insert 45.2.1.157a and 45.2.1.157.1a after 45.2.1.157.1 as follows:</td>
</tr>
<tr>
<td>116</td>
<td>116.1.4</td>
<td>E</td>
<td>28</td>
<td>10</td>
<td>164</td>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td>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</td>
<td>E</td>
<td>W</td>
<td>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).</td>
</tr>
<tr>
<td>119</td>
<td>119</td>
<td>E</td>
<td>31</td>
<td>1</td>
<td>165</td>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td>The strikethrough text does not appear in the published IEEE Std 802.3-2022 standard.</td>
<td>E</td>
<td>C</td>
<td>Delete Clause 119 from the draft.</td>
</tr>
<tr>
<td>156</td>
<td>156.9.6</td>
<td>E</td>
<td>89</td>
<td>3</td>
<td>166</td>
<td>Abbott, John</td>
<td>Corning Incorporated</td>
<td>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.</td>
<td>E</td>
<td>C</td>
<td>Spell out “1-sided” as “one-sided” IN TABLE 156-12</td>
</tr>
<tr>
<td>156</td>
<td>156.9.6</td>
<td>E</td>
<td>89</td>
<td>20</td>
<td>107</td>
<td>Abbott, John</td>
<td>Corning Incorporated</td>
<td>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.</td>
<td>E</td>
<td>C</td>
<td>Spell out “1-sided” as “one-sided” in FIGURE 156-6.</td>
</tr>
</tbody>
</table>

TYPE: TR/technical required  ER/editorial required  GR/general required  T/technical  E/editorial  G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected  RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Comment ID
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!

**Suggested Remedy**
- 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.

**Response**
- ACCEPT IN PRINCIPLE.
- The power spectral density of frequency noise has units of $Hz^2 / Hz$
- Ensure correct use of "power spectral density".
- Change "noise power spectral density" to "frequency noise power spectral density"
- With editorial license.

---

Maguire, Valerie Copperopolis

**Comment Type** T **Comment Status** R **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.

**Suggested Remedy**
- Globally replace "16QAM" with "16-QAM" and "DP-16QAM" with "DP-16-QAM".

**Response**
- REJECT.
- See response to comment 415

---

**Comment Type** TR **Comment Status** A

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

**Suggested Remedy**
- Delete 1.4.144b
- Accept 1.4.144b. Replace 400GBASE-Z with 400GBASE-ZR throughout draft.

**Response**
- ACCEPT IN PRINCIPLE.
- Change 1.4.144c to

"400GBASE-ZR: 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.)"
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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

EEC 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.

**Suggested Remedy**
- Change entry in Clause field to: 155, 156
- PROPOSED ACCEPT IN PRINCIPLE.
- Review supporting presentation, for comment resolution group (CRG) consideration.

**Response**
- **Response Status:** C
- ACCEPT IN PRINCIPLE.
- For the 400GBASE-ZR row in Table 116-5 delete “o” (optional) in following clauses (119, 120, 120B – 120G).

**Comment Type:** TR  **Comment Status:** A

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.

**Suggested Remedy**
- Make entries for the following clauses blank: 119, 120, 120B, 120C, 120D, 120E, 120F, and 120G..
- ACCEPT IN PRINCIPLE.

**Response**
- **Response Status:** C
- ACCEPT IN PRINCIPLE.
- For the 400GBASE-ZR row in Table 116-5 delete "o" (optional) in following clauses (119, 120, 120B – 120G).

**Comment Type:** TR  **Comment Status:** A

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

**Suggested Remedy**
- Add note C to entry for Clause 118.
- Note C - The 400GMII Extender SHALL only be used between the RS and 400GBASE-ZR PCS.
- REJECT.
- This comment was WITHDRAWN by the commenter.

**Response**
- **Response Status:** C
- ACCEPT IN PRINCIPLE.
- Change description Table 116-2 to

*400 Gb/s PHY using 400GBASE-ZR PCS and PMA 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 Clauses 155 and 156)*
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

D'Ambrosia, John
Fuutrewei, US Subsidiary of Huawei

Comment Type TR Comment Status A

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.

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment 5

D'Ambrosia, John
Fuutrewei, US Subsidiary of Huawei

Comment Type TR Comment Status A

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.

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment 6

D'Ambrosia, John
Fuutrewei, US Subsidiary of Huawei

Comment Type TR Comment Status A

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.

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment 7
Cl 155 SC 155.1.2 P 33 L 18 # 181
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type ER Comment Status A rewrite bucket

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.

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

Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.1.4 P 33 L 52 # 182
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type E Comment Status A rewrite bucket

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.

Suggested Remedy
Delete noted sentence.

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 116 SC 116.4 P 29 L 35 # 183
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type TR Comment Status D

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

Suggested Remedy
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 155 SC 155.1.4.2 P 34 L 15 # 184
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type E Comment Status A rewrite bucket

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.

Suggested Remedy
Delete the word FEC.

Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.1.4.2 P 34 L 16 # 185
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type ER Comment Status A rewrite bucket

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.

Suggested Remedy
Delete the word FEC.

Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.1.2 P 32 L 30 # 186
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type E Comment Status D

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

Suggested Remedy
Add abbreviation SD-FEC - staircase forward error correction

Proposed Response Response Status Z
REJECT.

This comment was WITHDRAWN by the commenter.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.1.4.2 P 34 L 17 # 187

D’Ambrosia, John Fuiuturewei, US Subsidiary of Huawei

Comment Type TR Comment Status A rewrite bucket

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.

Response Response Status W

ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155 SC 155.2.1.1 P 36 L 12 # 188

D’Ambrosia, John Fuiuturewei, US Subsidiary of Huawei

Comment Type ER Comment Status A rewrite bucket

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.

Response Response Status C

ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155 SC 155.2.1.1 P 36 L 22 # 190

D’Ambrosia, John Fuiuturewei, US Subsidiary of Huawei

Comment Type TR Comment Status A rewrite bucket

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.

Response Response Status W

ACCEPT IN PRINCIPLE.

See response to comment #346.
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.

Suggested Remedy
modify sentence to
Note that interleaving of signals by polarization is not allowed.

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

---

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

Suggested Remedy
Revisit skew constraints as needed.
The diagram reference should be 116-4.

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

---

Why is there a reference to a PCS lane alignment status? There are no PCS lanes in the 400GBASE-ZR PHY

Suggested Remedy
Looks like this was intended to be PMA lane alignment status

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

---

Why is there a reference to a PCS lane alignment status? There are no PCS lanes in the 400GBASE-ZR PHY

Suggested Remedy
Looks like this was intended to be PMA lane alignment status

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

---

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.
<table>
<thead>
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<th>L</th>
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<th>Status</th>
<th>Response</th>
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<td>The values of aMAUType are alphabetized by rate in 802.3-2022. 400GBASE-ZR should be inserted after 400GBASE-VR4 that 802.3db added.</td>
<td>Accept in principle.</td>
<td>Change SR16 to VR4 in the editing instruction</td>
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<td>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.</td>
<td>Accept in principle.</td>
<td>Change 45.2.1.157.1a to 45.2.1.157a.1</td>
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<td>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.</td>
<td>Accept in principle.</td>
<td>Change 45.2.1.153.1a to 45.2.1.153a.1</td>
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<td>P802.3cw is introducing a second PMA for 400GBASE-R. While the text &quot;all 400GBASE-R PMAs other than 400GBASE-ZR are specified in clause 120&quot; is correct, it also implies that there are many 400GBASE-R PMAs besides the one in clause 155, which is not the case.</td>
<td>Accept in principle.</td>
<td>Change the first sentence to read &quot;The 200GBASE-R PMA and 400GBASE-R PMA for PHYs other than 400GBASE-ZR are specified in Clause 120.&quot;</td>
<td></td>
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<td>The change indicated to be made to the NOTE in 119.2.5.7 has already been made in 802.3-2022</td>
<td>Accept in principle.</td>
<td>Remove clause 119 (and all subclauses)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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).

Suggested Remedy

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."

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

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.

Suggested Remedy

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 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.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

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, with details of the encoding of the GMP overhead in ITU-T G.709 Annex D. Details of the overhead encoding for 400GBASE-ZR are in 155.2.4.5.3.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.
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.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

The 'nD' in CnD(t) should be subscripted

SuggestedRemedy
Change the nD to subscript.

Response
ACCEPT IN PRINCIPLE.

The convolutional interleaver and Hamming encoder are working with 10976 rows, but figure 155-7 indicates 10970 rows

SuggestedRemedy
Change 10970 to 10976 in Figure 155-7.

Response
ACCEPT IN PRINCIPLE.

Each incoming block 10976 x 119 bits.

SuggestedRemedy
Change "Each incoming block 10976 x 119 bits." to "Each incoming block of 10976 x 119 bits."

Response
ACCEPT.

Type: TR/technical required  ER/editorial required  GR/general required  T/technical  E/editorial  G/general
Comment Status: D/dispatched  A/accepted  R/rejected  RESPONSE STATUS: O/open  W/written  C/closed  U/unsatisfied  Z/withdrawn
SORT ORDER: Comment ID
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."

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

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."

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

In the rest of 802.3, loopback is not hyphenated

SuggestedRemedy
Change loop-back to loopback

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

In the GET_BLOCK state, the variable slip_done should be faw_slip_done

SuggestedRemedy
Change slip_done to faw_slip_done

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.
Comment ID 218

Cl 156 SC 156.5.2 P 77 L 39 # 218

Huber, Thomas  

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  

PROPOSED ACCEPT IN PRINCIPLE.

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

Comment ID 219

Cl 156 SC 156.5.2 P 77 L 40 # 219

Huber, Thomas  

Comment Type T  

Comment Status A  

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  

ACCEPT.

Comment ID 220

Cl 156 SC 156.10.1.2.6 P 95 L 9 # 220

Huber, Thomas  

Comment Type E  

Comment Status A  

The editor's note about TBDs is no longer relevant.

SuggestedRemedy  

Remove the editor's note.

Proposed Response  

ACCEPT IN PRINCIPLE.

See response to comment 122.

Comment ID 221

Cl 45 SC 45.2.1.153.1a P 23 L 4 # 221

Law, David  

Response Status C  

ACCEPT IN PRINCIPLE.

Comment ID 222

Cl 45 SC 45.2.1.153.1a P 23 L 37 # 222

Law, David  

Response Status C  

ACCEPT IN PRINCIPLE.

See response to comment 198.

Comment ID 223

Cl 45 SC 45.2.1.153.1a P 23 L 41 # 223

Law, David  

Response Status C  

ACCEPT IN PRINCIPLE.

See response to comment 122.

Comment ID 224

Cl 45 SC 45.2.1.153.1a P 23 L 42 # 224

Law, David  

Response Status C  

ACCEPT IN PRINCIPLE.

See response to comment 122.
Comment Type TR Comment Status A

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 dependent; 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 meet. This seems to be confirmed by the one example given in appendix 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).'.

Comment Type TR Comment Status A

The terms 'overhead fields' (page 36, line 40) and 'OH fields' (page 38, line 2), then '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.

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Comment Type TR Comment Status A

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.

Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.
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 ... 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.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

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

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

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.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Law, David
Hewlett Packard Enterprise

Comment Type: T  Comment Status: A  rewrite bucket

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 primitive. 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.

Response  Response Status: C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Law, David
Hewlett Packard Enterprise

Comment Type: E  Comment Status: A  rewrite bucket

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 ...'.

Response  Response Status: C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Law, David
Hewlett Packard Enterprise

Comment Type: T  Comment Status: A  rewrite bucket

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.

Response  Response Status: C
ACCEPT IN PRINCIPLE.
See response to comment #346.
<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Type</th>
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<th>Comment</th>
<th>Response</th>
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<tbody>
<tr>
<td>235</td>
<td>T</td>
<td>rewrite bucket</td>
<td>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.</td>
<td>Suggest that either 'element' or 'component' be used consistently to describe IX, QX, IY, and QY used to form a DP-16QAM symbol.</td>
<td>ACCEPT IN PRINCIPLE.</td>
</tr>
<tr>
<td>236</td>
<td>ER</td>
<td>rewrite bucket</td>
<td>The terms 'DP-16QAM symbol' (e.g., page 52, line 32), 'Gray-coded signals' (e.g., page 52, line 44), '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</td>
<td>Suggest that a consistent terminology should be used for DP-16QAM symbols.</td>
<td>ACCEPT IN PRINCIPLE.</td>
</tr>
<tr>
<td>237</td>
<td>ER</td>
<td>rewrite bucket</td>
<td>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 passed across the PMA service interface.</td>
<td>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.</td>
<td>ACCEPT IN PRINCIPLE.</td>
</tr>
<tr>
<td>238</td>
<td>T</td>
<td>rewrite bucket</td>
<td>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.</td>
<td>Suggest that a consistent terminology should be used for DP-16QAM symbols.</td>
<td>ACCEPT IN PRINCIPLE.</td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment Type: T   Comment Status: A   rewrite bucket

Cl 155 SC 155.3.3.2 P 52 L 54 # 239

Law, David          Hewlett Packard Enterprise

Comment Type: T   Comment Status: A   rewrite bucket

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.

Response

Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID: 239

Page 53 of 128  10/19/2022  4:36:50 PM

TYPE: TR/technical required   ER/editorial required   GR/general required   T/technical   E/editorial   G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied   Z/withdrawn
SORT ORDER: Comment ID

Cl 155 SC 155.3.3.3 P 54 L 27 # 241

Law, David          Hewlett Packard Enterprise

Comment Type: TR   Comment Status: A   rewrite bucket

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.

Response

Response Status: W

ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID: 241

Page 53 of 128  10/19/2022  4:36:50 PM

TYPE: TR/technical required   ER/editorial required   GR/general required   T/technical   E/editorial   G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected   RESPONSE STATUS: O/open W/written C/closed U/unsatisfied   Z/withdrawn
SORT ORDER: Comment ID

Cl 155 SC 155.3.3.3 P 54 L 31 # 242

Law, David          Hewlett Packard Enterprise

Comment Type: TR   Comment Status: A   rewrite bucket

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...' 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.'.

Response

Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID: 242

Page 53 of 128  10/19/2022  4:36:50 PM
Law, David Hewlett Packard Enterprise

Comment Type | TR | Comment Status | A | rewrite bucket
---|---|---|---|---
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.

Response | Response Status | W
---|---|---
ACCEPT IN PRINCIPLE.

See response to comment #346.

Law, David Hewlett Packard Enterprise

Comment Type | TR | Comment Status | A | rewrite bucket
---|---|---|---|---
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.

Response | Response Status | W
---|---|---
ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155  SC 155.2.4.5.4  P 40  L 32  # 247
Law, David  Hewlett Packard Enterprise

Comment Type  T  Comment Status  A  rewrite bucket

It appears that the 10-bit interleaver isn't specified.

SuggestedRemedy
Specify the 10-bit interleaver.

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155  SC 155.2.4.6  P 40  L 37  # 248
Law, David  Hewlett Packard Enterprise

Comment Type  T  Comment Status  A  rewrite bucket
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.

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155  SC 155.2.4.6  P 40  L 42  # 249
Law, David  Hewlett Packard Enterprise

Comment Type  T  Comment Status  A  rewrite bucket
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'.

Response  Response Status  C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155  SC 155.2.4.6  P 40  L 49  # 250
Law, David  Hewlett Packard Enterprise

Comment Type  E  Comment Status  A  bucket
IEEE Std 802.3 doesn't specify implementations.

SuggestedRemedy
Suggest that '... staircase FEC implementation uses ...' should read '... staircase FEC uses ...'.

Response  Response Status  C
ACCEPT.

See response to comment #346.
<table>
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<td>155</td>
<td>155.2.4.7 P 41</td>
<td>L 1</td>
<td>251</td>
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<td>SuggestedRemedy</td>
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<tr>
<td>Suggest that subclause 155.2.4.7 be retitled ‘SC-FEC adapt and encoding’ to match the equivalent block in Figure 155-2.</td>
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<td>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’.</td>
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<td>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.</td>
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<td>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.</td>
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<td><strong>Rewrite bucket</strong></td>
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<tr>
<td>Suggest that ‘... SC-encoder ...’ should read ‘... SC-FEC encoder ...’.</td>
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<td>T</td>
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<td>256</td>
<td>IEEE Std 802.3 doesn't specify implementations.</td>
<td>Suggested Remedy: Suggest, based on the in subclause 155.2.4.9 above, 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.'</td>
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<tr>
<td>T</td>
<td>A</td>
<td>258</td>
<td>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.'</td>
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<td>257</td>
<td>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.'</td>
</tr>
</tbody>
</table>
Suggested Remedy

[1] 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.

Suggested Remedy

[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 bx 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 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 ...'.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

______________________________

Law, David
Hewlett Packard Enterprise

Comment ID 261
Page 58 of 128
10/19/2022 4:36:50 PM
<table>
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<td>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).’</td>
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<tr>
<td>Suggested Remedy</td>
<td>See comment.</td>
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<td>Comment</td>
<td>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 PMD 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 multiplexed 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 dependent. 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 PMD 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.</td>
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<tr>
<td>Suggested Remedy</td>
<td>Specify the 400GBASE-ZR PMA as a single .request and .indicate primitive, with a tx_symbol and rx_symbol parameter respectively as follows:</td>
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<td>- Change the three instances of ‘PMA:IS_UNITDATA_i.request’ to read ‘PMA_UNITDATA.request’ in subclause 155.2.1 ‘Functions within the PCS’.</td>
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<td>- Change subclause 155.1.4.2 ‘Physical Medium Attachment (PMA) service interface’ to read as follows:</td>
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<td>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</td>
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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.

155.3.2.2 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).

155.3.2.2.3 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.

155.3.2.2.3 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'.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

C/ 155 SC 155.3.2 P 50 L 3 # 264
Law, David Hewlett Packard Enterprise

Comment Type E Comment Status A rewrite bucket

Since subclause 155.3.2 only summarizes the primitives, a cross reference to where they are defined should be added.

Suggested Remedy

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 ...'.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

C/ 155 SC 155.3.2 P 50 L 16 # 265
Law, David Hewlett Packard Enterprise

Comment Type T Comment Status A rewrite bucket

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).

Suggested Remedy

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).

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

C/ 155 SC 155.3.2 P 51 L 18 # 266
Law, David Hewlett Packard Enterprise

Comment Type E Comment Status A rewrite bucket

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.

Suggested Remedy

Either label the rectangle or delete it.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.
Comment Type T Comment Status A rewrite bucket

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

Response Response Status C

ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment Type** TR  **Comment Status** A  **rewrite bucket**

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).’.

**Response**  **Response Status** W  **rewrite bucket**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

**Comment Type** T  **Comment Status** A  **rewrite bucket**

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 (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 separate 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.

**Response**  **Response Status** C  **rewrite bucket**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

**Comment Type** T  **Comment Status** A  **rewrite bucket**

Subclause 155.3.3 ‘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.

**Response**  **Response Status** C  **rewrite bucket**

ACCEPT IN PRINCIPLE.

See response to comment #346.
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?

Suggested Remedy
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 ...'.

Response
ACCEPT IN PRINCIPLE.
See response to comment #346.

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 0 mapped to a '-3' and a 1 mapped to a '+3'.

Suggested Remedy
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.

ACCEPT IN PRINCIPLE.
See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

### Comment ID 274

**Law, David**

**Comment Type** E  **Comment Status** A  **Suggested Remedy** rewrite bucket

Since the abbreviation 'PS' is 'pilot sequence' the text '... PS sequence ...' expands to '... pilot sequence sequence ...'.

**Response**

**Response Status** C

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

### Comment ID 275

**Law, David**

**Comment Type** E  **Comment Status** A  **Suggested Remedy** rewrite bucket

Add an arrow head to the line from P8, P4 and P3 where they connect to the XOR logic operator symbol.

**Response**

**Response Status** C

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

### Comment ID 276

**Law, David**

**Comment Type** E  **Comment Status** A  **Suggested Remedy** rewrite bucket

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'.

**Suggested Remedy**

[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'.

**Response**

**Response Status** C

ACCEPT.

See response to comment #346.

---

### Comment ID 277

**Law, David**

**Comment Type** E  **Comment Status** A  **Suggested Remedy** rewrite bucket

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.

**Suggested Remedy**

Suggest that the title of subclause 155.3.3.4 is changed to read '16QAM encode and DAC'.

**Response**

**Response Status** C

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

### Comment ID 278

**Law, David**

**Comment Type** E  **Comment Status** A  **Suggested Remedy** rewrite 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.

**Suggested Remedy**

Suggest that '... frames with minimum interpacket ...' should read '... frames with a minimum interpacket ...'.

**Response**

**Response Status** C

ACCEPT.

See comment.

---

### Comment ID 279

**Law, David**

**Comment Type** E  **Comment Status** A  **Suggested Remedy** rewrite 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.

**Suggested Remedy**

Suggest that '... when additionally processed according to this clause.' should read '... when processed according to this clause.'

**Response**

**Response Status** C

ACCEPT.

See response to comment #346.
Comment Type: T  Comment Status: A  rewrite bucket

Assuming this is a boolean variable, suggest this should be noted in the variable description, as with other boolean variables.

**Suggested Remedy**

Suggest that 'A variable set by the ...' should read 'A boolean variable set by the ...'.

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID 283

Comment Type: T  Comment Status: A  rewrite bucket

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 PMA 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.

**Suggested Remedy**

[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.'.

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID 283

Comment Type: E  Comment Status: A  bucket

Since Boolean is named after George Boole, I believe that it should always be Boolean (and not boolean).

**Suggested Remedy**

Change all instances of 'boolean' to 'Boolean'.

**Response**

ACCEPT.

Comment ID 283
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'.

Suggested Remedy

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 primitive. 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.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

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.

Suggested Remedy

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.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment Type: T  Comment Status: A  rewrite bucket
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'.

Response  Response Status: C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Comment Type: TR  Comment Status: A  rewrite bucket
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 155.3.3.1. 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.

Response  Response Status: W
ACCEPT IN PRINCIPLE.
See response to comment #346.
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.

**Suggested Remedy**

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.

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.

---

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.

**Suggested Remedy**

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 ...'.

**Response**

ACCEPT IN PRINCIPLE. See response to comment #346.

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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<> 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 'lx', 'Qx', 'Ly' 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 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 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 were 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 polarization. It seems there may, however, be another approach to determine 'current_pmal' and 'pma_lane'. Doesn't the PDM 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 PDM service interface.'
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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.
Ix: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is YI.
Qx: Value for given lane from mapping 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 ...’.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.

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 ...’.

Response

ACCEPT IN PRINCIPLE.

See response to comment #346.
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| Comment | 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'. |
| Response | ACCEPT IN PRINCIPLE. |
| See response to comment #346. |

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<td>Comment</td>
<td>Subclause 155.4.2.3 'Counters' defines the 'cw_bad_count' counter, however this counter is not reference anywhere else in the draft.</td>
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<td>Delete the 'cw_bad_count' counter definition.</td>
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<tr>
<td>Comment</td>
<td>As the PMA is 'above' the PMD, the PMA would detect alignment in the symbols for a given lane of the PMD service interface.</td>
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<td>SuggestedRemedy</td>
<td>Change the text '... the PMA service interface.' to read '... the PMD service interface.'.</td>
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<tr>
<td>Comment</td>
<td>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 &amp; 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, ...'.</td>
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<td>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.'</td>
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<td>See response to comment #346.</td>
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Based on the description of the 'faw_valid' variable, and slide 4 of the contribution 'faw_valid analysis' from Mike Sluyski 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. 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 deske state diagram can then be removed.

Suggested Remedy

1. Delete the variables 'pma_alignment_valid', 'all_locked', and PMA_lane_mapping from subclause 155.4.2.1 'Variables' and Figure 155-14.

2. Change the description of the 'faws_lock' 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 deske 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.

[11] Add the assignment 'pma_align_status <= TRUE' to the '2_GOOD' state of Figure 155-14.

[12] Delete Figure 155-15.

[13] 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'.

[14] Delete the SM2 row from subclause 155.7.4.4 and renumber following items.

Response

Response Status W
ACCEPT IN PRINCIPLE.

See response to comment #346.

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.

Suggested Remedy

Change the text 'slip_done <= FALSE' in the GET_BLOCK state in Figure 155-14 to read 'faw_slip_done <= FALSE'.

Response

Response Status C
ACCEPT IN PRINCIPLE.

See response to comment #346.
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.

Suggested Remedy
Delete the assignment 'prev_pmal <= prev_pmal + 4) mod 252' from the 'INVALID_FAW' state.

ACCEPT IN PRINCIPLE.
See response to comment #346.

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 26).

Suggested Remedy
Consider removing the assignment 'first_pmal <= current_pmal' from the '2_GOOD' and 'GOOD_FAW' states.

ACCEPT IN PRINCIPLE.
See response to comment #346.

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.

Suggested Remedy
Suggest that either the action 'restart_lock elseif 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.

ACCEPT IN PRINCIPLE.
See response to comment #346.
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<td>Complete the line under '2_GOOD'.</td>
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<td><strong>Suggested Remedy</strong></td>
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<td>See comment.</td>
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<th>L 42</th>
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<td>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).</td>
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<td><strong>Suggested Remedy</strong></td>
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<tr>
<td>Change the text 'PMA_lane_mapping&lt;x&gt; &lt;= current_pmal' in the 2_GOOD state in Figure 155-14 to read 'pma_lane_mapping&lt;x&gt; &lt;= current_pmal'.</td>
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<td>See response to comment #346.</td>
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<td>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.</td>
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<td>Suggest that:</td>
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<tr>
<td>[1] The title of Figure 155-14 should be changed to read 'PMA Frame alignment word (FAW) lock state diagram'.</td>
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<tr>
<td>[2] The title of Figure 155-16 should be changed to read 'PCS Alignment marker lock state diagram'.</td>
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IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment ID 307

Law, David
Hewlett Packard Enterprise

Comment Type E
Comment Status A

Typo, amp_... should be amp_... based on counter definition, see page 62, line 37.

Suggested Remedy
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'.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID 308

Law, David
Hewlett Packard Enterprise

Comment Type T

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.

Suggested Remedy
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.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID 309

Law, David
Hewlett Packard Enterprise

Comment Type E

Complete the line under '2_GOOD'.

Suggested Remedy
See comment.

Response
ACCEPT.

Comment ID 310

Law, David
Hewlett Packard Enterprise

Comment Type E
Comment Status A

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.

Suggested Remedy
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 be changed to read 'The following registers apply ...'.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment ID 311

Law, David
Hewlett Packard Enterprise

Comment Type E

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.

Suggested Remedy
Suggest that in subclause 155.5 '400GBASE-ZR PCS and PMA management' the text 'If an MDIO interface is provided ...' is changed to read 'If an MDIO interface is implemented ...'.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.
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 faw<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 register 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'.


[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.

Response

Accept in principle.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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**Comment Type:** E  **Comment Status:** A  
Suggest that ‘... frames with minimum interpacket ...’ should read ‘... frames with a minimum interpacket ...’.

**SuggestedRemedy:** See comment.

**Response**  **Response Status:** C  
ACCEPT IN PRINCIPLE.

See response to comment #91.

---

**Comment Type:** E  **Comment Status:** A  
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.

**Response**  **Response Status:** C  
ACCEPT IN PRINCIPLE.

See response to comment #346.

---

**Comment Type:** T  **Comment Status:** A  
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.’.

**Response**  **Response Status:** C  
ACCEPT IN PRINCIPLE.

See response to comment #346.
Comment Type: TR
Comment Status: A

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.

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.
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?

Suggested Remedy

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.

Response

ACCEPT IN PRINCIPLE.

At new sentence at the end of 45.2.1.150.1 and 45.2.1.154.2

"The supported channel indices of the PMA/PMD are advertised in the PMA/PMD channel ability registers. A PMA/PMD may ignore writes to the PMA/PMD channel index bits that select a channel it has not advertised in the PMA/PMD channel ability registers."

With editorial license.

Suggested Remedy

Suggest that SIGNAL_DETECT be removed from Figure 156-2.

Response

REJECT.

There was no consensus to make a change at this time.

[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 PMA in the tx_symbol parameters of the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request primitives.'.

[4] The text 'Four coherent signals IX, OQ, 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, OQ, IY, and QY received by the PMA 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.'
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.2 P 77 L 41 # 322
Law, David Hewlett Packard Enterprise

Comment Type T Comment Status A 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.

Response
Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 219

Cl 156 SC 156.6 P 78 L 49 # 323
Law, David Hewlett Packard Enterprise

Comment Type T Comment Status A bucket
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 ...'. Does 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 ...'.

Response
Response Status C
ACCEPT IN PRINCIPLE.

Change to "over which the PHY operates at a single optical frequency (often also referred to by its associated wavelength) on a defined frequency grid in each direction."

Cl 156 SC 156.4 P 79 L 52 # 324
Law, David Hewlett Packard Enterprise

Comment Type T Comment Status A 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.

Response
Response Status C
ACCEPT IN PRINCIPLE.

Implement suggested remedies with editorial license

Cl 156 SC 156.4 P 79 L 52 # 325
Law, David Hewlett Packard Enterprise

Comment Type T Comment Status A 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.

Response
Response Status C
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 A 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.

Response
Response Status C
ACCEPT IN PRINCIPLE.

Implement suggested remedies with editorial license
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.8 P 84 L 34 # 327
Law, David Hewlett Packard Enterprise

Comment Type E Comment Status A

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 annexes 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.’.

Response Response Status C
ACCEPT.

Cl 156 SC 156.6 P 79 L 10 # 328
Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type ER Comment Status R

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

Response Response Status U
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 156.7.1 P 82 L 35 # 329
Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type TR Comment Status A

RRC is introduced for 1st time in table 156-6 with not reference

SuggestedRemedy

Add reference to 156.9.4

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 103
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID 333**

Ghazi, Ali Ghiasi Quantum/Marvell

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

Receive OSNR tolerance is not defined at point till one reads section 156.9.24

**Suggested Remedy**

Please add reference to 156.9.24

**Response**  **Response Status** C  
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.

**Comment ID 334**

Ghazi, Ali Ghiasi Quantum/Marvell

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

The receiver must tolerate 26 dB OSNR and meet the required error rate, it is not clear what receive OSNR (min) of 29 dB provides

**Suggested Remedy**

Need discussions on the intent

**Response**  **Response Status** W  
REJECT.

Receiver OSNR tolerance is measured without line impairments, see 156.9.24, which is different than Receiver OSNR which includes line impairments, see 156.9.23

**Comment ID 335**

Ghazi, Ali Ghiasi Quantum/Marvell

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

Improve definition of the FIR

**Suggested Remedy**

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 vary 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."

**Comment ID 336**

Ghazi, Ali Ghiasi Quantum/Marvell

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

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 frequencies and about 4 bits at high frequency

**Suggested Remedy**

If there is interest I can bring a frequency dependent ENOB mask

**Response**  **Response Status** U  
REJECT.

No suggested remedy provided

**Comment ID 337**

Ghazi, Ali Ghiasi Quantum/Marvell

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

For full interoperability using EVM may need additional constrains based on the data in rahn_3cw_01a_220223 and way_3cw_01a_220523

**Suggested Remedy**

Need more data to prove that EVM will provide the IEEE level of interoperability

**Response**  **Response Status** U  
REJECT.

No suggested remedy provided

**Comment ID 338**

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

**Comment Type** E  **Comment Status** A  
 rewrite bucket

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

**Suggested Remedy**

change 155.1.5, page 54 line 3, to "400GBASE-ZR PCS sublayer" to agree with the figure

**Response**  **Response Status** C  
ACCEPT IN PRINCIPLE.

See response to comment #346.
<table>
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<th>Page</th>
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<th>Comment Text</th>
<th>Suggested Remedy</th>
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<tr>
<td>339</td>
<td>18</td>
<td>21</td>
<td>T</td>
<td>R</td>
<td>Zimmerman, George</td>
<td>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...</td>
<td>delete inserted abbreviation</td>
<td>REJECT.</td>
<td>R</td>
</tr>
<tr>
<td>340</td>
<td>18</td>
<td>23</td>
<td>T</td>
<td>R</td>
<td>Zimmerman, George</td>
<td>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.</td>
<td>delete inserted abbreviation</td>
<td>REJECT.</td>
<td>R</td>
</tr>
<tr>
<td>341</td>
<td>155</td>
<td>58</td>
<td>TR</td>
<td>A</td>
<td>Zimmerman, George</td>
<td>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 &quot;by an ADC&quot;.</td>
<td>Change header of 155.3.5 to Receive signal sampling. On line 50, Delete &quot;by an ADC&quot; Change line 54 to &quot;The details of the sampling, including any quantization and the chosen sampling rate are implementation specific.&quot; Replace &quot;ADC&quot; with &quot;Sampler&quot; in figure 155-10.</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>A</td>
</tr>
<tr>
<td>342</td>
<td>155</td>
<td>52</td>
<td>TR</td>
<td>A</td>
<td>Zimmerman, George</td>
<td>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 &quot;m/4 bits&quot; 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.</td>
<td>Preferably - delete the indicated sentence. Alternatively, change the indicated sentence to read &quot;The received symbol signals are sampled and quantized in the PMA sublayer.&quot; If the m/4 bits is used somewhere, provide a reference.</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>A</td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment Type: TR

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".

Suggested Remedy
- 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.

Response
- ACCEPT IN PRINCIPLE.
- See response to comment #346.

Comment Type: E

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.

Suggested Remedy
- 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).

Response
- ACCEPT IN PRINCIPLE.
- See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment Type TR Comment Status A rewrite bucket
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 "shall"s. 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.

Response Response Status W
ACCEPT IN PRINCIPLE.

With editorial license, restructure and clarify Clause 155 and 156 as appropriate: to identify interoperability requirements using "SHALL" statements, as needed. to address issues noted in https://www.ieee802.org/3/cw/public/22_10/dambrosia_3cw_01b_221018.pdf

Comment Type T Comment Status A rewrite bucket

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...

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment #170

Comment Type E Comment Status A rewrite bucket
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

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment Type T Comment Status A rewrite bucket
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.

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment #346.
Comment Type: T  Comment Status: A
I-Q is an insufficient name for this spec

Suggested Remedy
Change spec name to "I-Q Offset per Polarization (Max Instantaneous)"

Response  Response Status: C
ACCEPT IN PRINCIPLE.

In Tables 156-6 and table 156-11 change "I-Q (max instantaneous)" to "Instantaneous I-Q offset per polarization (max)"

With editorial license

Comment ID 351

Comment Type: T  Comment Status: A
I-Q is an insufficient name for this spec

Suggested Remedy
Change spec name to "I-Q Offset per Polarization (Mean)"

Response  Response Status: C
ACCEPT IN PRINCIPLE.

In Table 156-6 and table 156-11 change "I-Q (mean)" to "Mean I-Q offset per polarization (max)"

With editorial license

Comment ID 352

Comment Type: E  Comment Status: A
In-band should not be capitalized

Suggested Remedy
Change In to in

Response  Response Status: C
ACCEPT.
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>P</th>
<th>L</th>
<th>#</th>
<th>Comment ID</th>
<th>Commenter</th>
<th>Company</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
<th>Response</th>
<th>Response Status</th>
<th>Comments</th>
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<tbody>
<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>8</td>
<td>355</td>
<td>355</td>
<td>Maniloff, Eric</td>
<td>Ciena</td>
<td>E</td>
<td>A</td>
<td>Text for OSNR… should not be present</td>
<td>Delete text &quot;for OSNR at TP3 (12.5 GHz)&quot;</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>In Table 156-8 change &quot;Average output power at TP3 (min): for OSNR at TP3 (12.5 GHz)&quot; to &quot;Average output power at TP3 (min)&quot;</td>
</tr>
<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>13</td>
<td>356</td>
<td>356</td>
<td>Maniloff, Eric</td>
<td>Ciena</td>
<td>E</td>
<td>A</td>
<td>Text for OSNR… should not be present</td>
<td>Delete text &quot;for OSNR at TP3 (12.5 GHz)&quot;</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>In Table 156-8 change &quot;Optical path OSNR penalty (max), for OSNR at TP3 (12.5 GHz)&quot; to &quot;Optical path OSNR penalty (max)&quot;</td>
</tr>
<tr>
<td>156</td>
<td>156.9.1</td>
<td>87</td>
<td>8</td>
<td>357</td>
<td>357</td>
<td>Maniloff, Eric</td>
<td>Ciena</td>
<td>E</td>
<td>A</td>
<td>I-Q is an insufficient name for this spec</td>
<td>Change spec name to &quot;I-Q Offset per Polarization (Max Instantaneous)&quot;</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>See response to comment 350</td>
</tr>
<tr>
<td>156</td>
<td>156.9.5</td>
<td>88</td>
<td>1</td>
<td>359</td>
<td>359</td>
<td>Maniloff, Eric</td>
<td>Ciena</td>
<td>E</td>
<td>A</td>
<td>This clause defines the transmit mask as following a RRC. The RRC definition should be included.</td>
<td>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</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>Add footnote for RRC Roll-Off &quot;Root raised cosine (RRC) is the square root of the raised cosine which is calculated as&quot; (see piecewise-defined function at <a href="https://en.wikipedia.org/wiki/raised-cosine_filter">https://en.wikipedia.org/wiki/raised-cosine_filter</a>) See 11.3.1.2.3 for possible RRC formula. With editorial license</td>
</tr>
<tr>
<td>156</td>
<td>156.9.11</td>
<td>90</td>
<td>24</td>
<td>360</td>
<td>360</td>
<td>Maniloff, Eric</td>
<td>Ciena</td>
<td>E</td>
<td>A</td>
<td>I-Q is an insufficient name for this spec</td>
<td>Change spec name to &quot;I-Q Offset per Polarization (Max Instantaneous)&quot;</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>Change spec name to &quot;Instantaneous I-Q offset per polarization&quot;</td>
</tr>
</tbody>
</table>

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Comment ID
Comment Type: T  Comment Status: A
Add a definition for I-Q Offset Measurement

Suggested Remedy:
Add the following Specification:

\[ I_{O\text{ffset}}(\text{Max}) = 10\log_{10}\left( \frac{I_{\text{mean}}^2 + Q_{\text{mean}}^2}{P_{\text{signal}}} \right) \]

with a measurement interval of 1 us

Response: Response Status: C
ACCEPT IN PRINCIPLE.

Change 156.9.11 to "The instantaneous I-Q offset per polarization is calculated as \( I_{Q\text{ffset}}(\text{Max}) = 10\log_{10}\left( \frac{I_{\text{mean}}^2 + Q_{\text{mean}}^2}{P_{\text{signal}}} \right) \) with a measurement interval of 1 us. The instantaneous I-Q offset per polarization is the maximum value per polarization and shall be within the limits given in Table 156–6."

With editorial license

Comment ID: 364
Page 88 of 128
10/19/2022 4:36:51 PM

Comment ID: 364
Page 88 of 128
10/19/2022 4:36:51 PM
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Maniloff, Eric Ciena

Comment Type: E  Comment Status: A

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.

Suggested Remedy:
Change Average to Total on line 4

Response: C  Response Status: C

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".

Ci 156  SC 156.10.1.2.6  P 95  L 9  #366

Maniloff, Eric Ciena

Comment Type: E  Comment Status: A

Editor's Note should be removed

Suggested Remedy:
Remove Note

Response: C  Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment 122

Ci 156  SC 156.A.1  P 104  L 45  #367

Maniloff, Eric Ciena

Comment Type: T  Comment Status: A

Black Link examples should be expanded to include some specifications for Mux and Demux devices that would satisfy the black-link transfer function

Suggested Remedy:
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

Response: C  Response Status: C

ACCEPT IN PRINCIPLE.


Adding clarifying language that the filter characteristics in this presentation were derived for the case where adjacent channels were propogating in the same direction in one fiber .

With editorial license.

Ci 156  SC 156.A.1  P 11  L 3  #368

Wienckowski, Natalie General Motors

Comment Type: E  Comment Status: A

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

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

Response: C  Response Status: C

ACCEPT.

Ci 156  SC 156.10.2  P 11  L 30  #369

Wienckowski, Natalie General Motors

Comment Type: E  Comment Status: A

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

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

Response: C  Response Status: C

ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment #370

Cl: FM SC FM P 11 L 32 # 370
Wienckowski, Natalie General Motors

Comment Type E Comment Status A
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.

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #21

Comment #371

Cl: FM SC FM P 11 L 35 # 371
Wienckowski, Natalie General Motors

Comment Type E Comment Status A

SuggestedRemedy

cw is ammendment 8
Change: Ammendment x
To: Ammendment 8

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #21

Comment #372

Cl: FM SC FM P 11 L # 372
Wienckowski, Natalie General Motors

Comment Type E Comment Status A

SuggestedRemedy

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

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #1

Comment #373

Cl: FM SC FM P 10 L 44 # 373
Wienckowski, Natalie General Motors

Comment Type E Comment Status A

SuggestedRemedy

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

Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #21.

Comment #374

Cl: FM SC FM P 20 L 14 # 374
Wienckowski, Natalie General Motors

Comment Type E Comment Status A

SuggestedRemedy

style
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.

Response Response Status C
ACCEPT.

Comment #375

Cl: FM SC FM P 22 L 15 # 375
Wienckowski, Natalie General Motors

Comment Type E Comment Status A

SuggestedRemedy

154.6 is not a proper Table number.
Change: 154.6
To: 154-5

Response Response Status C
ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

### Comment 376

**Comment ID**: #376

**Cl**: 45  
**SC**: 45.2.1.153.1a  
**P**: 23  
**L**: 31

**Wienckowski, Natalie**  
General Motors

**Comment Type**: E  
**Comment Status**: A

**SuggestedRemedy**

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.

**Comment Type**: E  
**Comment Status**: bucket

**SuggestedRemedy**

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

**Response**  
**Response Status**: C

ACCEPT IN PRINCIPLE.

See response to comment 162.

### Comment 377

**Comment ID**: #377

**Cl**: 45  
**SC**: 45.2.1.157.1a  
**P**: 24  
**L**: 1

**Wienckowski, Natalie**  
General Motors

**Comment Type**: E  
**Comment Status**: 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.

**Response**  
**Response Status**: C

ACCEPT IN PRINCIPLE.

See response to comment 163.

### Comment 378

**Comment ID**: #378

**Cl**: 155  
**SC**: 155.1.3  
**P**: 33  
**L**: 36

**Wienckowski, Natalie**  
General Motors

**Comment Type**: E  
**Comment Status**: bucket

**SuggestedRemedy**

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

**Response**  
**Response Status**: C

ACCEPT.

### Comment 379

**Comment ID**: #379

**Cl**: 155  
**SC**: 155.1.3  
**P**: 33  
**L**: 36

**Wienckowski, Natalie**  
General Motors

**Comment Type**: E  
**Comment Status**: bucket

**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

**Response**  
**Response Status**: C

ACCEPT.

### Comment 380

**Comment ID**: #380

**Cl**: 155  
**SC**: 155.1.4.2  
**P**: 34  
**L**: 15

**Wienckowski, Natalie**  
General Motors

**Comment Type**: E  
**Comment Status**: bucket

**SuggestedRemedy**

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

**Response**  
**Response Status**: C

ACCEPT.
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>P</th>
<th>L</th>
<th>#</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment</th>
<th>Suggested Remedy</th>
<th>Response</th>
<th>Response Status</th>
<th>Comment Status</th>
<th>Response Status</th>
<th>Comment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>155.2.4.3</td>
<td>38</td>
<td>14</td>
<td>382</td>
<td>E</td>
<td>A</td>
<td>Payload should not be capitalized.</td>
<td>Change: The Payload area to: The payload area</td>
<td>ACCEPT.</td>
<td></td>
<td>A</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>155</td>
<td>155.2.4.9</td>
<td>43</td>
<td>13</td>
<td>383</td>
<td>E</td>
<td>A</td>
<td>The equation should be numbered.</td>
<td>Add Equation number to the scrambler equation, e.g. (155-1).</td>
<td>ACCEPT.</td>
<td></td>
<td>A</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>155</td>
<td>155.2.5.3</td>
<td>46</td>
<td>26</td>
<td>384</td>
<td>E</td>
<td>A</td>
<td>You should refer to the equation.</td>
<td>Change: polynomial given in 155.2.4.9 to: polynomial given by Equation (155-1).</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>See response to comment #346.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>155</td>
<td>155.2.4.4.1</td>
<td>38</td>
<td>50</td>
<td>386</td>
<td>E</td>
<td>A</td>
<td>The name of the section include 400GBASE-ZR, why? CI119 uses &quot;for 200GBASE-R&quot; and &quot;for 400GBASE-R&quot; 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</td>
<td>Remove &quot;400GBASE-ZR&quot; from the section title of 155.2.4.4.1 and 155.2.4.4.2</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>See response to comment #346.</td>
<td></td>
<td></td>
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<tr>
<td>Cl 155</td>
<td>SC 155.2.4.7</td>
<td>P 42</td>
<td>L 42</td>
<td># 388</td>
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</tr>
<tr>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Comment Type TR Comment Status A rewrite bucket</td>
<td>Figure 155-6 does not show the 6x119b pad</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>Add box at the end of the i+119 row to the right of the CRC+MBAS labeled 6x119b PAD</td>
<td></td>
<td></td>
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<tr>
<td>Response</td>
<td>Response Status W</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td></td>
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<tr>
<td>See response to comment #346.</td>
<td></td>
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<table>
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<tr>
<th>Cl 155</th>
<th>SC 155.2.4.8</th>
<th>P 43</th>
<th>L 4</th>
<th># 391</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Comment Type TR Comment Status A rewrite bucket</td>
<td>What is the contents of the PAD?</td>
<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>Change &quot;pad bits added&quot; to &quot;pad bits of all zeroes added&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>Response Status W</td>
<td>ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>See response to comment #346.</td>
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<tr>
<th>Cl 155</th>
<th>SC 155.2.4.5.2</th>
<th>P 39</th>
<th>L 51</th>
<th># 389</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Comment Type TR Comment Status A rewrite bucket</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>Change &quot;in bit 1&quot; to &quot;the first bit&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response</td>
<td>Response Status W</td>
<td>ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>See response to comment #346.</td>
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<tr>
<th>Cl 155</th>
<th>SC 155.2.4.5.2</th>
<th>P 39</th>
<th>L 32</th>
<th># 390</th>
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<tr>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Comment Type TR Comment Status A rewrite bucket</td>
<td>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 &quot;Reserved&quot; field.</td>
<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>Remove the RES text from Figure 155-4 and change the color of the box to be grey</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Response</td>
<td>Response Status W</td>
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<tr>
<td>See response to comment #346.</td>
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<tr>
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<th>P 37</th>
<th>L 31</th>
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<tr>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Comment Type TR Comment Status A rewrite bucket</td>
<td>We traditionally refer to the 257b blocks as 257-bit blocks not 257B blocks (which could be inferred as 257 Byte)</td>
<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>Change the seven instances of 257B block to 257-bit block</td>
<td></td>
<td></td>
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<tr>
<td>Response</td>
<td>Response Status W</td>
<td>ACCEPT IN PRINCIPLE.</td>
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<td></td>
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<tr>
<td>See response to comment #346.</td>
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<tr>
<th>Cl 155</th>
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<th>P 38</th>
<th>L 11</th>
<th># 393</th>
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<tr>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Comment Type TR Comment Status A rewrite bucket</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>Change 9.4.3.2 to 19.4.3.2</td>
<td></td>
<td></td>
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<tr>
<td>Response</td>
<td>Response Status W</td>
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<tr>
<td>See response to comment #346.</td>
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IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID 394**

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

Slavick, Jeff  Broadcom

**Comment Type** TR  **Comment Status** A  **rewrite bucket**

in item 5 it refers 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 column 10 279 of row 255".

**Response**

**Response Status** W

ACCEPT IN PRINCIPLE.

See response to comment #346.

**Comment ID 395**

**Cl** 155  **SC 155.2.5.7.1**  **P 47**  **L 33**  **# 395**

Slavick, Jeff  Broadcom

**Comment Type** TR  **Comment Status** A  **rewrite bucket**

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

**Response**

**Response Status** W

ACCEPT IN PRINCIPLE.

See response to comment #346.

**Comment ID 396**

**Cl** 155  **SC 155.2.4.5**  **P 39**  **L 16**  **# 396**

Slavick, Jeff  Broadcom

**Comment Type** ER  **Comment Status** A  **bucket**

Everywhere else uses the word four not the number

**SuggestedRemedy**

Change "4-frame multi-frame" to "four-frame multi-frame"

**Response**

**Response Status** W

ACCEPT.

**Comment ID 397**

**Cl** 155  **SC 155.2.4.9**  **P 43**  **L 12**  **# 398**

Slavick, Jeff  Broadcom

**Comment Type** E  **Comment Status** A  **bucket**

Extra "."

**SuggestedRemedy**

Remove the . After the 1 in the equation

**Response**

**Response Status** C

ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.2.4.9 P 43 L 16 # 399
Slavick, Jeff Broadcom
Comment Type TR Comment Status rewrite bucket
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"
Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.2.4.7 P 42 L 12 # 400
Slavick, Jeff Broadcom
Comment Type E Comment Status rewrite bucket
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 Bi+3 box.
SuggestedRemedy
Thicken the right edge of the grey boxes that represne the CRC+MBAS.
Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.2.5.5 P 46 L 46 # 401
Slavick, Jeff Broadcom
Comment Type TR Comment Status rewrite bucket
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 control of thresholds
SuggestedRemedy
Add references to the MDIO registers to control and observe link degrade
Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.
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.

**Suggested Remedy**

Change "fail to match" to "fail to match on a given PMA lane"

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.

---

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.

**Suggested Remedy**

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.

**Response**

ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Slavick, Jeff
Broadcom

Report ID: 407

Comment Type: TR
Comment Status: A rewrite bucket

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

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.

Slavick, Jeff
Broadcom

Report ID: 408

Comment Type: TR
Comment Status: A rewrite bucket

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_active_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

Response
ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl. 155 SC. 155.4.2.1 P. 68 L. 26 # 409
Slavick, Jeff Broadcom
Comment Type TR Comment Status A
FEC high SER is not a feature of 400GBASE-ZR
Suggested Remedy
Remove the FEC high SER row from Table 155-9
Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl. FM SC FM P. 2 L. 3 # 410
Dawe, Piers Nvidia
Comment Type T Comment Status R
for operation over DWDM systems - not. Figure 156-1 has it right: "PMD FOR DWDM CHANNEL OVER A DWDM BLACK LINK"
Suggested Remedy
Change "for operation over DWDM systems" to "for DWDM operation"
Response Response Status C
REJECT.
There was no consensus to make a change. The approved project title per the PAR is "Standard for Ethernet Amendment: Physical Layers and Management Parameters for 400 Gb/s Operation over DWDM (dense wavelength division multiplexing) systems".
The same language is used 802.3cl-2021 amendment title and abstract.

Cl. 1 SC. 1.4.144b P. 18 L. 9 # 412
Dawe, Piers Nvidia
Comment Type TR Comment Status A
"using 400GBASE-R encoding" doesn't represent what's in this draft: the BASE-R encoded signal is transmitted, 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 address medium, reach or wavelength.
Suggested Remedy
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.)
Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment 170

Cl. 1 SC. 1.4.144b P. 18 L. 9 # 413
Dawe, Piers Nvidia
Comment Type E Comment Status A
"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.
Suggested Remedy
Delete "family of"
Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment 170

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Comment ID

10/19/2022 4:36:51 PM
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Response #414

Cl 1 SC 1.4.144c P 18 L 13 # 414
Dawe, Piers Nvidia

Comment Type TR Comment Status A

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 because 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"

Response Response Status W
ACCEPT IN PRINCIPLE.

See response to comment 171

Response #415

Cl 1 SC 1.5 P 18 L 24 # 415
Dawe, Piers Nvidia

Comment Type ER Comment Status R

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

Response Response Status C
REJECT.

16QAM or DP-16QAM is commonly used in the industry for this optical modulation technique.

Response #416

Cl 45 SC 45.2.1.150.1 P 22 L 17 # 416
Dawe, Piers Nvidia

Comment Type TR Comment Status A

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?

Response Response Status W
REJECT.

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

Response #417

Cl 116 SC 116.1.3 P 27 L 22 # 417
Dawe, Piers Nvidia

Comment Type TR Comment Status A

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.

Response Response Status W
ACCEPT IN PRINCIPLE.

See response to comment 173

Response #418

Cl 116 SC 116.1.3 P 27 L 22 # 418
Dawe, Piers Nvidia

Comment Type T Comment Status A

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)"

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 173

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Comment ID
The manipulations described in this draft don't describe a BASE-R "native Ethernet"; rather, they are like 10GBASE-W. An Ethernet signal is packed into a telecoms wrapper (then, based on SONET, here, based on OTN). The combination is clumsy and messy. Starting from Ethernet building blocks, one would not engineer it like this. I understand that the rationale is because those designs were already there, and the cost of a clean design was thought to outweigh the inefficiencies of this scheme. But that calls "broad market potential" into question. 800G coherent will affect the market for this.

SuggestedRemedy
I can think of three options:

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

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

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

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

REJECT.

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

Response Info
ACCEPT IN PRINCIPLE.

See response to comment 5

"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).

Response Info
ACCEPT IN PRINCIPLE.

See response to comment 6
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
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<tr>
<td>155</td>
<td>155.1.1</td>
<td>TR</td>
<td>A</td>
<td>W</td>
<td>423</td>
<td>&quot;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.&quot;</td>
<td>before clock domain translation, addition of a CRC, the addition of forward error correction (FEC) and SC-FEC, scrambling, interleaving and a second FEC</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td></td>
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<tr>
<td>155</td>
<td>155.1.4</td>
<td>E</td>
<td>A</td>
<td>C</td>
<td>424</td>
<td>8 x 59.84375 x (28/29) ...</td>
<td>use multiplication sign as elsewhere</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td></td>
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<tr>
<td>155</td>
<td>155.1.5</td>
<td>TR</td>
<td>A</td>
<td>C</td>
<td>425</td>
<td>SCRUB the figures for capitals that should not be there.</td>
<td></td>
<td>ACCEPT.</td>
<td></td>
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<tr>
<td>155</td>
<td>155.1.5</td>
<td>TR</td>
<td>D</td>
<td>W</td>
<td>426</td>
<td>This PCS is too complicated for just a &quot;directive&quot; specification. We need examples.</td>
<td>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.</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
<td></td>
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**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID 428**  
**Response**

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<tr>
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<td>155.1.5</td>
<td>35</td>
<td>25</td>
<td>428</td>
<td>E</td>
<td>A</td>
<td>&quot;SC-FEC adapt &amp; encoding&quot;, &quot;SC-FEC decoding &amp; adapt&quot; - it would help to know that there is interleaving here as well as below.</td>
<td></td>
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<td></td>
<td>&quot;SC-FEC adapt, encoding and interleaving&quot;, &quot;SC-FEC de-interleaving, decoding &amp; adapt&quot; ?</td>
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See response to comment #346.

**Comment ID 429**  
**Response**

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<td>155.1.5</td>
<td>35</td>
<td>43</td>
<td>429</td>
<td>E</td>
<td>A</td>
<td>&quot;PMA:IS_UNITDATA_m-1.indication&quot;: the &quot;m&quot; 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</td>
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<td>Add an informative NOTE saying why it's m-1 not 7, and referring to the appropriate subclause.</td>
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See response to comment #346.

**Comment ID 430**  
**Response**

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<td>155</td>
<td>155.2.1</td>
<td>36</td>
<td>20</td>
<td>430</td>
<td>E</td>
<td>A</td>
<td>&quot;receives two streams of digitally encoded m-bit 16QAM symbols&quot; we need an explanation of why &quot;m-bit&quot;.</td>
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<td></td>
<td>Add sentence explaining that m is an implementation choice, for SD-FEC.</td>
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<td></td>
<td>ACCEPT IN PRINCIPLE.</td>
<td></td>
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</tr>
</tbody>
</table>

See response to comment #346.
Comment Type: T  Comment Status: A  rewrite bucket
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.)

Response  Response Status: C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment Type: E  Comment Status: A  rewrite bucket
Suddenly talking about receiver without warning - hard to understand at first.

SuggestedRemedy
Insert "in the receive direction,"

Response  Response Status: C
ACCEPT.

Comment Type: E  Comment Status: A  rewrite bucket
PCS Synchronization process

SuggestedRemedy
PCS synchronization process?

Response  Response Status: C
ACCEPT.

Comment Type: T  Comment Status: A  rewrite bucket
SC-FEC blocks of 510 x 512

SuggestedRemedy
whats? bits? bytes?

Response  Response Status: C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Comment Type: E  Comment Status: A  rewrite bucket
SC-FEC blocks

SuggestedRemedy
SC-FEC codewords (as on line 39)

Response  Response Status: C
ACCEPT IN PRINCIPLE.

See response to comment #346.
<table>
<thead>
<tr>
<th>Cl</th>
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<th>Page</th>
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<td>Nvidia</td>
<td><strong>Comment Type</strong></td>
<td>E</td>
<td><strong>Comment Status</strong></td>
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<td><strong>Suggested Remedy</strong></td>
<td>257B</td>
<td>rewrite bucket</td>
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<tr>
<td>257-bit, many places. Compare base doc. &quot;256B/257B&quot; can stay.</td>
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<td>Response Status</td>
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<td>See response to comment #346.</td>
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<td><strong>Comment Type</strong></td>
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<td><strong>Comment Status</strong></td>
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<tr>
<td>&quot;Base Frame&quot;: undefined term not used elsewhere, rogue capitals</td>
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<td>bucket</td>
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<tr>
<td><strong>Suggested Remedy</strong></td>
<td>Change to &quot;frame&quot;</td>
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<tr>
<td><strong>Response</strong></td>
<td>Response Status</td>
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<td>Nvidia</td>
<td><strong>Comment Type</strong></td>
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<td><strong>Comment Status</strong></td>
<td>A</td>
</tr>
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<td>16 x 120b markers</td>
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<td><strong>Suggested Remedy</strong></td>
<td>120-bit</td>
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<td><strong>Comment Type</strong></td>
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<td><strong>Comment Status</strong></td>
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<td>ITU-T G.709 Clause 9.4.3.2</td>
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<td>rewrite bucket</td>
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<td><strong>Suggested Remedy</strong></td>
<td>ITU-T G.709 Clause 19.4.3.2</td>
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<td>See response to comment #346.</td>
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<td><strong>Comment Type</strong></td>
<td>T</td>
<td><strong>Comment Status</strong></td>
<td>D</td>
</tr>
<tr>
<td>155.2.4.1 says &quot;The rate matching described in 119.2.4.1 is not required&quot;, so the 257B encoded data can have a rate of 401.5625 Gb/s +/- 100 ppm, not 401.542892 Gb/s +/- 100 ppm</td>
<td></td>
<td>rewrite bucket</td>
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<tr>
<td><strong>Suggested Remedy</strong></td>
<td>Change 401.5625 to 401.542892 mention both</td>
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<td><strong>Proposed Response</strong></td>
<td>Response Status</td>
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<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>The suggested remedy is not clear.</td>
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<tr>
<td>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</td>
<td></td>
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<td>155.2.4.3</td>
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<td>Dawe, Piers</td>
<td>Nvidia</td>
<td><strong>Comment Type</strong></td>
<td>T</td>
<td><strong>Comment Status</strong></td>
<td>A</td>
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<tr>
<td>The clock rate of the 400GBASE-ZR frame (GMP clock domain) is not given, although 155.1.4 gives the PMA service interface rate</td>
<td></td>
<td>rewrite bucket</td>
<td></td>
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</tr>
<tr>
<td><strong>Suggested Remedy</strong></td>
<td>Define the GMP rate in the PCS section</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Response</strong></td>
<td>Response Status</td>
<td>C</td>
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<td>ACCEPT IN PRINCIPLE.</td>
<td></td>
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<tr>
<td></td>
<td>See response to comment #346.</td>
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</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155  SC 155.2.4.3  P 38  L 20  # 446
Dawe, Piers  Nvidia
Comment Type  E  Comment Status  A  rewrite bucket
Comment: ~10 214.684 -eh?
SuggestedRemedy
  Wow, this is hard to read! Spaces inside indivisible things such as numbers or variable names are bad!
Response  Response Status  C
  ACCEPT IN PRINCIPLE.
  See response to comment #346.

Cl 155  SC 155.2.4.3  P 38  L 42  # 447
Dawe, Piers  Nvidia
Comment Type  E  Comment Status  A  rewrite bucket
Comment: Blank line
SuggestedRemedy
  Remove
Response  Response Status  C
  ACCEPT.

Cl 155  SC 155.2.4.5.1  P 39  L 41  # 448
Dawe, Piers  Nvidia
Comment Type  TR  Comment Status  A  rewrite bucket
Comment: G.709.1 is not a normative reference
SuggestedRemedy
  Remove GMP, define the 256-frame multi-frame sequence here, or add the reference
Response  Response Status  W
  ACCEPT IN PRINCIPLE.
  See response to comment #346.

Cl 155  SC 155.2.4.5.2  P 39  L 48  # 449
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  A  rewrite bucket
Comment: "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
Response  Response Status  C
  ACCEPT IN PRINCIPLE.
  See response to comment #346.

Cl 155  SC 155.2.4.5.2  P 39  L 48  # 450
Dawe, Piers  Nvidia
Comment Type  TR  Comment Status  A  rewrite bucket
Comment: "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
Response  Response Status  W
  ACCEPT IN PRINCIPLE.
  See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.2.4.5.2 P 40 L 5 # 451
Dawe, Piers Nvidia

Comment Type: E Comment Status: A rewrite bucket

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

Response
Response Status: C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155 SC 155.2.4.5.2 P 40 L 10 # 452
Dawe, Piers Nvidia

Comment Type: T Comment Status: A rewrite bucket

"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>"?

Response
Response Status: C
ACCEPT IN PRINCIPLE.

See response to comment #346.

Cl 155 SC 155.2.4.5.3 P 40 L 17 # 453
Dawe, Piers Nvidia

Comment Type: TR Comment Status: A rewrite bucket

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.

Response
Response Status: W
ACCEPT IN PRINCIPLE.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.2.4.9 P 43 L 12 # 457
Dawe, Piers Nvidia
Comment Type E Comment Status A bucket
SuggestedRemedy italic
Response Response Status C
ACCEPT.

Cl 155 SC 155.2.4.9 P 43 L 12 # 458
Dawe, Piers Nvidia
Comment Type T Comment Status A rewrite bucket
SuggestedRemedy define x
Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.2.4.9 P 43 L 12 # 459
Dawe, Piers Nvidia
Comment Type T Comment Status A rewrite bucket
SuggestedRemedy
Response Response Status C
ACCEPT IN PRINCIPLE.
See response to comment #346.

Cl 155 SC 155.2.4.10 P 43 L 21 # 460
Dawe, Piers Nvidia
Comment Type TR Comment Status A rewrite bucket
SuggestedRemedy
Response Response Status W
ACCEPT IN PRINCIPLE.
See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

### Comment #463

**Cl:** 155  **SC:** 155.2.4.11  **P:** 44  **L:** 36  **#:** 463

**Dawe, Piers**  
**Nvidia**

**Comment Type:** TR  
**Comment Status:** D  
**rewrite bucket**

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

**Suggested Remedy**

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

**Proposed Response**

**Response Status:** W

- PROPOSED ACCEPT IN PRINCIPLE.

- See response to comment #346.

### Comment #464

**Cl:** 155  **SC:** 155.2.4.11  **P:** 44  **L:** 45  **#:** 464

**Dawe, Piers**  
**Nvidia**

**Comment Type:** T  
**Comment Status:** A  
**rewrite bucket**

- This says 8-bit symbols, 155.2.1 says two streams of 4-bit data. PMA:IS_UNITDATA_i.request is 7 wide.

**Suggested Remedy**

- The difference may matter when we are discussing Skew limits

**Response**

**Response Status:** C

- ACCEPT IN PRINCIPLE.

- See response to comment #346.

### Comment #465

**Cl:** 155  **SC:** 155.2.4.12  **P:** 45  **L:** 33  **#:** 465

**Dawe, Piers**  
**Nvidia**

**Comment Type:** E  
**Comment Status:** A  
**bucket**

- "The Hamming SD-FEC decoder is a soft decision decoder"

**Suggested Remedy**

- What requires this? a sensitivity / OSNR tolerance spec? Please refer to wherever the reason is given.

**Response**

**Response Status:** W

- ACCEPT IN PRINCIPLE.

- See response to comment #346.

### Comment #466

**Cl:** 155  **SC:** 155.2.5.1  **P:** 46  **L:** 11  **#:** 466

**Dawe, Piers**  
**Nvidia**

**Comment Type:** TR  
**Comment Status:** A  
**rewrite bucket**

- "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.

**Suggested Remedy**

- Write out what you need to say, here

**Response**

**Response Status:** C

- ACCEPT IN PRINCIPLE.

- See response to comment #346.

### Comment #467

**Cl:** 155  **SC:** 155.2.5.1  **P:** 46  **L:** 16  **#:** 467

**Dawe, Piers**  
**Nvidia**

**Comment Type:** E  
**Comment Status:** A  
**bucket**

- Interleaver

**Suggested Remedy**

- Missing full stop

**Response**

**Response Status:** C

- ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment 155 SC 155.2.5.5**

**Comment Type:** E  **Comment Status:** A  **SuggestedRemedy:** rewrite bucket

**Response:**

- **Response Status:** C
- **Response:**
  - incoming block 10 ...
  - incoming block of 10 ...
  - ACCEPT IN PRINCIPLE.
  - See response to comment #346.

**Comment 155 SC 155.2.5.6**

**Comment Type:** T  **Comment Status:** A  **SuggestedRemedy:** rewrite bucket

**Response:**

- **Response Status:** C
- **Response:**
  - base block*: not defined, used only once
  - I think this means the "B" blocks of 155.2.5.5. Are they "SC-FEC codewords", and are they named?
  - ACCEPT IN PRINCIPLE.
  - See response to comment #346.

**Comment 155 SC 155.2.5.7**

**Comment Type:** E  **Comment Status:** A  **SuggestedRemedy:** rewrite bucket

**Response:**

- **Response Status:** C
- **Response:**
  - will have
  - has
  - ACCEPT IN PRINCIPLE.
  - See response to comment #346.

**Comment 155 SC 155.2.5.7.1**

**Comment Type:** E  **Comment Status:** A  **SuggestedRemedy:** rewrite bucket

**Response:**

- **Response Status:** C
- **Response:**
  - Figure 155-9 is an orphan
  - Reference it or remove it. See another comment.
  - ACCEPT IN PRINCIPLE.
  - See response to comment #346.

**Comment 155 SC 155.2.5.7.1**

**Comment Type:** T  **Comment Status:** A  **SuggestedRemedy:** rewrite bucket

**Response:**

- **Response Status:** C
- **Response:**
  - upstream, downstream
  - Rx, Tx. Compare base doc.
  - ACCEPT IN PRINCIPLE.
  - See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
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<td>48</td>
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Dawe, Piers  
Nvidia  

**Comment Type:** E  
**Comment Status:** A  
**Suggested Remedy:**  
detailed in 155.2.5.7.2 - but this is 155.2.5.7.2  

**Response:**  
Response Status: C  
ACCEPT IN PRINCIPLE.  

See response to comment #346.

<table>
<thead>
<tr>
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<td>478</td>
</tr>
</tbody>
</table>

Dawe, Piers  
Nvidia  

**Comment Type:** T  
**Comment Status:** A  
**Suggested Remedy:**  
The interfaces for the inputs of  

**Response:**  
Response Status: C  
ACCEPT IN PRINCIPLE.  

See response to comment #346.

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<tr>
<th>Cl</th>
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<td>48</td>
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</tbody>
</table>

Dawe, Piers  
Nvidia  

**Comment Type:** T  
**Comment Status:** A  
**Suggested Remedy:**  
framing of frame or multi-frame loss - eh?  

**Response:**  
Response Status: C  
ACCEPT IN PRINCIPLE.  

See response to comment #346.

<table>
<thead>
<tr>
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<td>155.3.1.3</td>
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Dawe, Piers  
Nvidia  

**Comment Type:** T  
**Comment Status:** A  
**Suggested Remedy:**  
"m is ... the number of bits of resolution of the DP-16QAM symbols"  

**Response:**  
Response Status: C  
ACCEPT IN PRINCIPLE.  

See response to comment #346.

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</tbody>
</table>

Dawe, Piers  
Nvidia  

**Comment Type:** T  
**Comment Status:** A  
**Suggested Remedy:**  
The PCS receives decode blocks  

**Response:**  
Response Status: C  
ACCEPT IN PRINCIPLE.  

See response to comment #346.

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</table>

Dawe, Piers  
Nvidia  

**Comment Type:** T  
**Comment Status:** A  
**Suggested Remedy:**  
Align CFEC and remove FAW/TS symbols (X)  

**Response:**  
Response Status: C  
ACCEPT IN PRINCIPLE.  

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID 481**

Cl 155 SC 155.3.1.2 P 49 L 16

Dawe, Piers Nvidia

**Comment Type** E  **Comment Status** A  rewrite bucket

relationship with

SuggestedRemedy

relationship to  Also 156.1

Response  **Response Status** C

ACCEPT IN PRINCIPLE.

See response to comment #346.

**Comment ID 482**

Cl 155 SC 155.3.2 P 50 L 16

Dawe, Piers Nvidia

**Comment Type** TR  **Comment Status** A  rewrite bucket

* ~50.212875 Gb/s:  ~ too vague, signaling rate should be in GBd

SuggestedRemedy

Specify the rate without approximation

Response  **Response Status** W

ACCEPT IN PRINCIPLE.

See response to comment #346.

**Comment ID 483**

Cl 155 SC 155.3.3 P 52 L 21

Dawe, Piers Nvidia

**Comment Type** TR  **Comment Status** A  rewrite bucket

split table (not properly indicated).  Also Table 155-6-PS

SuggestedRemedy

Response  **Response Status** C

ACCEPT IN PRINCIPLE.

See response to comment #346.
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment</th>
<th>Response</th>
<th>Comment Status</th>
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<tr>
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<td>E</td>
<td>A</td>
<td>Cl 155</td>
<td>SC 155.3.3.3</td>
<td>P 57 L 32</td>
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<td>E</td>
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<td>SC 155.5</td>
<td>P 67 L 3</td>
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<td>Cl 155</td>
<td>SC 155.5.1</td>
<td>P 67 L 9</td>
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</table>

**Cl 156 SC 156.1 P 73 L 48 #492**

Dawe, Piers Nvidia

**Comment Type** TR

**Comment Status** A

Delete the four FEC degraded SER rows

Response **Response Status** W

Accept in principle.

See response to comment #346.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID 493**

<table>
<thead>
<tr>
<th>CI 156</th>
<th>SC 156.1.1</th>
<th>P 74</th>
<th>L 39</th>
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<td>L 39</td>
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<td>Nvidia</td>
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<tr>
<td>Comment Type</td>
<td>E</td>
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<td>A</td>
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<tr>
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<td>SuggestedRemedy</td>
<td>PMA (155.3)</td>
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<tr>
<td>Response</td>
<td>Response Status</td>
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<tr>
<td>ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>See response to comment 91.</td>
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**Comment ID 494**

<table>
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<th>SC 156.2</th>
<th>P 75</th>
<th>L 14</th>
<th># 494</th>
</tr>
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<tbody>
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<td>Cl 156</td>
<td>SC 156.2</td>
<td>P 75</td>
<td>L 14</td>
<td># 494</td>
</tr>
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<td>Nvidia</td>
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<td>Comment Type</td>
<td>E</td>
<td>Comment Status</td>
<td>D</td>
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<tr>
<td>3, 1, -1, and -3</td>
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<td></td>
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<tr>
<td>SuggestedRemedy</td>
<td>Please count forwards in the usual way: -3, -1, 1, and 3, and in next paragraph and 156.5.2 and 156.5.3</td>
<td></td>
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</tr>
<tr>
<td>Proposed Response</td>
<td>Response Status</td>
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<tr>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>Review supporting presentation, for comment resolution group (CRG) consideration.</td>
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**Comment ID 495**

<table>
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<tr>
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<th>SC 156.2</th>
<th>P 75</th>
<th>L 22</th>
<th># 495</th>
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<td>SC 156.2</td>
<td>P 75</td>
<td>L 22</td>
<td># 495</td>
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<tr>
<td>Dawe, Piers</td>
<td>Nvidia</td>
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<tr>
<td>Comment Type</td>
<td>E</td>
<td>Comment Status</td>
<td>R</td>
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<tr>
<td>&quot;the variable SIGNAL_DETECT parameter&quot;: 156.5.4 says it's a parameter, this and that say not variable</td>
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<td>SuggestedRemedy</td>
<td>Delete variable</td>
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<tr>
<td>Response</td>
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<tr>
<td>REJECT.</td>
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</tr>
<tr>
<td>There was no consensus in the CRG to make a change at this time.</td>
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</table>

**Comment ID 496**

<table>
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<th>SC 156.2</th>
<th>P 75</th>
<th>L 26</th>
<th># 496</th>
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<tbody>
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<td>Cl 156</td>
<td>SC 156.2</td>
<td>P 75</td>
<td>L 26</td>
<td># 496</td>
</tr>
<tr>
<td>Dawe, Piers</td>
<td>Nvidia</td>
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<td></td>
</tr>
<tr>
<td>Comment Type</td>
<td>T</td>
<td>Comment Status</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>&quot;poor quality link to provide sufficient light for a SIGNAL_DETECT = OK&quot;: this note isn't relevant if the parameter is fixed</td>
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<tr>
<td>SuggestedRemedy</td>
<td>Change the note to explain the situation</td>
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<tr>
<td>Response</td>
<td>Response Status</td>
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<td>REJECT.</td>
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<tr>
<td>There was no consensus in the CRG to make a change at this time.</td>
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**Comment ID 497**

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<th>L 35</th>
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<td>P 75</td>
<td>L 35</td>
<td># 497</td>
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<td>Comment Type</td>
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<tr>
<td>2048 bit times</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>SuggestedRemedy</td>
<td>8192 bit times</td>
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<td>Proposed Response</td>
<td>Response Status</td>
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<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
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<tr>
<td>Review supporting presentation, for comment resolution group (CRG) consideration.</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
| 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)"

**Comment ID 498**

<table>
<thead>
<tr>
<th>CI 156</th>
<th>SC 156.3.2</th>
<th>P 75</th>
<th>L 52</th>
<th># 498</th>
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<td>SC 156.3.2</td>
<td>P 75</td>
<td>L 52</td>
<td># 498</td>
</tr>
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<td>Nvidia</td>
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<tr>
<td>Comment Type</td>
<td>TR</td>
<td>Comment Status</td>
<td>A</td>
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<tr>
<td>Are these Skew and SV limits plausible? What does the PMA need? This is a hybrid of &quot;parallel&quot; and &quot;serial&quot;, needs new numbers.</td>
<td></td>
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<tr>
<td>SuggestedRemedy</td>
<td>Revise to limits that are appropriate to DP-16PAM technology and the channel.</td>
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<tr>
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<tr>
<td>See response to comment #346.</td>
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</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.5.1 P 77 L 30 # 499
Dawe, Piers Nvidia

Comment Type E Comment Status A bucket
blank line(s)

Suggested Remedy
Remove

Response Response Status C bucket
ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl 156 SC 156.5.2 P 77 L 40 # 500
Dawe, Piers Nvidia

Comment Type E Comment Status A bucket
The mapping of the analog values to the symbol amplitudes is listed in Table 155-2.

Suggested Remedy

Response Response Status C bucket
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 R bucket
No SD!

Suggested Remedy

Response Response Status C bucket
REJECT.

There was no consensus in the CRG to make a change at this time.

Cl 156 SC 156.6 P 79 L 18 # 502
Dawe, Piers Nvidia

Comment Type E Comment Status R bucket
misuse of TP2

Suggested Remedy

Response Response Status C bucket
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 A bucket
blank line

Suggested Remedy

Response Response Status C bucket
ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

Cl 156 SC 156.6 P 79 L 52 # 504
Dawe, Piers Nvidia

Comment Type E Comment Status A bucket
Rx_optical_frequency_index Tx_optical_frequency_index Tx_Rx_diff_opt_freq_ability

Suggested Remedy

Tables 156-2, 3 and a later sentence have Tx_optical_channel_index
Rx_optical_channel_index Tx_Rx_diff_opt_chan_ability

Response Response Status C bucket
ACCEPT IN PRINCIPLE.

See responses to comments 324, 325 and 326
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

CI 156 SC 156.6 P 80 L 1 # 505
Dawe, Piers Nvidia

Comment Type E Comment Status A blank lines 1 to 3
SuggestedRemedy

Response Response Status C
ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license

CI 156 SC 156.6 P 80 L 7 # 506
Dawe, Piers Nvidia

Comment Type E Comment Status R f not defined
SuggestedRemedy

Response Response Status C
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

A straw poll was taken:

I support rejection of comment #506 as proposed

Yes: 16
No: 2

CI 156 SC 156.6 P 80 L 28 # 507
Dawe, Piers Nvidia

Comment Type E Comment Status R square or round brackets
SuggestedRemedy

Response Response Status C
REJECT.

Use of [ ] brackets consistent with Table 154-5 in IEEE Std 802.3-2022

Type: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
Comment Status: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
Sort Order: Comment ID

Comment ID 508
Page 115 of 128
10/19/2022 4:36:52 PM

CI 156 SC 156.7.1 P 82 L 23 # 508
Dawe, Piers Nvidia

Comment Type E Comment Status R Why 59.84375?
SuggestedRemedy

Response Response Status C
REJECT.

This is an exact value per adopted baseline from page 24 of https://www.ieee802.org/3/cn/public/19_01/lyubomirsky_3cn_01b_0119.pdf

CI 156 SC 156.7.1 P 82 L 23 # 509
Dawe, Piers Nvidia

Comment Type E Comment Status R Why +/-20 ppm?
SuggestedRemedy

Response Response Status C
REJECT.

This is a value per adopted baseline from page 6 of https://www.ieee802.org/3/cn/public/19_01/lyubomirsky_3cn_01b_0119.pdf. There was no proposed remedy or justification for a change.

CI 156 SC 156.7.1 P 82 L 27 # 510
Dawe, Piers Nvidia

Comment Type E Comment Status R Average channel output power
SuggestedRemedy

Response Response Status C
REJECT.

Use of "Average channel output power" consistent with Table 154-7 in IEEE Std 802.3-2022
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>P</th>
<th>L</th>
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<tr>
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<td>156.7.1</td>
<td>82</td>
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<td>Nvidia</td>
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<td>E</td>
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<td>Several things with max and min, others without. Definition of 156.9.14 in I-Q phase error doesn't define its sign</td>
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</table>

**Comment ID 516**

**Comment Type** E  **Comment Status** A  **SuggestedRemedy**

says that receiver OSNR tolerance "is informative and compliance is not required"

**Response Status** C  **Response**

ACCEPT IN PRINCIPLE.

Add note in Table 156-7 for Receiver OSNR tolerance stating "OSNR tolerance is optional and compliance is not required."
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

CI 156 SC 156.8 P 84 L 33 # 517
Dawe, Piers Nvidia

Comment Type E Comment Status R
Are these specs for "black link" or for "DWDM channel"?

SuggestedRemedy

Response Response Status C
REJECT.

No suggested remedy provided

CI 156 SC 156.8 P 84 L 35 # 518
Dawe, Piers Nvidia

Comment Type E Comment Status A
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?

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 367

CI 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 Z
REJECT.

This comment was WITHDRAWN by the commenter.

CI 156 SC 156.8 P 85 L 22 # 520
Dawe, Piers Nvidia

Comment Type E Comment Status R
DGD-max

SuggestedRemedy

Is there a spec to make the Rx tolerate it?

Response Response Status C
REJECT.

No consensus to make a change. This requirement in the specifications defined in 156.9.23.

CI 156 SC 156.8 P 85 L 28 # 521
Dawe, Piers Nvidia

Comment Type E Comment Status A
Adjacent channel isolation

SuggestedRemedy

? see G.671

Response Response Status C
ACCEPT IN PRINCIPLE.

In 156.9.29 delete reference to ITU-T G671

CI 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 Z
REJECT.

This comment was WITHDRAWN by the commenter.
Response

Response Status: C

ACCEPT IN PRINCIPLE.

In footnote d change:

"Only relevant with implementations of a DWDM black link with one or more optical add-drop multiplexers present."

to

"Applicable to implementations of a DWDM black link with one or more optical add-drop multiplexers present."

Response

Response Status: C

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"

Comment ID 527

Page 118 of 128

10/19/2022  4:36:52 PM

TYPE: TR/technical required  ER/editorial required  GR/general required  T/technical  E/editorial  G/general

COMMENT STATUS: D/dispatched A/accepted R/rejected  RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn

SORT ORDER: Comment ID
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</table>

**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

**Suggested Remedy:**

**Proposed Response**  
**Response Status:** Z

REJECT.

This comment was WITHDRAWN by the commenter.

<table>
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</table>

**Comment Type:** E  **Comment Status:** A

Compliant transmitters ... are required to ... by applying minimum and maximum masks to the spectrum acquired using an optical spectrum analyzer.

**Suggested Remedy:**

**Response**  
**Response Status:** C

ACCEPT IN PRINCIPLE.

Change 156.9.4 to:

"The transmit spectrum shall be within the limits of this subclause if measured per IEC 61280-1-3. Upper and lower limits are defined by truncated root-raised-cosine (RRC) responses around the signal's center frequency.

The upper and lower masks are illustrated in Figure 156–4.

The upper limit follows a RRC response with a roll-off factor β of 0.4 from 0 dB at zero frequency offset up to 40.4 GHz offset; it is –20 dB at higher frequencies. The lower limit is set at -9 dB up to 30.8 GHz offset and follows a RRC β of 0.05 for higher frequencies."

**Comment Type:** E  **Comment Status:** A

Blank line

**Suggested Remedy:**

**Response**  
**Response Status:** C

ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license.
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Cl</th>
<th>SC</th>
<th>Type</th>
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<th>Line</th>
<th>Comment</th>
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<td>1-sided noise power spectral density [Hz^2/Hz]</td>
<td>but noise power should be in watts, or dBc. Figure title has &quot;spectral power density&quot;</td>
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<td>the frequency of interest</td>
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**TYPE:** TR/technical required  ER/editorial required  GR/general required  T/technical  E/editorial  G/general  
**COMMENT STATUS:** D/dispatched  A/accepted  R/rejected  
**RESPONSE STATUS:** O/open  W/written  C/closed  U/unsatisfied  Z/withdrawn  
**SORT ORDER:** Comment ID
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment 156 SC 156.9.12**

**Response**

**Response Status** C

ACCEPT IN PRINCIPLE.

See responses to comments 351 and 363

---

**Comment 156 SC 156.9.13**

**Response**

**Response Status** C

REJECT.

Comment unclear and no suggested remedy provided

---

**Comment 156 SC 156.9.14**

**Response**

**Response Status** C

ACCEPT IN PRINCIPLE.

Delete "proportional".

---

**Comment 156 SC 156.9.15**

**Response**

**Response Status** C

REJECT.

Comment unclear and no suggested remedy provided

---

**Comment 156 SC 156.9.16**

**Response**

**Response Status** C

REJECT.

Comment unclear and no suggested remedy provided

---

**Comment 156 SC 156.9.17**

**Response**

**Response Status** Z

REJECT.

This comment was WITHDRAWN by the commenter.
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>Page</th>
<th>Line</th>
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<tr>
<td>Accept in principle.</td>
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<tr>
<td>Add &quot;Optical signal-to-noise ratio (OSNR)&quot; to 156.13.4.4. With editorial license</td>
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<td>Accept in principle.</td>
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<tr>
<td>In 156.9.17 change the end of the second sentence from &quot;plus and minus the maximum spectral excursion&quot; to &quot;plus and minus the maximum spectral excursion as defined in ITU-T G.698.2.&quot;</td>
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<td>Accept in principle.</td>
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<tr>
<td>Update definition of in-band OSNR to define relative noise with editorial license.</td>
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</tbody>
</table>
Dawe, Piers Nvidia

**Comment Type**: E  **Comment Status**: A
see earlier for table footnote and "optional"

**Suggested Remedy**

**Response**: 

**Response Status**: C  ACCEPT IN PRINCIPLE.

Change the last sentence in 156.9.24 to

"OSNR tolerance is optional and compliance is not required. The normative receiver requirement is receiver OSNR, see 156.9.23."

---

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

**Suggested Remedy**

**Proposed Response**: 

**Response Status**: Z  REJECT.

This comment was WITHDRAWN by the commenter.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

### Comment 555

**Cl: 156**  
**SC: 156.9.29**  
**P: 92**  
**L: 33**  
**# 555**

Dawe, Piers  
Nvidia

**Comment Type:** E  
**Comment Status:** A

[Adjacent channel isolation, defined in Recommendation ITU-T G.671, qv]

**Suggested Remedy:**

**Response**  
**Response Status:** C

ACCEPT IN PRINCIPLE.

In 156.9.29 change subclause name to "Adjacent channel spectral isolation" and the definition to "The adjacent channel isolation, as defined in TBD, shall be within the limits given in Table 156–9."

With editorial license.

### Comment 556

**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]

**Suggested Remedy:**

**Proposed Response**  
**Response Status:** W

PROPOSED ACCEPT IN PRINCIPLE.

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

### Comment 557

**Cl: 156**  
**SC: 156.1**  
**P: 92**  
**L: 44**  
**# 557**

Dawe, Piers  
Nvidia

**Comment Type:** E  
**Comment Status:** A

**Suggested Remedy:**

**Response**  
**Response Status:** C

ACCEPT IN PRINCIPLE.

The 400GBASE-ZW transmitter is connected to the 400 Gb/s DP-16QAM transmitter to connect the 400 Gb/s DP-16QAM transmitter to PROPOSED ACCEPT IN PRINCIPLE.

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

### Comment 558

**Cl: 156**  
**SC: 156.10.1**  
**P: 92**  
**L: 49**  
**# 558**

Dawe, Piers  
Nvidia

**Comment Type:** E  
**Comment Status:** A

**Suggested Remedy:**

**Proposed Response**  
**Response Status:** W

PROPOSED ACCEPT IN PRINCIPLE.

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

### Comment 559

**Cl: 156**  
**SC: 156.10.1**  
**P: 93**  
**L: 9**  
**# 559**

Dawe, Piers  
Nvidia

**Comment Type:** E  
**Comment Status:** A

**Suggested Remedy:**

**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.

### Comment 560

**Cl: 156**  
**SC: 156.10.1**  
**P: 93**  
**L: 9**  
**# 560**

Dawe, Piers  
Nvidia

**Comment Type:** E  
**Comment Status:** A

**Suggested Remedy:**

**Response**  
**Response Status:** C

ACCEPT IN PRINCIPLE.

Change "TX" to "Tx".

There was was no consensus in the CRG to make a change.
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<th>SC</th>
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**Comment Type:** E  **Comment Status:** A  **Suggested Remedy:**
Calibrated Coherent Receiver and so on, also in other figures

**Proposed Response:**
Accept in principle.

In 156.10 ensure correct capitalization with editorial license

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**Comment Type:** E  **Comment Status:** D  **Proposed Response:**
A to D and analysis? 156.10.1.2 says it's Offline

**Response:**
REJECT.

This comment was WITHDRAWN by the commenter.

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**Comment Type:** TR  **Comment Status:** R  **Suggested Remedy:**
Need a bigger block size for at least one of these, to go with the jitter corner frequency

**Response:**
REJECT.

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

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**Comment Type:** E  **Comment Status:** A  **Proposed Response:**
3rd-order super Gaussian filter with RRC = 0.2

**Response:**
ACCEPT IN PRINCIPLE.

See response to comment 121

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**Comment Type:** E  **Comment Status:** A  **Proposed Response:**
Super Gaussian [https://en.wikipedia.org/wiki/Gaussian_function#Higher-order_Gaussian_or_super-Gaussian_function](https://en.wikipedia.org/wiki/Gaussian_function#Higher-order_Gaussian_or_super-Gaussian_function)

**Response:**
ACCEPT IN PRINCIPLE.

See response to comment 121

**Comment Status:** D/dispatched A/accepted R/rejected
**Response Status:** O/open W/written C/closed U/unsatisfied Z/withdrawn
**Type:** TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
**Sort Order:** Comment ID

10/19/2022 4:36:52 PM
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID 567**

Comment Type: E  
Comment Status: A  
RRC  
Suggested Remedy:

**Response**  
Response Status: C  
ACCEPT IN PRINCIPLE.  
See response to comment 359

**Comment ID 568**

Comment Type: E  
Comment Status: A  
IQ Offset  
Suggested Remedy:

**Response**  
Response Status: C  
ACCEPT IN PRINCIPLE.  
Change "IQ Offset" to "IQ offset" with editorial license

**Comment ID 569**

Comment Type: E  
Comment Status: A  
FIR filter with 15 real taps  
Suggested Remedy:

**Response**  
Response Status: C  
ACCEPT IN PRINCIPLE.  
See response to comment 335.

**Comment ID 570**

Comment Type: E  
Comment Status: D  
using the signal with additive white Gaussian noise considering the Receiver OSNR(min)  
Suggested Remedy:

**Proposed Response**  
Response Status: W  
PROPOSED REJECT.  
No suggested remedy provided

**Comment ID 571**

Comment Type: E  
Comment Status: R  
define k and K  
Suggested Remedy:

**Response**  
Response Status: C  
REJECT.  
No suggested remedy provided.  
Further contributions for defining noted parameters are welcome.

**Comment ID 572**

Comment Type: E  
Comment Status: R  
It would be better to count from 1 to K in the usual way  
Suggested Remedy:

**Response**  
Response Status: C  
REJECT.  
No suggested remedy provided.  
Further contributions for defining noted parameters are welcome.  
See response to comment 571.
Dawe, Piers  
Comment Type: E  Comment Status: R

*Comment*: I delta and Q delta not norm then norm

*Suggested Remedy*:

**Response**  
Response Status: C  
REJECT.

No suggested remedy provided.

Further contributions for defining noted parameters are welcome.

---

Dawe, Piers  
Comment Type: E  Comment Status: R

*Comment*: Do what with alpha_peak? add equation

*Suggested Remedy*:

**Response**  
Response Status: C  
REJECT.

No suggested remedy provided.

Further contributions for defining noted parameters are welcome.

---

Dawe, Piers  
Comment Type: E  Comment Status: R

*Comment*: n and eta are the same thing? Why not k?

*Suggested Remedy*:

**Response**  
Response Status: C  
REJECT.

No suggested remedy provided.

Further contributions for defining noted parameters are welcome.

---

Dawe, Piers  
Comment Type: E  Comment Status: A

*Comment*: blank line

*Suggested Remedy*:

**Response**  
Response Status: C  
ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment 156 SC 156.12**

**Comment Type**: E  **Comment Status**: A

Dawe, Piers  Nvidia

**SuggestedRemedy**

Make it clear that there is one fibre per direction at the MDI even if there is bidirectional fibre between mux/demuxes.

**Response**

Response Status: C

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"

**Comment 156 SC 156.13.4.2**

**Comment Type**: E  **Comment Status**: A

Dawe, Piers  Nvidia

**SuggestedRemedy**

- rogue underscore, column widths

**Response**

Response Status: C

ACCEPT IN PRINCIPLE.

Correct underscore and column widths, with editorial license

**Comment 120A SC 120A.6**

**Comment Type**: E  **Comment Status**: A

Dawe, Piers  Nvidia

**SuggestedRemedy**

- two 400GMII and 400GAUI-8 interfaces

**Response**

Response Status: C

ACCEPT IN PRINCIPLE.

See response to comment #346.

**Comment 00 SC 0**

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

Dawe, Piers  Nvidia

**SuggestedRemedy**

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

**Proposed Response**

**Response Status**: W

PROPOSED ACCEPT IN PRINCIPLE.

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