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<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>120A</td>
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<td>Change all dated references to 802.3 from 202x to 2022</td>
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<td>Text of the editorial instruction should be bolded and italics</td>
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**Proposed Response**

**Response Status**

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<td>Change title of Table 116-5 to &quot;PHY type and clause correlation (400GBASE-Z 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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<td>The 400GBASE-ZR is part of the family of physical layer devices called 400GBASE-Z as defined in 1.4.144b, not 400GBASE-R. The editorial changes in 116.2.3 are therefore incorrect.</td>
</tr>
</tbody>
</table>

**Proposed Response**

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

Cl 116 SC 116.2.4 P 29 L 12 # 6
Brown, Matt Huawei

Comment Type ER Comment Status X

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

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

Proposed Response Response Status O

Cl 116 SC 116.2.5 P 29 L 19 # 7
Brown, Matt Huawei

Comment Type ER Comment Status X

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

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

Proposed Response Response Status O

Cl 116 SC 116.4 P 29 L 27 # 8
Brown, Matt Huawei

Comment Type E Comment Status X

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

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

Proposed Response Response Status O

Cl 155 SC 155.1.1 P 32 L 10 # 9
Brown, Matt Huawei

Comment Type E Comment Status X

PHY name breaks across two rows.

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

Proposed Response Response Status O

Cl 155 SC 155.1.5 P 35 L 3 # 10
Brown, Matt Huawei

Comment Type E Comment Status X

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

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

Proposed Response Response Status O

Cl 155 SC 155.2.5.1 P 46 L 14 # 11
Lewis, Jon Dell Technologies

Comment Type E Comment Status X

need a non-breaking space between "Annex" and "D"

SuggestedRemedy
Add non-breaking space.

Proposed Response Response Status O

Cl 155 SC 155.3.2 P 51 L 31 # 12
Lewis, Jon Dell Technologies

Comment Type E Comment Status X

Text and arrow intersect.

SuggestedRemedy
Remove intersection of text and arrow to make the figure more legible.

Proposed Response Response Status O
Comment Type: T  Comment Status: X

Clause 155.3.3.3.1 defines FAW as a 22 symbols sequence, "bits" are not mentioned there

Suggested Remedy
For consistency replace: "The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.3.1.", with: "The sequence is considered to be valid if at least 18 symbols match the 22 known symbols of the FAW pattern described in 155.3.3.3.1."

Proposed Response

Comment Type: T  Comment Status: X

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)

Suggested Remedy
Replace: "The synchronization process operates independently on each lane" with: "The synchronization process operates independently on each polarization"

Proposed Response

Comment Type: E  Comment Status: X

Empty box without any function

Suggested Remedy
Remove empty fbox from figure 155-10

Proposed Response

Comment Type: ER  Comment Status: X

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

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

Proposed Response

Comment Type: E  Comment Status: X

It seems worthwhile to provide some basic context regarding the meaning of Cm(t) and \( \Sigma C_n(t) \). 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 \( \Sigma C_n(t) \) nominally indicating the running remainder. Averaging the Cm(t) plus \( \Sigma C_n(t) \) values across multiple multi-frames, the average represent the incoming serial stream rate as the number of information bytes arriving at the GMP encoder per multi-frame."

Proposed Response

Comment Type: ER  Comment Status: X

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."

Proposed Response
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."

**Proposed Response**

Response Status O

---

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"

**Proposed Response**

Response Status O

---

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 802.3de-202x Amendment 5 and 802.3cx Amendment 6. Add amendment 7 for 400GBASE-ZR PCS/PMA over single-mode fiber PMD with reach up to at least 80 km as specified in Clause 150."

**Proposed Response**

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

**Comment ID 25**

Marris, Arthur  
Cadence Design Systems

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

**Suggested Remedy**:  
Needs to reference modification made by 802.3db and change paragraph number to 45.2.1.22.1aa

**Proposed Response**  
Response Status: O

**Comment ID 26**

Marris, Arthur  
Cadence Design Systems

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

**Suggested Remedy**:  
Change "characters. The" to "characters. The"

**Proposed Response**  
Response Status: O

**Comment ID 27**

Marris, Arthur  
Cadence Design Systems

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

**Suggested Remedy**:  
Define OH acronym as it is the first use in the Clause

**Proposed Response**  
Response Status: O

**Comment ID 28**

Marris, Arthur  
Cadence Design Systems

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

**Suggested Remedy**:  
Should this be "128 bit"?

**Proposed Response**  
Response Status: O

**Comment ID 29**

Marris, Arthur  
Cadence Design Systems

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

**Suggested Remedy**:  
Is "frame" the correct word to use here?

**Proposed Response**  
Response Status: O

**Comment ID 30**

Marris, Arthur  
Cadence Design Systems

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

**Suggested Remedy**:  
Change "The PMA service interface"

**Proposed Response**  
Response Status: O
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<td>Change &quot;IEEE Std 802.3™-202x&quot; to &quot;IEEE Std 802.3™-2022&quot; in the page header.</td>
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<td>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.</td>
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<td>Remove the &quot;O&quot; in the 400GBASE-ZR row for EEE in Table 116-5.</td>
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<td></td>
<td>Delete all registers and functions related to EEE or LPI from the PCS specifications in clause 155.</td>
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<td>Implement additional changes as necessary with editorial license.</td>
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</table>
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.

Proposed Response  Response Status  O

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  O

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

Also in 155.3.2.

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

Proposed Response  Response Status  O

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

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

Proposed Response  Response Status  O
Comment ID 42

Cl 155 SC 155.1.4 P 34 L 2 # 42

Ran, Adee Cisco

Comment Type T Comment Status X

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

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

Proposed Response Response Status O

Comment ID 43

Cl 155 SC 155.2.1 P 36 L 6 # 43

Ran, Adee Cisco

Comment Type E Comment Status X

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

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

Proposed Response Response Status O

Comment ID 44

Cl 155 SC 155.2.1 P 36 L 7 # 44

Ran, Adee Cisco

Comment Type E Comment Status X

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

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

Proposed Response Response Status O

Comment ID 45

Cl 155 SC 155.2.1 P 36 L 20 # 45

Ran, Adee Cisco

Comment Type E Comment Status X

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

SuggestedRemedy
Insert a space.

Proposed Response Response Status O

Comment ID 46

Cl 155 SC 155.2.1 P 36 L 29 # 46

Ran, Adee Cisco

Comment Type T Comment Status X

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

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

Proposed Response Response Status O

Comment ID 47

Cl 155 SC 155.2.1 P 36 L 38 # 47

Ran, Adee Cisco

Comment Type E Comment Status X

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

SuggestedRemedy
Add "bits" after "510 × 512".

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

Cl 155 SC 155.2.1 P 36 L 43 # 48
Ran, Adee Cisco
Comment Type E Comment Status X

"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).

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

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

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

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 37 L 30 # 49
Ran, Adee Cisco
Comment Type E Comment Status X

"The frame is illustrated as a structure with 256 rows of 10 280 bits with a logical transmission order of left to right, top to bottom. This frame contains 5140 bits of overhead and 10 220 257B blocks of payload. This frame is illustrated in Figure 155–3"" The order should be clearly defined in the text, not just "illustrated" in a figure.

The text can be made shorter and clearer.

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

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 38 L 5 # 50
Ran, Adee Cisco
Comment Type T Comment Status X

"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 need to use another term (and possibly create confusion, since in the related Clause 155 the columns denote octets).

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

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

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

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 38 L 20 # 51
Ran, Adee Cisco
Comment Type E Comment Status X

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

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

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

Alternatively keep the fractions and delete the space separators.

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

**Comment ID 52**

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>L</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>155.2.4.3</td>
<td>30</td>
<td>T</td>
<td>X</td>
<td>Ran, Adee Cisco</td>
</tr>
</tbody>
</table>

Comment Type: T  Comment Status: X

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

SuggestedRemedy

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

**Comment ID 53**

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>L</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>155.2.4.3</td>
<td>30</td>
<td>E</td>
<td>X</td>
<td>Ran, Adee Cisco</td>
</tr>
</tbody>
</table>

Comment Type: E  Comment Status: X

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

SuggestedRemedy

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

**Comment ID 54**

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>L</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>155.2.4.3</td>
<td>6</td>
<td>E</td>
<td>X</td>
<td>Ran, Adee Cisco</td>
</tr>
</tbody>
</table>

Comment Type: E  Comment Status: X

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

SuggestedRemedy

Change to "10970-bit row aligned".

**Comment ID 55**

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>L</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>155.2.4.5</td>
<td>16</td>
<td>E</td>
<td>X</td>
<td>Ran, Adee Cisco</td>
</tr>
</tbody>
</table>

Comment Type: E  Comment Status: X

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

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

SuggestedRemedy

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

**Comment ID 56**

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>L</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>155.2.4.5</td>
<td>16</td>
<td>E</td>
<td>X</td>
<td>Ran, Adee Cisco</td>
</tr>
</tbody>
</table>

Comment Type: E  Comment Status: X

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

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

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

SuggestedRemedy

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

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

Cl 155 SC 155.2.4.5.3 P 39 L 24 # 57
Ran, Adee Cisco
Comment Type T Comment Status X
C_m(t) and CnD(t) are used but not defined.
I assume they are defined in an external reference, but it is unclear. If all control bytes are
defined externally then there is no need for this text.

Suggested Remedy
Preferably add the detailed definitions from the referenced document.
Otherwise, delete the entire last paragraph.

Proposed Response Response Status O

Cl 155 SC 155.2.4.5.1 P 39 L 40 # 58
Ran, Adee Cisco
Comment Type T Comment Status X
I assume the MFAS is an 8-bit counter, but figure 155-4 shows only 2 bits. This can
confuse readers.

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

Proposed Response Response Status O

Cl 155 SC 155.2.4.5.2 P 40 L 1 # 60
Ran, Adee Cisco
Comment Type E Comment Status X
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.

Proposed Response Response Status O

Cl 155 SC 155.2.4.5.2 P 40 L 9 # 61
Ran, Adee Cisco
Comment Type E Comment Status X
"If there is not an adjacent PHY 400GXS sublayer"
Also in 155.2.5.7.2.

Suggested Remedy
Change to "If there is no adjacent PHY 400GXS sublayer" (2 places).

Proposed Response Response Status O

Cl 155 SC 155.2.4.5.1 P 39 L 41 # 59
Ran, Adee Cisco
Comment Type T Comment Status X
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.

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

#### Comment ID 62

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

"OIF-400ZR-01.0, March 10, 2020, subclause 8.9"

This should be a normative reference document (in addition to the ITU-T documents). I found a matching document in https://www.oiforum.com/wp-content/uploads/OIF-400ZR-01.0_reduced2.pdf.

Note that there are updates to this document (OIF-400ZR-01.0 Maintenance, https://www.oiforum.com/get/51820) where the subclause number seems to have changed. Consider whether the reference should be to a specific dated version or to the up-to-date one.

Preferably provide a URL to the specific document.

**Suggested Remedy**

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).

**Proposed Response**  **Response Status:** O

#### Comment ID 63

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

"mapped to 5 successive SC-FEC blocks"

isolated numbers less than 10 in general text should be spelled out.

**Suggested Remedy**

Change "5" to "five".

Implement similar changes, and write numbers greater than 9 in digits, across the document as necessary.

**Proposed Response**  **Response Status:** O

#### Comment ID 64

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

"a frame-synchronous scrambler of sequence 65535"

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.

**Proposed Response**  **Response Status:** O

#### Comment ID 65

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

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).

**Proposed Response**  **Response Status:** O
Comment Type T  Comment Status X
ITU-T G.709.3 seems to be a normative reference.

SuggestedRemedy
Add a reference in 1.3.

Proposed Response  Response Status O

Comment Type T  Comment Status X
"The convolutional interleaver is described in ITU-T G.709.3 subclause 15.4.3"
The text in this subclause and figure 155-7 are insufficient to understand/implement the interleaver function.
If it isn't fully defined (defined only in an external document) then there is no need for this text and figure.

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

Proposed Response  Response Status O

Comment Type T  Comment Status X
"The generic operation of the Hamming SD-FEC scheme is specified in ITU-T G.709.3 Annex D"
The text in this subclause is insufficient to understand/implement the SD-FEC encoder function.
If it isn't fully defined (defined only in an external document) then there is no need for the details in the second paragraph.

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

Proposed Response  Response Status O

Comment Type E  Comment Status X
"will" is deprecated.

SuggestedRemedy
Change "will" to "has".
Change other instances as necessary.
There are multiple state machines (diagrams) in 155.4.

I assume Figure 155–16 is the one.

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

Proposed Response
Response Status O

"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)

Proposed Response
Response Status O

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.

Proposed Response
Response Status O
It is not clear how the "Gray-coded symbol" defined here is used in the remainder of the process - the subsequent DP-16QAM mapping is defined in terms of bits, not symbols.

**SuggestedRemedy**

Consider defining the Gray code mapping as a function from bit-pairs to bit-pairs, instead of the set \{-3, -1, +1, +3\}, or removing it completely since it is embedded in the mapping defined in Table 155-2.

**Proposed Response**

Response Status: O

---

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

**Proposed Response**

Response Status: O
"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 [5]."

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_word instead of tx_symbol and rx_word instead of rx_symbol.

**Proposed Response**

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

**Comment ID**: 85

**CI**: 155  
**SC**: 155.3.3.6  
**P**: 59  
**L**: 22  
**Ran, Adee**  
**Cisco**

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

"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"

"comprising sixteen symbols encoded as shown in Table 155–2 but at a higher resolution than 8 bits"

SD-FEC codewords are by definition 128 bits; and table 155-2 shows mapping of bit tuples into output symbols.

Also, according to the next paragraph, the output of the process is a single stream of samples, not codewords.

This text seems to specify that the input to the decoder should be four streams of samples (combinations of X/Y and I/Q) with more than two bits per sample.

**SuggestedRemedy**

Rewrite to clarify.

**Proposed Response**  
**Response Status**: O

---

**Comment ID**: 86

**CI**: 155  
**SC**: 155.3.3.6  
**P**: 59  
**L**: 40  
**Ran, Adee**  
**Cisco**

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

The hyphen in "-12" should be an en-dash (or minus sign).

**SuggestedRemedy**

Per comment

**Proposed Response**  
**Response Status**: O

---

**Comment ID**: 87

**CI**: 155  
**SC**: 155.4.2  
**P**: 60  
**L**: 22  
**Ran, Adee**  
**Cisco**

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

"comprising sixteen symbols encoded as shown in Table 155–2 but at a higher resolution than 8 bits"

SD-FEC codewords are by definition 128 bits; and table 155-2 shows mapping of bit tuples into output symbols.

Also, according to the next paragraph, the output of the process is a single stream of samples, not codewords.

This text seems to specify that the input to the decoder should be four streams of samples (combinations of X/Y and I/Q) with more than two bits per sample.

**SuggestedRemedy**

Rewrite to clarify.

**Proposed Response**  
**Response Status**: O

---

**Comment ID**: 88

**CI**: 155  
**SC**: 155.4.2  
**P**: 64  
**L**: 1  
**Ran, Adee**  
**Cisco**

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

The state diagram has several blocks in which text of assignment statements wraps to the next line. There is enough room to prevent that.

**SuggestedRemedy**

Resize blocks (changing layout if required) to prevent wrapping lines.

**Proposed Response**  
**Response Status**: O
# IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

## Comment ID 90

**Cl 156 SC 156.1 P 73 L 33 # 90**

Ran, Adee - Cisco

**Comment Type** E

**Comment Status** X

Font size mismatch in "120C"

**Suggested Remedy**

Reduce size to match surrounding text, here and elsewhere if necessary

**Proposed Response**

**Response Status** O

## Comment ID 91

**Cl 156 SC 156.1.1 P 74 L 39 # 91**

Ran, Adee - Cisco

**Comment Type** T

"The bit error ratio (BER) when processed by the 400GBASE-ZR PMA (Clause 155) shall be less than 1.25 \times 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.

**Suggested Remedy**

Consider removing this requirement and defining only the PCS output frame loss ratio.

Otherwise, rewrite to create a well-defined requirement.

**Proposed Response**

**Response Status** O

## Comment ID 92

**Cl 156 SC 156.2 P 75 L 3 # 92**

Ran, Adee - Cisco

**Comment Type** T

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.

**Suggested Remedy**

Rewrite the text without referring to 116.3 (or make it "similar to 116.3 but...")

**Proposed Response**

**Response Status** O
### 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>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>T</td>
<td>X</td>
<td>The values listed are not binary. Also applies in 156.5.2</td>
<td>O</td>
</tr>
<tr>
<td>96</td>
<td>T</td>
<td>X</td>
<td>As described here the PMD sends analog signals (continuous, to be sampled and digitized in the PMA). &quot;Analog streams&quot; 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.</td>
<td>O</td>
</tr>
<tr>
<td>97</td>
<td>T</td>
<td>X</td>
<td>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.</td>
<td>O</td>
</tr>
<tr>
<td>99</td>
<td>T</td>
<td>X</td>
<td>The NOTE about signal detect is out of place since the value is always OK. &quot;sufficient light&quot; and &quot;meeting the BER&quot; are irrelevant for this PMD, since signal detect is not a function of light intensity and the PMD does not detect bits.</td>
<td>O</td>
</tr>
<tr>
<td>Comment ID</td>
<td>Cl</td>
<td>SC</td>
<td>P</td>
<td>L</td>
</tr>
<tr>
<td>------------</td>
<td>-----</td>
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<td>----</td>
<td>----</td>
</tr>
<tr>
<td>100</td>
<td>156</td>
<td>156.5.2</td>
<td>77</td>
<td>35</td>
</tr>
<tr>
<td>Ran, Adee</td>
<td>Cisco</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comment Type</td>
<td>E</td>
<td>Comment Status</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The text in this subclause practically repeats a paragraph in 156.2. Similarly for 156.5.3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Suggested Remedy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply any changes to these two paragraphs in 156.2 to these subclauses too.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Proposed Response</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

| 101        | 156 | 156.6 | 79 | 48 | 101 |
| Ran, Adee  | Cisco |
| Comment Type | E   | Comment Status | X |
| "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). |
| **Suggested Remedy** |   |   |   |   |   |
| Change to "transmitter" and "receiver" here and in other places as appropriate. |
| **Proposed Response** |   |   |   |   |   |
|   |

| 102        | 156 | 156.7.1 | 82 | 23 | 102 |
| Ran, Adee  | Cisco |
| Comment Type | E   | Comment Status | X |
| "+/- 20 ppm" Also in Table 156–7 |
| **Suggested Remedy** |   |   |   |   |   |
| Change to "±20 ppm" (symbol and space) |
| **Proposed Response** |   |   |   |   |   |
|   |

| 103        | 156 | 156.7.1 | 83 | 8  | 103 |
| Ran, Adee  | Cisco |
| Comment Type | T   | Comment Status | X |
| "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. |
| **Suggested Remedy** |   |   |   |   |   |
| Change "Value" to "See 156.9.4" and use em-dash for "Unit" in both rows. |
| **Proposed Response** |   |   |   |   |   |
|   |
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

105

Cl 156 SC 156.7.2 P 83 L 16 # 105
Ran, Adee Cisco

Comment Type T Comment Status X
"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.

Proposed Response Response Status O

Cl 156 SC 156.7.1 P 83 L 20 # 106
Ran, Adee Cisco

Comment Type T Comment Status X
RIN average and RIN peak are not designated as maximum. I assume they should be.

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

Proposed Response Response Status O

Cl 156 SC 156.8 P 85 L 45 # 107
Ran, Adee Cisco

Comment Type E Comment Status X
"+/-" Suggested Remedy
Change to "±" (symbol) across the table

Proposed Response Response Status O

Cl 156 SC 156.9.1 P 86 L 35 # 108
Ran, Adee Cisco

Comment Type T Comment Status X
82.2.11 defines a 100GBASE-R test pattern, which is irrelevant. The 400GBASE-ZR PCS has a test pattern mode specified in 155.2.1.

Suggested Remedy
Change "82.2.11, Clause 155" to "155.2.1".

Proposed Response Response Status O

Cl 156 SC 156.9.1 P 86 L 42 # 109
Ran, Adee Cisco

Comment Type T Comment Status X
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.

Proposed Response Response Status O

Cl 156 SC 156.9.4 P 88 L 1 # 110
Ran, Adee Cisco

Comment Type E Comment Status X
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.

Proposed Response Response Status O
"The laser frequency noise mask is the laser frequency noise measured at a resolution between 10^-1 and 10^-6 times the frequency of interest"

The mask is not the measured noise; it is the specified maximum.

The paragraph is not phrased in typical standard language and can be improved. The text in the suggested remedy may be used (or corrected if it contains any error).

Suggested Remedy
Change the first paragraph from
"The laser frequency noise mask is the laser frequency noise measured at a resolution between 10^-1 and 10^-6 times the frequency of interest. The frequency sweep relative to the laser center frequency shall be from less than 100 Hz to fbaud/2. With the exception of spurs, the measured frequency noise at any frequency shall be below the mask formed by interpolating between the points listed in Table 156–12 and illustrated in Figure 156–5 to"

"The laser frequency noise mask is the maximum allowed laser frequency noise and is formed by interpolating between the points listed in Table 156–12 and illustrated in Figure 156–5. The mask frequencies are relative to the laser center frequency from less than 100 Hz to fbaud/2. Measurement resolution should be between 10^-1 and 10^-6 times the frequency of interest. With the exception of spurs, the measured frequency noise at any frequency shall be below the mask".

Proposed Response
Response Status O

"fbaud" is not defined in this clause.

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

Proposed Response
Response Status O

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).

Proposed Response
Response Status O

The last paragraph defines EVMmax, but the specified value in Table 156-6 is for EVM (max). It does not seem to be the same thing.

Should the specification be for EVMmax (max)?

Suggested Remedy
Move the first paragraph (containing the "shall") after the last one (which defines EVMmax), and hinge the specifications to be EVMmax instead of EVM.

Proposed Response
Response Status O
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>156</td>
<td>156.9.11</td>
<td>E</td>
<td>X</td>
<td>Make it consistent.</td>
</tr>
<tr>
<td>156</td>
<td>156.9.12</td>
<td>T</td>
<td>X</td>
<td>Consider renaming this parameter.</td>
</tr>
<tr>
<td>156</td>
<td>156.9.12</td>
<td>T</td>
<td>X</td>
<td>Change to the ≤ symbol</td>
</tr>
</tbody>
</table>

**Comment ID 116**

Proposed Response

- Make it consistent.

**Comment ID 117**

Proposed Response

- 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.

**Comment ID 118**

Proposed Response

- Change to the ≤ symbol.

**Comment ID 119**

Proposed Response

- Change to the ≤ symbol.
Comment Type T  Comment Status X
"OSNR tolerance is informative and compliance is not required."

Informative text should not appear in normative clauses. 802.3dc did the work of removing "informative specifications" or turning them into recommendations.

This parameter seems to be loosely defined and unmeasurable in a deployed system (pre-FEC BER counters and test patterns are not specified). So maybe it should not even be a recommendation.

Also, the "Receiver OSNR" parameter have names that does not suggest their meaning. If this parameter is retained, the name should be changed, maybe to "Receiver OSNR tolerance without channel impairments"

SuggestedRemedy
Preferably delete this parameter (subclause text and table).

Otherwise change the "informative" paragraph to make it a recommendation, and change the parameter name to be more meaningful.

Proposed Response  Response Status O

Comment Type E  Comment Status X
I don't see any TBDs.

SuggestedRemedy
Delete the editor's note.

Proposed Response  Response Status O

Comment Type E  Comment Status X
The equation label format seems unusual (hyphen instead of en dash, spaces).

Also, the equation labels are not on the same line as the equation.

SuggestedRemedy
Use the standard equation style.

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

**Comment ID**: 125

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

Nicholl, Gary  Cisco Systems

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

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

**Suggested Remedy**

Use non-breaking hyphen throughout the document.

**Proposed Response**  **Response Status**: O

---

**Comment ID**: 126

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

Nicholl, Gary  Cisco Systems

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

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.

**Proposed Response**  **Response Status**: O

---

**Comment ID**: 127

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

Nicholl, Gary  Cisco Systems

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

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.

**Proposed Response**  **Response Status**: O

---

**Comment ID**: 128

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

Nicholl, Gary  Cisco Systems

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

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).

**Proposed Response**  **Response Status**: O

---

**Comment ID**: 129

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

Nicholl, Gary  Cisco Systems

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

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

**Suggested Remedy**

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

**Proposed Response**  **Response Status**: O

---

**Comment ID**: 130

**Cl**: 155  **SC**: 155.1.5  **P**: 33  **L**: 3  **#**: 130

Nicholl, Gary  Cisco Systems

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

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.

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

**SuggestedRemedy**

**Change**

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

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

**Proposed Response**

**Response Status** O

It is not clear to me from reading the descriptions as to how the 400GBASE-ZR base frame (Figure 155.3), 400GBASE-ZR OH frame (Figure 155.4) and the SC-FEC frame (Figure 155-5) are related and aligned?

**Suggested Remedy**

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

**Proposed Response**

**Response Status** O

The format of the text in Figure 155-8 is all over the place. I know in 802.3df we are using a constant font for all text in figures.

**Suggested Remedy**

Update Figure 155-8 to use a constant font for all text.

**Proposed Response**

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

1. The sentence states "Each super-frame is made up of 49 sub-frames ...”. This is unusual terminology as a super-frame (or multi-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".

2. 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.

3. 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).

Suggested Remedy:
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 PMA service interface directly.

4. 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.

Suggested Remedy:
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". 

Proposed Response
Response Status O
Comment Type | TR | Comment Status | X
---|---|---|---

**Comment Type:** TR

**Comment:** Definition of variable "faws_lock<x>". A number of issues here. Firstly the text states that "...receiver has detected the location of the FAW for a given lane on the PMA service interface …". There is no "FAW" on the "PMA service interface" (i.e. the interface above the PMA sublayer) as the FAW is inserted/removed by the PMA sublayer itself. I think what is meant here is the "PMD service interface" and not the "PMA service interface"? Secondly the description states "...where x=0:3". This suggests that there are four separate FAWs being locked to, whereas according to section 155.3.3.3 and Figure 155-10 there is only a single FAW inserted per polarization, so one FAW for X polarization and one FAW for Y polarization.

**Suggested Remedy:**
Correct the reference to the PMD service interface (if the assumption in the comment is correct) and explain why there are 4 "faws_lock<x>" boolean variables when according to section 155.3.3.3 there are only two FAWs (one for X polarization and one for Y polarization).

**Proposed Response**

**Response Status:** O

---

Comment Type | ER | Comment Status | X
---|---|---|---

**Comment Type:** ER

**Comment:** Definition of "faw_valid". The references to "Table 155-3" and section "155.3.3.3.1" are not active cross-references.

**Suggested Remedy:**
Correct cross-references.

**Proposed Response**

**Response Status:** O

---

Comment Type | TR | Comment Status | X
---|---|---|---

**Comment Type:** TR

**Comment:** 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 above the PMA sublayer) and not the PMD 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".

Fix the cross-reference to Table 155-3.

**Proposed Response**

**Response Status:** O

---

Comment Type | TR | Comment Status | X
---|---|---|---

**Comment Type:** TR

**Comment:** In Table 155-8 there are several MDIO control variables associated with "FEC degraded SER" processing, but I can find no description of FEC degraded SER processing in the draft? For 400GBASE-R the FEC degrade SER processing is associated with the RS544 FEC and based on monitoring for RS symbol errors within a given time interval (as described in section 119.2.5.3).

If we want to do something similar for 400GBASE-ZR then the "FEC degrade" monitoring should be based on monitoring a combination of the SD-FEC and SC-FEC.

This appears to be completely missing from the current draft.

**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).

**Proposed Response**

**Response Status:** O
**Comment ID 145**

**Cl 155 SC 155.5.1 P 67 L 37 # 145**

Nicholl, Gary  
Cisco Systems

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

Table 155-9 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.

**Proposed Response**  
**Response Status** O

**Comment ID 146**

**Cl 155 SC 155.5.1 P 67 L 37 # 146**

Nicholl, Gary  
Cisco Systems

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

Table 155-9 has a MDIO variable called "SC-FEC AM lock" which refers to a PCS/PMS variable "amps_locked". However when I look in section 155.4.2 (state variables), "amps_locked" is based on locking onto the alignment marker (AM). But then in Figure 155-2 it appears that the "AM detect" block appears after the "SC-FEC decoding" block, so how can "amps_locked" be used to lock onto the SC-FEC frame? Are the AM frames and the SC-FEC frames aligned, and is the AM used by the SC-FEC decoding block to lock onto the SC-FEC frame?

**Suggested Remedy**
This is simply a question for clarification. Depending on the answer changes may or may not be required in the draft.

**Proposed Response**  
**Response Status** O

**Comment ID 147**

**Cl 155 SC 155.5.1 P 68 L 1 # 147**

Nicholl, Gary  
Cisco Systems

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

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.

**Proposed Response**  
**Response Status** O

**Comment ID 148**

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

Lusted, Kent  
Intel Corporation

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

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

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

**Proposed Response**  
**Response Status** O

**Comment ID 149**

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

Lusted, Kent  
Intel Corporation

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

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.

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

Suggested Remedy

In the second to last paragraph, change:

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

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

In the last paragraph, change:

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

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

Update title of Table 155-1 to:

"GMP stuffing block locations in 400GBASE-ZR frame"

In Table 155-1, change column header from:

"GMP word numbers of stuff locations" to

"GMP word numbers of stuffing block locations"

In Table 155-1, change column header from:

"(row, column) of stuff location starting bits" to

"(row, column) of stuffing block starting location"

Suggested Remedy

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

Suggested Remedy

Fill in assigned amendment number.

Suggested Remedy

Update list order and years as appropriate. Make the same edits to the list of amendments in the introduction starting on page 10.
<table>
<thead>
<tr>
<th>#</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>154</td>
<td>159</td>
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<td></td>
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<tr>
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<td>157</td>
<td>E</td>
<td>X</td>
<td></td>
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<td>159</td>
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<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comment ID 154**

**Comment Type:** ER

**Comment Status:** X

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

**SuggestedRemedy**

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

**Proposed Response**

**Response Status:** O

---

**Comment ID 155**

**Comment Type:** E

**Comment Status:** X

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

**SuggestedRemedy**

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

**Proposed Response**

**Response Status:** O

---

**Comment ID 156**

**Comment Type:** E

**Comment Status:** X

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

**SuggestedRemedy**

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

**Proposed Response**

**Response Status:** O

---

**Comment ID 157**

**Comment Type:** E

**Comment Status:** X

P802.3cz has been designated Amendment 7.

**SuggestedRemedy**

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

**Proposed Response**

**Response Status:** O

---

**Comment ID 158**

**Comment Type:** E

**Comment Status:** X

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

**SuggestedRemedy**

Number based on current designations from the WG Chair.

**Proposed Response**

**Response Status:** O

---

**Comment ID 159**

**Comment Type:** E

**Comment Status:** X

Incorrect subclause number.

**SuggestedRemedy**

Change to 45.2.1.22

**Proposed Response**

**Response Status:** O
<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>160</td>
<td>E</td>
<td>X</td>
<td>Incorrect insert point, subclauses are in decreasing register bit number order.</td>
<td></td>
</tr>
<tr>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>161</td>
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<td>X</td>
<td>The subclause title for this subclause number and the following text is: Tx optical channel index (1.800.5:0)</td>
<td></td>
</tr>
<tr>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SuggestedRemedy**

- Correct title as in 802.3-2022.

<table>
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<th>Type</th>
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<th>Proposed Response</th>
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</thead>
<tbody>
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<td>X</td>
<td>Insert point is after the subclauses of 45.2.1.153.</td>
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<tr>
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</tbody>
</table>

**SuggestedRemedy**

- Insert 45.2.1.153a and 45.2.1.153.1a after 45.2.1.153.1 as follows:

<table>
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<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>163</td>
<td>E</td>
<td>X</td>
<td>Insert 45.2.1.157a and 45.2.1.157.1a after 45.2.1.157.1 as follows:</td>
<td></td>
</tr>
<tr>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Proposed Response**

- 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.

<table>
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<th>Comment Status</th>
<th>Proposed Response</th>
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</tr>
</thead>
<tbody>
<tr>
<td>164</td>
<td>TR</td>
<td></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></td>
</tr>
<tr>
<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SuggestedRemedy**

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

<table>
<thead>
<tr>
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<th>Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
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</thead>
<tbody>
<tr>
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<td>X</td>
<td>The strikethrough text does not appear in the published IEEE Std 802.3-2022 standard.</td>
<td></td>
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<td>Grow, Robert</td>
<td>RMG Consulting</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**SuggestedRemedy**

- Delete Clause 119 from the draft.
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 3 # 166
Abbott, John Corning Incorporated

Comment Type E Comment Status X
IN TABLE 156-12 Everywhere else in the 802.3 standard "1-sided" is spelled out as "one-sided". For example table 93.8, table 110-11, table 136-18, table 137-6, table 83D-6, table 93A-1, section 93A.1.6, table 120D-8.

SuggestedRemedy
Spell out "1-sided" as "one-sided" IN TABLE 156-12

Proposed Response Response Status O

Cl 156 SC 156.9.6 P 89 L 20 # 167
Abbott, John Corning Incorporated

Comment Type E Comment Status X
FIGURE 156-6 Everywhere else in the 802.3 standard "1-sided" is spelled out as "one-sided". For example table 93.8, table 110-11, table 136-18, table 137-6, table 83D-6, table 93A-1, section 93A.1.6, table 120D-8.

SuggestedRemedy
Spell out "1-sided" as "one-sided" in FIGURE 156-6.

Proposed Response Response Status O

Cl 156 SC 156.9.6 P 89 L 3 # 168
Abbott, John Corning Incorporated

Comment Type T Comment Status X
Table 156-12 and figure 156-6. Table 93.8 for example has units of V^2 / Hz and just want to check that the power density here really has units of Hz^2 / Hz. I think this is the first time a one-side spectral power density with these units shows up in 802.3 standard, but this is not my area and I'm just trying to help. Thank you!

SuggestedRemedy
Check that correct units are Hz^2 / Hz and maybe consider explaining the units if indeed this is the first time such units appear in 802.3 standard.

Proposed Response Response Status O

Cl 155 SC 155.1.1 P 32 L 17 # 109
Maguire, Valerie Copperopolis

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

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

Proposed Response Response Status O

Cl 1 SC 1.4.144b P 18 L 9 # 170
D’Ambrosia, John Fuuturewei, US Subsidiary of Huawei

Comment Type TR Comment Status X
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.

SuggestedRemedy
Delete 1.4.144b

Proposed Response Response Status O

Cl 1 SC 1.4.144c P 18 L 12 # 171
D’Ambrosia, John Fuuturewei, US Subsidiary of Huawei

Comment Type TR Comment Status X
The 400GBASE-ZR PHY is not encoded with the 400GBASE-R PCS.

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

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

Table 1:

<table>
<thead>
<tr>
<th>Cl</th>
<th>78</th>
<th>SC 78.1.4</th>
<th>P 26</th>
<th>L 16</th>
<th>#</th>
<th>172</th>
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</table>

Comment Type: TR  Comment Status: X

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

Suggested Remedy:

Change entry in Clause field to:

155, 156

Proposed Response  Response Status: O

Table 2:

<table>
<thead>
<tr>
<th>Cl</th>
<th>116</th>
<th>SC 116.1.3</th>
<th>P 27</th>
<th>L 22</th>
<th>#</th>
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</table>

Comment Type: TR  Comment Status: X

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

Suggested Remedy:

modify description entry of Table 116-2 to:

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

Proposed Response  Response Status: O

Table 3:

<table>
<thead>
<tr>
<th>Cl</th>
<th>116</th>
<th>SC 116.1.4</th>
<th>P 28</th>
<th>L 42</th>
<th>#</th>
<th>174</th>
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</tbody>
</table>

Comment Type: TR  Comment Status: X

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

Suggested Remedy:

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

Proposed Response  Response Status: O

Table 4:

<table>
<thead>
<tr>
<th>Cl</th>
<th>116</th>
<th>SC 116.2.3</th>
<th>P 29</th>
<th>L 1</th>
<th>#</th>
<th>175</th>
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Comment Type: TR  Comment Status: X

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

Suggested Remedy:

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

Proposed Response  Response Status: O

Table 5:

<table>
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<tr>
<th>Cl</th>
<th>116</th>
<th>SC 116.2.4</th>
<th>P 29</th>
<th>L 10</th>
<th>#</th>
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Comment Type: TR  Comment Status: X

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

Suggested Remedy:

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

Proposed Response  Response Status: O

Table 6:

<table>
<thead>
<tr>
<th>Cl</th>
<th>116</th>
<th>SC 116.4</th>
<th>P 29</th>
<th>L 42</th>
<th>#</th>
<th>177</th>
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Comment Type: TR  Comment Status: X

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

Suggested Remedy:

Delete noted text in 802.3cw D2.0 116.4 recommended text will be provided in a follow-up presentation.

Proposed Response  Response Status: O
<table>
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<tr>
<th>Cl</th>
<th>SC</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>116</td>
<td>116.2.5</td>
<td>TR</td>
<td>X</td>
<td>The changes to the base text are incorrect as 400GBASE-ZR is not a member of 400GBASE-R family.</td>
<td>Delete noted text in 802.3cw D2.0 116.2.5 recommended text will be provided in a follow-up presentation.</td>
</tr>
<tr>
<td>116</td>
<td>116.4</td>
<td>TR</td>
<td>X</td>
<td>As noted, 400GBASE-ZR is not a member of 400GBASE-R. It is also noted that per 1.4.215, the bit time is the reciprocal of the bit rate.</td>
<td>Modify beginning of notes a and b to For 400GBASE-R and 400GBASE-ZR</td>
</tr>
<tr>
<td>116</td>
<td>116.5</td>
<td>TR</td>
<td>X</td>
<td>Upon further review it is not clear how Table 116-8 actually ties into 400GBASE-ZR: The skew variation is tied to 400GBASE-R - 3RD column - Unclear that there are PCS lanes in 400GBASE-ZR - Both Fig 1164 and 116-5 are relevant to 400GBASE-ZR and these are not the same service interfaces that are defined for 400GBASE-ZR</td>
<td>Presentation to be provided to address topic. Proposed remedy at this time - 1. Delete Table 116-8 in 802.3cw - not relevant to 400GBASE-ZR 2. Create new skew constraint table 3. A skew points diagram for 400GBASE-ZR is needed.</td>
</tr>
<tr>
<td>155</td>
<td>155.1.2</td>
<td>ER</td>
<td>X</td>
<td>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.</td>
<td>Add 400GBASE-ZR under the box labeled &quot;MEDIUM&quot;. Reference Figure 124-1 for a similar diagram.</td>
</tr>
<tr>
<td>155</td>
<td>155.1.4</td>
<td>E</td>
<td>X</td>
<td>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.</td>
<td>Delete noted sentence.</td>
</tr>
<tr>
<td>116</td>
<td>116.4</td>
<td>TR</td>
<td>X</td>
<td>Note a and b for Table 116-7 only provide respective definitions for 400GBASE-R.</td>
<td>Modify notes to provide definitions for 400GBASE-ZR.</td>
</tr>
</tbody>
</table>
D'Ambrosia, John, Futurewei, US Subsidiary of Huawei

155.1.4.2

**Comment Type: E**

Missing word "The" at beginning of first sentence.

**Suggested Remedy:**

- add "The" at the beginning of the sentence.

**Proposed Response**

Response Status: O

---

155.1.4.2

**Comment Type: ER**

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.

**Proposed Response**

Response Status: O

---

155.1.2

**Comment Type: E**

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: O

---

155.2.4.5.1

**Comment Type: E**

MFAS is not listed in abbreviations

**Suggested Remedy:**

- Add to 1.5

**Proposed Response**

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

Cl 155 SC 155.2.1 P 21 L 22 # 190
D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

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

Proposed Response Response Status O

Cl 155 SC 155.3.3.4.1 P 58 L 39 # 191
D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

Comment Type E Comment Status X
This sentence appears to include unnecessary information -
Note that interleaving of signals by polarization is not allowed since this would add a non-essential level of complexity to the Rx digital processing.

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

Proposed Response Response Status O

Cl 156 SC 156.3.2 P 75 L 44 # 193
D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

Comment Type TR Comment Status X
It is unclear if the skew constraints need to be revisited in light that the part is not part of 400GBASE-R family, but current pointer is to 80-8, which is for 100G

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

Proposed Response Response Status O

Cl 155 SC 155.5.1 P 68 L 30 # 194
D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

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

SuggestedRemedy
Looks like this was intended to be PMA lane alignment status

Proposed Response Response Status O

Cl 116 SC 116.5 P 30 L 9 # 195
D'Ambrosia, John Fuuturewei, US Subsidiary of Huawei

Comment Type TR Comment Status X
400GBASE-ZR has no PCS lanes -

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

Proposed Response Response Status O

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 196

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

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

**Suggested Remedy:**  
Change SR16 to VR4 in the editing instruction

**Proposed Response:**  
Response Status | O

### Comment 197

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

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.

**Suggested Remedy:**  
Change 45.2.1.153.1a to 45.2.1.153a.1

**Proposed Response:**  
Response Status | O

### Comment 198

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

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

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

**Proposed Response:**  
Response Status | O

### Comment 199

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

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.

**Suggested Remedy:**  
Change 45.2.1.157.1a to 45.2.1.157a.1

**Proposed Response:**  
Response Status | O

### Comment 200

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

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

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

**Proposed Response:**  
Response Status | O

### Comment 201

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

The change indicated to be made to the NOTE in 119.2.5.7 has already been made in 8022.

**Suggested Remedy:**  
Remove clause 119 (and all subclauses)

**Proposed Response:**  
Response Status | O
<table>
<thead>
<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR</td>
<td>X</td>
<td>Huber, Thomas</td>
<td>O</td>
</tr>
<tr>
<td>T</td>
<td>X</td>
<td>Huber, Thomas</td>
<td>O</td>
</tr>
<tr>
<td>TR</td>
<td>X</td>
<td>Huber, Thomas</td>
<td>O</td>
</tr>
</tbody>
</table>

**Comment Type** TR  | **Comment Status** X  
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."

**Proposed Response**
Response Status O

---

<table>
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<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR</td>
<td>X</td>
<td>Huber, Thomas</td>
<td>O</td>
</tr>
<tr>
<td>T</td>
<td>X</td>
<td>Huber, Thomas</td>
<td>O</td>
</tr>
</tbody>
</table>

**Comment Type** T  | **Comment Status** X  
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 400GMMII, as specified in the transmit state diagram shown in Figure 119-14. One 400GMMII data transfer is encoded into one 66-bit block. The contents of each block are contained in a vector tx_code<65:0>, which is passed to the 64B/66B to 256B/257B transcoder. tx_code<1:0> contains the sync header and the remainder of the bits contain the block payload. The rate matching described in 119.2.4.1 is not required for the 400GBASE-ZR PCS because the mapping of the transcoded block stream into the 400GBASE-ZR frame structure performs clock compensation between the two clock domains.

**Proposed Response**
Response Status O
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.

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

**Proposed Response**
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.

**Comment Status**: X

**Response Status**: O

---

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

**Suggested Remedy**
Change the nD to subscript.

**Proposed Response**
Change the nD to subscript.

**Comment Status**: X

**Response Status**: O

---

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

**Suggested Remedy**
Change 10970 to 10976 in Figure 155-7.

**Proposed Response**
Change 10970 to 10976 in Figure 155-7.

**Comment Status**: X

**Response Status**: O

---

Figure 155-9 is identical to Figure 155-4. It is also not referenced in the text at all, though it is obvious how it relates to the text. To avoid potential divergence of the figures, it would be better to refer to the earlier figure rather than replicate it.

**Suggested Remedy**
Remove figure 155-9. Add a sentence to the end of clause 155.2.5.7 indicating that the overhead bytes over the four-frame multiframe are shown in Figure 155-4.

**Proposed Response**
Remove figure 155-9. Add a sentence to the end of clause 155.2.5.7 indicating that the overhead bytes over the four-frame multiframe are shown in Figure 155-4.

**Comment Status**: X

**Response Status**: O
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…”

Comment Type E  Comment Status X
Proposed Response Response Status O

Comment Type E  Comment Status X
Proposed Response Response Status O

Comment Type E  Comment Status X
Proposed Response Response Status O

Comment Type TR  Comment Status X
The intended interleaving is that first symbol of each of 16 codewords is transmitted, then the second symbol, etc. The example is not consistent with that - S(1,1) should follow S(0,1) rather than S(0,2) (as seen in figure 155-11).

SuggestedRemedy
Change S0,2 to S1,1

Proposed Response Response Status O

Comment Type T  Comment Status X
There is a horizontal line missing between the second and third sets of symbols in Figure 155-11

SuggestedRemedy
Add the missing line

Proposed Response Response Status O

Comment Type TR  Comment Status X
In the GET_BLOCK state, the variable slip_done should be faw_slip_done

SuggestedRemedy
Change slip_done to faw_slip_done

Proposed Response Response Status O
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 39  # 218
Huber, Thomas  Nokia

Comment Type  T  Comment Status  X
"Binary values 3, 1, -1, -3" doesn't seem to be correct since there are four values listed.

SuggestedRemedy
    Change "binary values" to "symbol values".

Proposed Response  Response Status  O

Cl 156  SC 156.5.2  P 77  L 40  # 219
Huber, Thomas  Nokia

Comment Type  T  Comment Status  X
Table 155-2 is mapping the value of a pair of FEC-encoded bits to the symbol values.

SuggestedRemedy
    Change the last sentence of the paragraph to read "The mapping of FEC bits to symbol
    amplitudes is listed in Table 155-2."

Proposed Response  Response Status  O

Cl 156  SC 156.10.1.2.6  P 95  L 9  # 220
Huber, Thomas  Nokia

Comment Type  E  Comment Status  X
The editor's note about TBDs is no longer relevant

SuggestedRemedy
    Remove the editor's note.

Proposed Response  Response Status  O

Cl 45  SC 45.2.1.153.1a  P 23  L 4  # 221
Law, David  Hewlett Packard Enterprise

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

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

Proposed Response  Response Status  O

Cl 45  SC 45.2.1.153.1a  P 23  L 37  # 222
Law, David  Hewlett Packard Enterprise

Comment Type  E  Comment Status  X
Subclause 45.2.1.153.1a 'Tx index ability 48 through 63 (1.804.0 through 1.804.15)' includes the text 'For 400GBASE-ZR see Table 156–4.' at the end of the subclause.
Similarly, subclause 45.2.1.157a 'Rx optical frequency ability 4 register (Register 1.924)' includes the text 'For 400GBASE-ZR see Table 156–4.' at the end of the subclause. Since
Tx index ability 0 through 47 and Rx index ability 0 through 47 will now also apply to
400GBASE-ZR, as well as 100GBASE-ZR, suggest that similar text be added to the end of
subclauses 45.2.1.151.1 through 45.2.1.157.1.

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

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

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

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

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

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8/17/2022 12:06:28 PM
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 ‘The Payload area of a four-frame multi-frame is divided into 10 220 GMP words of 4 x 257 = 1028 bits.’ and that ‘Each 1028-bit GMP word is either filled with data (the logically serialized 257B encoded stream produced according to 155.2.4.2) ...’. This seems to imply that the 257B blocks are inserted into four 400GBASE-ZR frames, that form a single multi-frame, at a time.

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

Suggested Remedy
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.

---

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.

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

---

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.

Suggested Remedy
Suggest that the text ‘The 400GBASE-ZR PCS payload is mapped ...’ is changed to read ‘The 400GBASE-ZR PCS payload of the serialized stream of 257B blocks is mapped ...’.
<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Subclause</th>
<th>Paragraph</th>
<th>Line</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment</th>
<th>Proposed Response</th>
<th>Response Status</th>
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<tbody>
<tr>
<td>230</td>
<td>155.2.4.5.2</td>
<td>2</td>
<td>39</td>
<td>T</td>
<td>X</td>
<td>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.</td>
<td>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 &quot;0&quot; if the value was OK and &quot;1&quot; if the value was FAIL.&quot;.</td>
<td>O</td>
</tr>
<tr>
<td>231</td>
<td>155.3.2</td>
<td>2</td>
<td>39</td>
<td>T</td>
<td>X</td>
<td>SIGNAL_OK is a parameter that is passed by the PMA:IS_SIGNAL.indication primitive.</td>
<td>Suggest that '&quot;... the SIGNAL_OK primitive has the value FAIL.' should be changed to read '&quot;... the SIGNAL_OK parameter has the value FAIL.'</td>
<td>O</td>
</tr>
<tr>
<td>232</td>
<td>155.3.2</td>
<td>2</td>
<td>49</td>
<td>T</td>
<td>X</td>
<td>Subclause 155.3.2 'Functions within the PMA' says 'The purpose of the PMA is to ... and optionally to provide test signals and loop-back.'</td>
<td>Either add definitions defining test signals and loop back within the PMA or remove this text from subclause 155.3.3.</td>
<td>O</td>
</tr>
<tr>
<td>233</td>
<td>155.3.3</td>
<td>2</td>
<td>51</td>
<td>T</td>
<td>X</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 '&quot;(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>O</td>
</tr>
</tbody>
</table>

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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
The terms 'DP-16QAM symbol' (e.g., page 52, line 32 and line 48), 'Gray-coded signals' (e.g., page 52, line 44) and 'Gray mapped' symbols (e.g., page 54, line 29) seem to be used interchangeably in the subclauses of 155.3.3 'Functions within the PMA'. For example, subclause 155.3.3.2 Symbol interleaving' says 'The DP-16QAM symbols are time interleaved ...' yet the following subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says '... the stream of Gray mapped, interleaved symbols are ...'. It, however, appears the 'symbols' in both cases are the same.

SuggestedRemedy
Suggest that a consistent terminology should be used for DP-16QAM symbols.

Proposed Response

Comment Type ER Comment Status X

The terms '128-bit code word' (e.g., page 52, line 32), 'FEC codeword' (e.g., page 52, line 44), SD-FEC codewords (e.g., page 53, line 36), 'Hamming code words' (e.g., page 52, line 53), and just 'code word' (page 53, line 32) seem to be used interchangeably to describe the 128-bit code word that is passed across the 8 lane PMA service interface to the PMA sublayer as 16 groups of 8

SuggestedRemedy
Suggest that the term 'SD-FEC codeword' be used consistently in subclause 155.3.3 to describe the 128-bit code word passed across the PMA service interface.

Proposed Response

Comment Type T Comment Status X

On page 52, line 54, the symbol number is in normal font whereas it is in subscript font in the remainder of subclause 155.3.3.2.

SuggestedRemedy
Suggest that, based on page 52, line 54, the symbol number should be in normal rather than subscript font in the rest of the subclause to make it clear the two numbers following 'S' separated by a comma are the code word number followed by the symbol number in the code word. Alternatively, perhaps it should be stated that two numbers following 'S' separated by a comma are the code word number followed by the symbol number in the code word.

Proposed Response
Comment Type: TR  Comment Status: X

According to 155.3.3.1 Gray mapping and polarization distribution the 'S' code word is an array of DP-16QAM symbols (page 52, line 35). As a result, aren't 'Symbols from eight code words [S0, ..., S7] ...' (page 52, line 54) a total of 128 DP-16QAM symbols? This seems to be confirmed by Figure 155-11 'Eight-way Hamming code interleaver' which shows symbols S0,0 through S7,15 which is 128 symbols.

Suggested Remedy
Suggest the text 'When the 64-symbol buffer is full ...' be changed to read 'When the 128-symbol buffer is full ...'.

Comment Type: TR  Comment Status: X

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.

Suggested Remedy
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.

Comment Type: T  Comment Status: X

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.

Suggested Remedy
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.'.

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

Comment ID 245
Cl 155 SC 155.3.3.3 P 55 L 10 # 245
Law, David Hewlett Packard Enterprise

Comment Type TR Comment Status X

The third paragraph of subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says that 'The next 48 sub-frames of the super-frame have an 11-symbol TS (ts<0:10>), 116 PS symbols [P0, ...,P115], and 3586 payload symbols.' which seems to imply that sub-frames 1 through 48 are all the same formats. Figure 155-12, however, shows 31 symbols after P0 for sub-frame 1, yet 42 symbols after P0 for sub-frame 48. Similarly, Figure 155-12 shows 31 symbols after P1 for sub-frame 1, yet 32 symbols after P1 for sub-frame 48. And if sub-frame 1 and sub-frame 48 are different formats, what are the formats for sub-frames 2 through 47.

The 31 symbols after P0 shown for sub-frame 1 in Figure 155-12 are ts<0:10>, but P0 overlaps ts<0>, so this is 10 bits, followed by m<3488:3508> which is 21 bits resulting in a total of 31 bits. The 42 symbols after P0 shown for sub-frame 48 in Figure 155-12 are ts<0:10>, but P0 overlaps ts<0>, so this is 10 bits, followed by m<172 030:172 061> which is 32 bits, resulting in a total of 42 bits. The 31 symbols after P1 shown for sub-frame 1 in Figure 155-12 are m<3509:3539>, the 32 symbols after P1 shown for sub-frame 48 in Figure 155-12 are m<172 062:172 093>.

SuggestedRemedy
If sub-frames 1 through 48 are not the same format, specify which sub-frames are in what format. If they are in the same format, correct the figure to show the correct number of bits.

Proposed Response Response Status O

Comment ID 246
Cl 155 SC 155.2.4.5.2 P 40 L 9 # 246
Law, David Hewlett Packard Enterprise

Comment Type E Comment Status X

Suggest that '... connected to a MAC-RS ...' should be changed to read '... connected directly to a MAC-RS ...'.

SuggestedRemedy
See comment.

Proposed Response Response Status O

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

Comment Type T Comment Status X

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

SuggestedRemedy
Specify the 10-bit interleaver.

Proposed Response Response Status O

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

Comment Type T Comment Status X

Subclause 155.2.4.6 'CRC32 and multi-block alignment signal (MBAS) insertion' says that 'Each SC-FEC block has 119 x 10 280 / 5 bits = 244 664 bits.', but isn't an input SC-FEC block 244 736 bits, formed of 244 664 information bits, 32 CRC bits, 6 MBAS bits, and 34 bits of padding (see figure 155-5). In addition, based on figure 155-5 and subclause 155.2.4.7, subclause 155.2.4.6 describes the input SC-FEC block.

SuggestedRemedy
Suggest that:

[1] The first paragraph of subclause 155.2.4.6 should be changed to read 'The stream of 400GBASE-ZR frames, illustrated in Figure 155–3, provide the information bits for the calculation of SC-FEC input blocks. To conform with the format of the input SC-FEC block, 119 rows from the stream of 400GBASE-ZR frames are mapped to the information bits in 5 successive SC-FEC input blocks. Each SC-FEC input block has 119 x 10 280 / 5 bits = 244 664 information bits.'.

[2] The text '... cyclic redundancy code is calculated over 244 664 input bits as ...' in the second paragraph of subclause 155.2.4.6 should be changed to read '... cyclic redundancy code is calculated over the 244 664 information bits as ...'.

[3] The term 'SC-FEC block' be changed to read 'SC-FEC input block' in subclause 155.2.4.6.

Proposed Response Response Status O

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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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: X

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.

Suggested Remedy:
Suggest that:

[1] The text '... the CRC value are placed with...' in the second paragraph of subclause 155.2.4.6 should be changed to read '... the CRC value are placed immediately after the information bits in the SC-FEC input block with...'.

[2] The first sentence of the last paragraph of subclause 155.2.4.6 should be moved to the end of the paragraph and changed to read 'The 6 bits of the MBAS field are placed immediately after the CRC with the most significant bit as the left-most bit of the MBAS field and the least significant bit as the right-most bit of the MBAS field. The bits of the MBAS are transmitted in the order of most significant bit first, least significant bit last.'.

[3] The two instances of 'MBAS overhead' should be changed to read 'MBAS field'.

Proposed Response  Response Status: O

Law, David Hewlett Packard Enterprise

Comment Type: E  Comment Status: X

IEEE Std 802.3 doesn't specify implementations.

Suggested Remedy:
Suggest that '... staircase FEC implementation uses...' should read '... staircase FEC uses...'.

Proposed Response  Response Status: O

Law, David Hewlett Packard Enterprise

Comment Type: T  Comment Status: X

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'.

Suggested Remedy:
Subclause 155.2.4.7 '400GBASE-ZR frame to SC-FEC adaptation' says '... which are added to the 400GBASE-ZR SC-FEC frame as...'. This seems to be the only time the term '400GBASE-ZR SC-FEC frame' is used and the title of the referenced figure 155-6 is '400GBASE-ZR SC-FEC encoded frames'.

Proposed Response  Response Status: O

Law, David Hewlett Packard Enterprise

Comment Type: T  Comment Status: X

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.

Suggested Remedy:
Add a new paragraph to subclause 155.4.7 to specify the mapping of the 16384 parity bits into bits 10280 to 10970 of the 400GBASE-ZR SC-FEC encoded frames.

Proposed Response  Response Status: O
Both instances of block 7.11 in figure 155-6 are marked with an asterisk which, I assume, is meant to reference a footnote that says that only the information bits of block 7.11 are included, that the CRC32 and MBAS bits are appended after the parity bits, and the pad is discarded.

**SuggestedRemedy**

Add a new paragraph to subclause 155.4.7 to specify the mapping of the CRC32 and MBAS bits from block 7.11 and add a suitable footnote to figure 155-6.

**Proposed Response**

**Response Status O**

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Suggest that ‘... SC-encoder ...’ should read ‘... SC-FEC encoder ...’.

**SuggestedRemedy**

See comment.

**Proposed Response**

**Response Status O**

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IEEE Std 802.3 doesn't specify implementations.

**SuggestedRemedy**

Suggest that:

1. The text ‘... results in 10 796 128-bit blocks.’ be changed to read ‘... results in 10 796 128-bit SD-FEC codewords.’.

2. The text ‘... is encoded to the 128-bit code word ...’ be changed to read ‘... is encoded to the 128-bit SD-FEC codeword ...’.

3. The text ‘The 128-bit code words are ...’ should be changed to read ‘The 128-bit SD-FEC codewords are ...’.

**Proposed Response**

**Response Status O**
<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Category</th>
<th>Comment Status</th>
<th>Comment</th>
<th>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>259</td>
<td>T</td>
<td>X</td>
<td>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.</td>
<td>Suggested Remedy: 1. Suggest that the PMA service interface be added to Figure 155-8. To do this suggest that the label 'PMA:IS_UNITDATA_0.request' be added to the leftmost arrow at the bottom of the figure, with the label 'PMA:IS_UNITDATA_1.request' and 'PMA:IS_UNITDATA_2.request' staggered above on the next two arrows to the right. The label 'PMA:IS_UNITDATA_7.request' should be added to the rightmost arrow. As an existing example, see Figure 119-10 '200GBASE-R Transmit bit ordering and distribution'. 2. Suggest that the last paragraph of subclause 155.2.4.11 be changed to read 'The 128-bit code word is then passed across the 8 lane PMA service interface to the PMA sublayer as 16 groups of 8 bits, each representing a DP-16QAM symbol. The first group of 8 bits are c0 through c7, the last group of 8 bits are c128 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 should be changed to read 'Each 128-bit code word from the SD-FEC encoder is passed across the PMA service interface as described in 155.2.4.11. Each 128-bit code word c = [c0, c1, ..., c127], is mapped ...'.</td>
<td>O</td>
</tr>
<tr>
<td>260</td>
<td>E</td>
<td>X</td>
<td>The vast majority of references to the in-phase and quadrature-phase X and Y polarization use the symbols I&lt;subscript&gt;X&lt;/subscript&gt;, Q&lt;subscript&gt;X&lt;/subscript&gt;, I&lt;subscript&gt;Y&lt;/subscript&gt;, and Q&lt;subscript&gt;Y&lt;/subscript&gt; (e.g., Figure 155-10 on page 51, line 26 and subclause 155.3.3, page 52, line 9). There, however, seem to be a few instances where the X and Y are not in subscript, or the phase and polarization symbols are reversed.</td>
<td>Suggested Remedy: On the assumption that they are referencing the same signals, please use I&lt;subscript&gt;X&lt;/subscript&gt;, Q&lt;subscript&gt;X&lt;/subscript&gt;, I&lt;subscript&gt;Y&lt;/subscript&gt;, and Q&lt;subscript&gt;Y&lt;/subscript&gt; in the following locations: Subclause 155.2.5.1, page 46, line 12 Table 155-3, page 55, line 38 Table 155-4, page 56, line 35 Table 155-7, page 59, line 5 through 16</td>
<td>O</td>
</tr>
<tr>
<td>261</td>
<td>E</td>
<td>X</td>
<td>Suggest a direct reference to the Alignment marker lock state diagram is provided in subclause 155.2.5.7.</td>
<td>Suggested Remedy: Suggest that the first sentence of the penultimate paragraph of subclause 155.2.5.7 be changed to read 'The process of locking to the AM field is described in the Alignment marker lock state diagram in Figure 155-16'.</td>
<td>O</td>
</tr>
<tr>
<td>Comment Type</td>
<td>Comment Status</td>
<td>Comment ID</td>
<td>Law, David</td>
<td>Hewlett Packard Enterprise</td>
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<tr>
<td>E</td>
<td>X</td>
<td>262</td>
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</tbody>
</table>

**Proposed Response**

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).’.

**Comment Status**

**Response Status**

**Suggested Remedy**

See comment.

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<table>
<thead>
<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment ID</th>
<th>Law, David</th>
<th>Hewlett Packard Enterprise</th>
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</thead>
<tbody>
<tr>
<td>TR</td>
<td>X</td>
<td>263</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Proposed Response**

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 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 PMA service interface be defined using a single .request and .indicate primitive, with a tx_symbol and rx_symbol parameter respectively, to reflect the synchronous data path nature of the interface.

**Suggested Remedy**

Specify the 400GBASE-ZR PMA as a single .request and .indicate primitive, with a tx_symbol and rx_symbol parameter respectively as follows:

- Change the three instances of ‘PMA:IS_UNITDATA_i.request’ to read ‘PMA_UNITDATA.request’ in subclause 155.2.1 ‘Functions within the PCS’.

- Change subclause 155.1.4.2 ‘Physical Medium Attachment (PMA) service interface’ to read as follows:

The 400GBASE-ZR PMA service interface provided by the 400GBASE-ZR PMA for the 400GBASE-ZR PCS is described in an abstract manner and does not imply any particular implementation. The 400GBASE-ZR PMA Service Interface supports the exchange of
encoded DP-16QAM symbols between the PCS and PMA sublayer. The 400BASE-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 400BASE-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 '400BASE-ZR PMA service interface', adding new subclauses 155.3.2.1 through 155.3.2.2.3, to read:

  155.3.2 400BASE-ZR PMA service interface

  The 400BASE-ZR PMA Service Interface supports the exchange of encoded DP-16QAM symbols between the PCS and PMA sublayer. The inter-sublayer 400BASE-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 400BASE-ZR PCS to the 400BASE-ZR PMA. The PMA_UNITDATA.indication primitive is used to define the transfer of a DP-16QAM symbol from the 400BASE-ZR PMA to the 400BASE-ZR PCS. The PMA_SIGNAL.indication primitive is used to define the transfer of signal status from the 400BASE-ZR PMA to the 400BASE-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 400BASE-ZR PCS to the 400BASE-ZR PMA. The PMA_UNITDATA.indication primitive is used to define the transfer of a DP-16QAM symbol from the 400BASE-ZR PMA to the 400BASE-ZR PCS. The PMA_SIGNAL.indication primitive is used to define the transfer of signal status from the 400BASE-ZR PMA to the 400BASE-ZR PCS.

  155.3.2.2 PMA_UNITDATA.indication

  This primitive defines the transfer of encoded DP-16QAM symbols in the rx_symbol parameter from the 400BASE-ZR PMA to the 400BASE-ZR PCS.

  155.3.2.3 PMA_SIGNAL.indication

  This primitive defines the transfer of the status of the PMA receive process in the SIGNAL_OK parameter from 400BASE-ZR PMA to the 400BASE-ZR PCS.

155.3.2.1.2 When generated

  The PCS generates sixteen PMA_UNITDATA.request messages for each 128-bit code word from the PCS SD-FEC encoder. The messages convey the least significant octet C<7:0> first, most significant octet C<127:120> last, with code word bits C<n+7:n> mapped to tx_symbol<7:0>. The nominal rate of PMA_UNITDATA.indication messages is 57.78 Gbd.

155.3.2.1.3 Effect of receipt

  The PMA continuously forms the tx_symbol parameters received in sixteen consecutive PMA_UNITDATA.indication messages into 128-bit code words that are passed to the PMA Gray mapping and polarization distribution function (see 155.3.3.1).

155.3.2.2.2 PMA_UNITDATA.indication

  This primitive defines the transfer of encoded DP-16QAM symbols in the rx_symbol parameter from the 400BASE-ZR PMA to the 400BASE-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 400BASE-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 PMA continuously forms the rx_symbol parameters received in sixteen consecutive PMA_UNITDATA.indication messages into n-bit code words that are passed to the PCS Hamming SD-FEC decoder function (see 155.2.5.1).

155.3.2.3 PMA_SIGNAL.indication

  This primitive defines the transfer of the status of the PMA receive process in the SIGNAL_OK parameter from 400BASE-ZR PMA to the 400BASE-ZR PCS.

155.3.2.3.2 When generated
The PMA generates a PMA_SIGNAL.indication message whenever there is change in the
value of the SIGNAL_OK parameter (see 155.3.3.9).

155.3.2.2.3 Effect of receipt

The PCS Synchronization process monitors the PMA_SIGNAL.indication primitive for a
change in the SIGNAL_OK parameter (see 155.2.1).

- Move the last paragraph of the current subclause to a new subclause 155.3.3.9 titled
'Signal Indication Logic (SIL)'.

- Change the last paragraph of subclause 155.3.3.8 'Polarization combining and symbol de-
interleaving' to read:

The sixteen encoded DP-16QAM symbols are transferred to the 400GBASE-ZR PCS
sublayer as m-bit DP-16QAM symbols using sixteen PMA_UNITDATA.indication
messages.

- Change ‘PMA:IS_UNITDATA_0.request to PMA:IS_UNITDATA_7.request’ to read
‘PMA_UNITDATA.request’ and ‘PMA:IS_UNITDATA_0.indication to
PMA:IS_UNITDATA_m-1.indication’ to read ‘ PMA_UNITDATA.indication’ in Figure 155–2
‘Functional block diagram’.

- Change ‘PMA:IS_UNITDATA_0.request to PMA:IS_UNITDATA_7.request’ to read
‘PMA_UNITDATA.request’ and ‘PMA:IS_UNITDATA_0.indication to
PMA:IS_UNITDATA_m-1.indication’ to read ‘ PMA_UNITDATA.indication’ in Figure 155–10
‘400GBASE-ZR PMA functional block diagram’.

Proposed Response
Response Status O
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 superframe format of Figure 155–12, the FAW, TS, and PS symbols are removed ...'. As a result, it seems the X and Y polarizations identification is performed by the FAW lock function, and pilot removal occurs after the FAW lock function.

SuggestedRemedy

[1] Suggest that the labels 'IX', 'QX', 'IY' and 'QY' be removed from below the 'ADC' block in Figure 155-10.

[2] Suggest that the Pilot removal (X) Pilot removal (Y) block be removed from Figure 155-10.

[3] Suggest that the label 'Align CFEC and FAW/TS symbols (X) remove' be changed to read:

FAW alignment
Remove FAW, PS, TS symbols

[4] Suggest that the label 'Align CFEC and FAW/TS symbols (Y) remove' be changed to read:

FAW alignment
Remove FAW, PS, TS symbols

Proposed Response: Remove FAW, PS, TS symbols
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 PMD-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 the PMD:IS_SIGNAL.indication parameter of the PMD:IS_SIGNAL.indication to a fixed 'OK value', it doesn't seem correct to say that the SIL will report signal health based on the PMD:IS_SIGNAL.indication primitive since it is fixed.

SuggestedRemedy

Suggest that:

[1] The PMD:IS_SIGNAL.indication primitive is disconnected from the SIL box in figure 155-10 and is shown as not used by the PMA sublayer.

[2] In subclause 155.3.2 the text ‘... reports signal health based on receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer, data being processed successfully by the signal ...’ be changed to read ‘... reports signal health based on data being processed successfully by the signal ...’.

[3] In subclause 156.5.4 the text ‘The presence of a valid signal is determined only by the 400GBASE-ZR PCS (see 155.2.1).’ should be changed to read ‘The presence of a valid signal is determined only by the SIL function in the PMA (see 155.3.2).’.

Proposed Response

Response Status O
Comment 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  272
Law, David Hewlett Packard Enterprise

Cl  155 SC  155.3.3.3.3 P  57 L  8 #  272

Comment Type  T  Comment Status  X

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 ...'.

Proposed Response  Response Status  O

Comment ID  273
Law, David Hewlett Packard Enterprise

Comment Type  TR  Comment Status  X

There is no specification of how the PRBS10 sequence is mapped to 16QAM symbols. From review of Table 155-6 it appears that the generator in Figure 155-13 is used to produce 232 bits. The even bits are mapped to the in-phase component of the 16QAM symbol, odd bits mapped to the quadrature-phase component of the 16QAM symbol, with a 0 mapped to a '-3' and a 1 mapped to a '3'.

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, \([P0, ...,P_{115}]\) 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,

\([P0, ...,P_{115}]\)

where for \(i = 0\) to \(115\),

- PSBR\([2i]\) maps to the in-phase (I) component of the 16QAM symbol \([P_i]\) for the respective polarization
- PSBR\([2i+1]\) maps to the quadrature-phase (Q) component of the 16QAM symbol \([P_i]\) for the respective polarization

and where,

- 0 maps to -3 for the respective 16QAM symbol component
- 1 maps to +3 for the respective 16QAM symbol component

The generator polynomial and seed values are listed in Table 155–6 and the complete PS sequence is shown in Table 155-6.

Proposed Response  Response Status  O
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</tbody>
</table>

**Law, David**  
Hewlett Packard Enterprise

### Comment Type: E  
**Comment Status:** X

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

**SuggestedRemedy**  
Suggest the text '... the complete PS sequence is ...' be changed to read '... the complete PS is ...'.

**Proposed Response**  
**Response Status:** O

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

**SuggestedRemedy**  
See comment.

**Proposed Response**  
**Response Status:** O

---

#### There appear to be two separate tables number 155-6, the first labelled 'Table 155-5-PS generator polynomial and seed values', the second labelled 'Table 155-6-PS'.

**SuggestedRemedy**  
[1] Suggest that the second Table 155-6 'PS' be renumbered to be 155-7, with subsequent tables renumbered, and its title should be 'Pilot sequence'.  
[2] Suggest that the title of the second Table 155-6 should be changed from 'PS' to read 'Pilot sequence'.

**Proposed Response**  
**Response Status:** O

---

The title of clause 155.3.3.4 is "16QAM encode and signal drivers' however I don't think IEEE P802.3cw specifies a physical instantiation of the PMD service interface, and I don't see any text related to signal drivers in subclause 155.3.3.4. Perhaps it would be better to reference the DAC (see Figure 155-10) to parallel the title of subclause 155.3.3.5 below.

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

---

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

**SuggestedRemedy**  
See comment.

**Proposed Response**  
**Response Status:** O

---

Subclause 155.3.3.6 'Receive signal processing' says 'Implementations are required to have a frame loss ratio (see 1.4.275) of less than 1.7 x 10-12 for 64-octet frames with minimum interpacket gap when additionally processed according to this clause.' It's not clear what the additionally processed is in reference to as there is no other processing referenced.

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

**Proposed Response**  
**Response Status:** O

---

Subclause 155.3.3.6 'Receive signal processing' says 'Implementations are required to have a frame loss ratio (see 1.4.275) of less than 1.7 x 10-12 for 64-octet frames with minimum interpacket gap when additionally processed according to this clause.' It's not clear what the additionally processed is in reference to as there is no other processing referenced.

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

**Proposed Response**  
**Response Status:** O
Comment Type: T  Comment Status: X

Comment:

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 ...'.

Proposed Response

Response Status: O

Comment Type: T  Comment Status: X

Comment:
The description of the 'pma_enable_deskew' variable says 'A boolean variable that enables and disables the PMA deskew process...'. Is this correct as 'pma_enable_deskew' is an output of the Figure 155 15 'PMA deskew state diagram' that doesn't appear to be used anywhere else.

Suggested Remedy:

Suggest the description of the 'pma_enable_deskew' variable should be changed to read 'A boolean variable that set to true when deskew is enabled and set to false when deskew is disabled. Received symbols may be discarded whenever deskew is enabled.'.

Proposed Response

Response Status: O

Comment Type: E  Comment Status: X

Comment:

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'.

Proposed Response

Response Status: O

Comment Type: T  Comment Status: X

Comment:
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 PES 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 PES 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.'.
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.

**Proposed Response**

**Response Status**: O

---

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.

**Proposed Response**

**Response Status**: O
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.

Suggested Remedy

[1] Rename all instances of the 'restart_lock' variable used in Figure 155-14 'Frame alignment word (FAW) lock state diagram' to be 'pma_restart_lock'.

[2] Rename all instances of the 'restart_lock' variable used in Figure 155-16 'Alignment marker lock state diagram' to be 'pcs_restart_lock'.

[3] Rename 'restart_lock' variable in subclause 155.4.2.1 'Variables' to be 'pma_restart_lock'.

[4] Add a definition of the 'pcs_restart_lock' variable to subclause 155.4.2.1 'Variables'.

Proposed Response

Response Status O
Cl 155 SC 155.4.2.1 P 61 L 11 # 288

Law, David Hewlett Packard Enterprise

Comment Type TR Comment Status X

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.

Proposed Response Response Status O

Cl 155 SC 155.4.2.1 P 61 L 18 # 289

Law, David Hewlett Packard Enterprise

Comment Type T Comment Status X

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 'Frame alignment word (FAW) sequence', suggest that the four instances of '... FAW payload ...' (page 61, lines 16, 18, 20 and 23) be changed to read '... FAW sequence ...'.

Proposed Response Response Status O

---

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<xx> 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 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 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 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 PMA 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 PDM, 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.'

---

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

**Suggested Remedy**

[1] Change the description of the first_pmal variable to read as follows (note my other comment to change the coherent signal labels in Table 155-7 would impact this item if accepted):

A variable that holds the PMA lane identifier corresponding to the first FAW sequence that is recognized on a given lane of the PMD service interface. It is compared to the PMA lane identifier corresponding to the next FAW payload that is tested. The PMA lane identifier is the value for the given lane in the row of Table 155-7 that defines the PMD service interface lane mapping used to find the match for the current FAW sequence as described in the faw_valid variable.

Values:
- **Ix**: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is XI.
- **Qx**: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is XQ.
- **Iy**: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is YI.
- **Qy**: Value for given lane from mapping used in Table 155-7 to find the current FAW sequence is YQ.

[2] Change the description of the current_pmal variable to read as follows:

A variable that holds the PMA lane identifier corresponding to the current FAW sequence that is recognized on a given lane of the PMD service interface. It is compared to the variable first_pmal to confirm that the location of the FAW sequence has been detected. The PMA lane identifier is the value for the given lane in the row of Table 155-7 that defines the PMD service interface lane mapping used to find the match for the current FAW sequence as described in the faw_valid variable.

Values:
- See first_pmal.

[3] Change the description of the pma_lane variable to read as follows:

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 ...’.
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.

**Suggested Remedy**

[1] Change the text 'If current_pmal and first_pmal both found a match and indicate the same PMA lane number, faw_match is set to true' in the description of the FAW_COMPARE function to read 'If current_pmal and first_pmal indicate the same PMA lane number, faw_match is set to true'.

[2] Change the condition on the transition from the 'COUNT_2' state to the 'COMP' state in Figure 155-14 'Frame alignment word (FAW) lock state diagram' to read 'faw_counter_done * faw_valid'.

[3] Add a transition from the 'COUNT_2' state to the 'INVALID_FAW' state in Figure 155-14 'Frame alignment word (FAW) lock state diagram' that reads 'faw_counter_done * !faw_valid'.

**Proposed Response**

**Response Status** O

---

Subclause 155.4.2.4 'Counts' defines the 'cw_bad_count' counter, however this counter is not reference anywhere else in the draft.

**Suggested Remedy**

Delete the 'cw_bad_count' counter definition.

**Proposed Response**

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

Law, David
Hewlett Packard Enterprise

Comment Type: TR  Comment Status: X

Based on the description of the 'faw_valid' variable, and slide 4 of the contribution 'faw_valid analysis' from Mike SliySKI
<https://www.ieee802.org/3/cw/public/22_0523/sliyski_3cw_01a_220523.pdf#page=4>
reversing 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
to in to one if the first_pmal and current_pmal variables hold the mapping number found in
table 155-7 to achieve faw_valid rather than the lane number. The PMA deskew state
diagram can then be removed.

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 deskew process as shown in Figure 155–14.

[9] Delete the second paragraph of subclause 155.4.2.4.

[10] Add the assignment 'pma_align_status <= FALSE' to the 'LOCK_INIT' state of Figure
155–14.

[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.

Proposed Response: O  Response Status: O

Comment Type: T  Comment Status: X

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'.

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

Law, David  
Hewlett Packard Enterprise

Comment Type  TR  Comment Status  X

There is no definition of the 'prev_pmal' variable used in the 'INVALID_FAW' state of figure 155-14 "Frame alignment word (FAW) lock state diagram", and there is no use or reference to the 'prev_pmal' variable elsewhere in the IEEE P802.3cw draft.

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

Proposed Response  Response Status  O

Comment Type  T  Comment Status  X

The description of the 'first_pmal' variable says it '... the PMA lane number that corresponds to the first FAW payload ...' however, it is updated by the assignment 'first_pmal <= current_pmal' every cycle through the '2_GOOD' and 'GOOD_FAW' states. With that said, the assignment 'first_pmal <= current_pmal' in the '2_GOOD' and 'GOOD_FAW' states appear to be redundant since the only way to enter these states is if 'faw_match' is TRUE and for 'faw_match' to be TRUE the first_pmal and current_pmal variables have to be equal (see FAW_COMPARE function, page 62, line 28).

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

Proposed Response  Response Status  O

Comment Type  E  Comment Status  X

Complete the line under '2_GOOD'.

SuggestedRemedy
See comment.

Proposed Response  Response Status  O
Comment Type | E  | Comment Status | X  
---|---|---|---
The variable 'PMA_lane_mapping' in the 2_GOOD state of the Frame alignment word (FAW) lock state diagram should read 'pma_lane_mapping' based on the definition in subclause 155.4.2.1 (page 61, line 34).

**SuggestedRemedy**
Change the text 'PMA_lane_mapping<x> <= current_pmal' in the 2_GOOD state in Figure 155-14 to read 'pma_lane_mapping<x> <= current_pmal'.

**Proposed Response**

---

Comment Type | E  | Comment Status | X  
---|---|---|---
Since the title of Figure 155-15 is 'PMA deskew state diagram' suggest that PMA should be added to the title of Figure 155-14 and PCS to the title of Figure 155-16.

**SuggestedRemedy**
Suggest that:

1. The title of Figure 155-14 should be changed to read 'PMA Frame alignment word (FAW) lock state diagram'.
2. The title of Figure 155-16 should be changed to read 'PCS Alignment marker lock state diagram'.

**Proposed Response**

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Comment Type | E  | Comment Status | X  
---|---|---|---
There are two instances of amps_lock and one of amps_lock<x> in figure 155-16 Alignment marker lock state diagram. Since subclause 155.2.4.3 ‘GMP mapper’ says ‘... 400GBASE-ZR frames are not mapped to 16 PCS lanes ...’, and since subclause 155.4.2.1 ‘Variables’ defines amps_lock without an index, it seems that ‘amps_lock<x>’ should read ‘amps_lock’.

**SuggestedRemedy**
Change 'amps_lock<x> <= FALSE' in the LOCK_INIT state to read 'amps_lock <= FALSE'.

**Proposed Response**
### Proposed Response

**Law, David**  
Hewlett Packard Enterprise

**Comment ID**: 308

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

The 'restart_lock' variable is set to TRUE on entry to the '5_BAD' state. This will cause the state diagram to transition to the 'LOCK_INIT' state because 'restart_lock' is one of the OR conditions in the 'open arrow' entry to that state. The actions in the 'LOCK_INIT' state will be executed, but since 'restart_lock' remains set to TRUE, and 'open arrow' transitions are evaluated continuously whenever any state is evaluating its exit conditions (see 21.5.3), on exit the state diagram will loop back to the 'LOCK_INIT' state. The state diagram will then be locked in this loop permanently.

**SuggestedRemedy**

Suggest that either the action 'restart_lock <= FALSE' be added to the 'LOCK_INIT' state or the 'restart_lock' be deleted and a 'UCT' be added from the '5_BAD' state to the 'LOCK_INIT' state.

**Proposed Response**

**Response Status**: O

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

Complete the line under '2_GOOD'.

**SuggestedRemedy**

See comment.

**Proposed Response**

**Response Status**: O

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

Strictly speaking, protocol agnostic management 'objects' are defined in Clause 30, with protocol specific 'objects' defined in IEEE Std 802.3.1 and IEEE Std 802.3.2.

**SuggestedRemedy**

Since the title of subclause 45.2 in IEEE Std 802.3-2022 is 'MDIO Interface registers', suggest that the text 'The following objects apply ...' in subclause 155.5 ne changed to read 'The following registers apply ...'.

**Proposed Response**

**Response Status**: O
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 (faws_lock<3:0>). Similarly, register bit 3.50:12 is the PCS alignment status, yet it is mapped to the PMA alignment status variable (pma_align_status).

If there was a 400GBASE-ZR framing issue on a link where the PMA framing was operating correctly, the faws_lock<3:0> bits and the pma_align_status would all be true based on the respective frame alignment word (FAW) lock state diagrams, while the PCS would not be aligned based on the alignment marker lock status 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.

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.

Proposed Response

Subclause '156.1.1 Bit error ratio' says '... for 64-octet frames with minimum interpacket gap when additionally processed by the CFEC (Clause 155).'. The text '.. the CFEC (Clause 155) seems to imply a function but isn't CFEC '.. a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer Hamming code SD-FEC' to quote subclause 155.2.1.

Suggested Remedy

Suggest that the text '.. for 64-octet frames with minimum interpacket gap when additionally processed by the CFEC (Clause 155) should be changed to read '.. for 64-octet frames with a minimum interpacket gap after CFEC error correction (see 155.2.1)'.
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Law, David  
Hewlett Packard Enterprise

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

Suggested Remedy
See comment.

Proposed Response  Response Status  O

Law, David  
Hewlett Packard Enterprise

Comment Type  E  Comment Status  X
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.’.

Suggested Remedy
See comment.

Proposed Response  Response Status  O

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Law, David  
Hewlett Packard Enterprise

Comment Type  T  Comment Status  X
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 ...’.

Suggested Remedy
[1] Suggest that in subclause 156.2 (page 75, line 14) the text ‘... X and Y polarizations with binary values of 3, 1, -1, and -3 using the ...’ should be changed to read ‘... X and Y polarizations with the values of 3, 1, -1, and -3 using the ...’.

[2] Suggest that in subclause 156.5.2 (page 77, line 39) the text ‘... X and Y polarizations with binary values of 3, 1, -1, and -3.’ should be changed to read ‘... X and Y polarizations with the values of 3, 1, -1, and -3.’.

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

Law, David  
Hewlett Packard Enterprise

Comment Type: TR  
Comment Status: X

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.

Suggested Remedy
Since 400GBASE-ZR doesn't seem to support FEC lanes, and says it doesn't support PCS lanes, suggest that subclause 156.3.2 is deleted.

Proposed Response  
Response Status: O

Law, David  
Hewlett Packard Enterprise

Comment Type: T  
Comment Status: X

There is no description of how the PMD_global_signal_detect variable, defined in subclause 156.4, should be driven. Subclause 156.5.4 ‘PMD global signal detect function’ says that SIGNAL_DETECT is set to a fixed OK value, hence there is no signal detect to report in the PMD.

Suggested Remedy
Suggest that:
1. The PMD_global_signal_detect row in Table 156-3 (page 76, line 38) should be deleted.
2. A change to subclause 45.2.1.9.7 'Global PMD receive signal detect (1.10.0)' be added to the draft that adds 'This bit is not supported by the 400GBASE-ZR PMDs.' to subclause 45.2.1.9.7.

Proposed Response  
Response Status: O

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Comment ID: 318  
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Comment ID: 319  
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Comment ID: 320  
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Rather than being requested by the PMD service interface messages, messages are passed across the PMD service interface, either from the PMA to the PMD or from the PMD to the PMA. In addition, abstract service interfaces pass data in the parameters of primitives. In the case of the inter-sublayer service interface primitives defined in subclause 116.3 referenced by IEEE P802.3cw, these parameters are tx_symbol (see 116.3.3.1) and rx_symbol (see 116.3.3.2).

Suggested Remedy

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 156.3.3.4 (page 78, line 43) is changed to read 'The analog signals are sent to the 400GBASE-ZR PMD sublayer over the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request primitives.'.

4. The text 'Four coherent signals IX, QX, IY, and QY are supplied by the receive function of the 400GBASE-ZR PMD and input to the 400GBASE-ZR PMD over the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication.' in subclause 155.3.3.5 (page 79, line 47) is changed to read 'Four coherent signals IX, QX, IY, and QY received by the PMA are passed across the PMD service interface to the MDI in the rx_symbol parameters of the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication primitives.'.

Suggested Remedy

Change reference if required.

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 ...' Doesn't the PHY to operate over two different optical frequencies when the Tx Rx different optical channel ability is true?

Suggested Remedy

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 ...'.

Comment ID 324

Page 72 of 113

8/17/2022 12:06:29 PM
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.

Suggested Remedy
See comment.

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.

Suggested Remedy
See comment.

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 Annex 156A, just two examples of 400GBASE-ZR compliant DWDM black links.

Suggested Remedy
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.’.

Suggested Remedy
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.’.

Suggested Remedy
Remove the negative line.

Transmit output power stability max=1 dB does not define the time interval

Suggested Remedy
Is the time interval 1 us, 1 ms, 1 s, or 1 hour. Suggest that the power stability is measured over 1 s period where optical power is sampled every 10 ms time interval.
<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Cl</th>
<th>SC</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Comment</th>
<th>Suggested Remedy</th>
<th>Proposed Response</th>
<th>Response Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>332</td>
<td>156</td>
<td>156.7.1</td>
<td>TR</td>
<td>X</td>
<td>Transmit output power absolute accuracy has to be in dBm. Also not clear if this line remain dB what is different with power stability?</td>
<td>Need discussions on the intent</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>333</td>
<td>156</td>
<td>156.7</td>
<td>TR</td>
<td>X</td>
<td>Receive OSNR tolerance is not defined at point till one reads section 156.9.24</td>
<td>Please add reference to 156.9.24</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>334</td>
<td>156</td>
<td>156.7</td>
<td>TR</td>
<td>X</td>
<td>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</td>
<td>Need discussions on the intent</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>335</td>
<td>156</td>
<td>156.10.1.2.6</td>
<td>TR</td>
<td>X</td>
<td>Improve definition of the FIR</td>
<td></td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>336</td>
<td>156</td>
<td>156.10.1.1</td>
<td>TR</td>
<td>X</td>
<td>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</td>
<td>If there is interest I can bring a frequency dependent ENOB mask</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>337</td>
<td>156</td>
<td>156.7.1</td>
<td>TR</td>
<td>X</td>
<td>For full interoperability using EVM may need additional constrains based on the data in rahn_3cw_01a_220223 and way_3cw_01a_220523</td>
<td>Need more data to prove that EVM will provide the IEEE level of interoperability</td>
<td></td>
<td>G</td>
</tr>
<tr>
<td>Comment ID</td>
<td>SC</td>
<td>P</td>
<td>L</td>
<td>Comment Type</td>
<td>Comment Status</td>
<td>Proposed Response</td>
<td>Response Status</td>
<td></td>
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<tr>
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<td>----------------</td>
<td>-------------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>338</td>
<td>155.1.5</td>
<td>55</td>
<td>3</td>
<td>E</td>
<td>X</td>
<td>The sentence says 400GBASE-Z PCS sublayer, but the figure is labeled and used as the 400GBASE-ZR PCS sublayer (also the &quot;R&quot; generally is used to refer to the BASE-R encoding used here…)</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>339</td>
<td>1.5</td>
<td>18</td>
<td>21</td>
<td>T</td>
<td>X</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>O</td>
<td></td>
</tr>
<tr>
<td>340</td>
<td>155.3.3.5</td>
<td>58</td>
<td>45</td>
<td>TR</td>
<td>X</td>
<td>&quot;The signals are sampled by an ADC on each lane at a sampling rate…” “The details of the ADC … are implementation specific&quot;. 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>O</td>
<td></td>
</tr>
<tr>
<td>341</td>
<td>155.3.3.1</td>
<td>52</td>
<td>28</td>
<td>TR</td>
<td>X</td>
<td>&quot;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.&quot; 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>O</td>
<td></td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Comment ID 343
Zimmerman, George  CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type TR  Comment Status X

"The signals are sampled by an ADC on each lane at a sampling rate…"  "The details of the ADC … are implementation specific".  This is a description of an implementation, not appropriate for an interoperability specification.  If someone could do the signal processing optically, analog, or by magic, it would still comply with the standard.  The fact that an ADC is used, isn’t a part of the interoperability standard, or even any of the characteristics of the ADC.  Hence the mention is inappropriate and should be deleted.  The sentence works just fine anyways and describes the processing without the "by an ADC".

SuggestedRemedy
Change header of 155.3.5 to Receive signal sampling.
On line 50, Delete "by an ADC" Change line 54 to "The details of the sampling, including any quantization and the chosen sampling rate are implementation specific."
Replace "ADC" with "Sampler" in figure 155-10.

Proposed Response  Response Status O

Comment ID 344
Zimmerman, George  CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type TR  Comment Status X

This figure is supposed to be a functional block diagram, not an implementation diagram.  There are no characteristics for the DAC blocks defined in the specification.  The closest thing in the text is 155.3.3.4 which are called the 16QAM encode and signal drivers.  However, most other 802.3 PHY clauses leave out signal drivers, DACs and the like, and there are no specific requirements in 155.3.3.4, so deleting the blocks seems the right approach to making a functional block diagram.

SuggestedRemedy
Preferably, delete the "DAC" blocks from Figure 155-10 (going straight to the output is fine) Alternatively, Relabel "16QAM Encoder and Signal Driver" (probably drawing as 2 blocks since you show I&Q paths)

Proposed Response  Response Status O

Comment ID 345
Zimmerman, George  CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type TR  Comment Status X

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.

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

Cl 156 SC 156.7.1 P 82 L 49 # 350
Maniloff, Eric Ciena
Comment Type T Comment Status X
I-Q is an insufficient name for this spec
SuggestedRemedy
Change spec name to "I-Q Offset per Polarization (Max Instantaneous)"
Proposed Response Response Status O

Cl 156 SC 156.7.1 P 82 L 50 # 351
Maniloff, Eric Ciena
Comment Type T Comment Status X
I-Q is an insufficient name for this spec
SuggestedRemedy
Change spec name to "I-Q Offset per Polarization (Mean)"
Proposed Response Response Status O

Cl 156 SC 156.7.1 P 83 L 8 # 352
Maniloff, Eric Ciena
Comment Type E Comment Status X
In-band should not be capitalized
SuggestedRemedy
change In to in
Proposed Response Response Status O

Cl 156 SC 156.7.1 P 82 L 30 # 353
Maniloff, Eric Ciena
Comment Type TR Comment Status X
Limiting Adjacent channel crosstalk penalty requires a reduction in the power deltas between channels. To ensure this, adjustable power must be specified.
SuggestedRemedy
Add an entry "Adjustable Range of Tx Output Power" with Min limited to -13 to -9 dBm
Proposed Response Response Status O
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Cl 156 SC 156.7.1 P 82 L 30 # 354**
Maniloff, Eric Ciena

*Comment Type* TR *Comment Status* X

When adding the Tx output power tuning, its accuracy should be defined as well

*Suggested Remedy*
- Add an entry "Transmit output power control absolute accuracy" with Min = -1.0 dB and Max = 1.0 dB

*Proposed Response*
- Response Status O

**Cl 156 SC 156.8 P 85 L 8 # 355**
Maniloff, Eric Ciena

*Comment Type* E *Comment Status* X

Text for OSNR... should not be present

*Suggested Remedy*
- Delete text "for OSNR at TP3 (12.5 GHz)"

*Proposed Response*
- Response Status O

**Cl 156 SC 156.8 P 85 L 13 # 356**
Maniloff, Eric Ciena

*Comment Type* E *Comment Status* X

Text for OSNR... should not be present

*Suggested Remedy*
- Delete text "for OSNR at TP3 (12.5 GHz)"

*Proposed Response*
- Response Status O

**Cl 156 SC 156.9.1 P 87 L 8 # 357**
Maniloff, Eric Ciena

*Comment Type* E *Comment Status* X

I-Q is an insufficient name for this spec

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

*Proposed Response*
- Response Status O
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID** 361

<table>
<thead>
<tr>
<th>Cl</th>
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<th>L</th>
<th>#</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
</tr>
</thead>
</table>
| 156 | 156.9.11 | 90 | 24 | 361 | T | X | Add a definition for I-Q Offset Measurement

**Maniloff, Eric Ciena**

**Proposed Response**

Add the following Specification:

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

with a measurement interval of 1 us

**Response Status** O

**Comment ID** 362

<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>Suggested Remedy</th>
</tr>
</thead>
</table>
| 156 | 156.9.11 | 90 | 28 | 362 | E | X | I-Q is an insufficient name for this spec

**Maniloff, Eric Ciena**

**Proposed Response**

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

**Response Status** O

**Comment ID** 363

<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>Suggested Remedy</th>
</tr>
</thead>
</table>
| 156 | 156.9.12 | 90 | 28 | 363 | T | X | Add a definition for I-Q Offset Measurement

**Maniloff, Eric Ciena**

**Proposed Response**

Add the following Specification:

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

**Response Status** O

**Comment ID** 364

<table>
<thead>
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<th>SC</th>
<th>P</th>
<th>L</th>
<th>#</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
</tr>
</thead>
</table>
| 156 | 156.9.17 | 91 | 4 | 364 | E | X | 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

**Proposed Response**

**Response Status** O

**Comment ID** 365

<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>Suggested Remedy</th>
</tr>
</thead>
</table>
| 156 | 156.10.1.2.6 | 95 | 9 | 365 | E | X | Editor's Note should be removed

**Suggested Remedy**

Remove Note

**Proposed Response**

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

**Comment #367**

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

**Proposed Response:**
Response Status: O

**Comment #368**

**Comment Type:** E  **Comment Status:** X  
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)

**Proposed Response:**
Response Status: O

**Comment #369**

**Comment Type:** E  **Comment Status:** X  
The description of cx doesn't match D3.0 of P802.3cw.

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

**Proposed Response:**
Response Status: O

**Comment #370**

**Comment Type:** E  **Comment Status:** X  
802.3 has been approved

**Suggested Remedy:**
Change: IEEE Std 802.3-2022
To: IEEE Std 802.3-2022x

**Response Status:** O

**Comment #371**

**Comment Type:** E  **Comment Status:** X  
802.3 has been approved

**Suggested Remedy:**
Change: IEEE Std 802.3-2022
To: IEEE Std 802.3-2022x

**Response Status:** O
<table>
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<tr>
<th>Cl</th>
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<th>L</th>
<th>#</th>
<th>Comment ID</th>
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<th>Company</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
<th>Proposed Response</th>
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<tbody>
<tr>
<td>373</td>
<td>10</td>
<td>44</td>
<td># 373</td>
<td>Wienckowski, Natalie</td>
<td>General Motors</td>
<td>E</td>
<td>802.3dd has been approved</td>
<td>X</td>
<td>Change: IEEE Std 802.3dd(TM)-202x</td>
<td>To: IEEE Std 802.3dd(TM)-2022</td>
<td></td>
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</tr>
<tr>
<td># 374</td>
<td>20</td>
<td>14</td>
<td># 374</td>
<td>Wienckowski, Natalie</td>
<td>General Motors</td>
<td>E</td>
<td>Add an ellipsis in the first blank row in Table 45-3. Delete the blank row after the row for 1.825 through 1.899.</td>
<td>X</td>
<td>Change: 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.</td>
<td>Also in the instructions on P22L19.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># 375</td>
<td>22</td>
<td>15</td>
<td># 375</td>
<td>Wienckowski, Natalie</td>
<td>General Motors</td>
<td>E</td>
<td>typo 154.6 is not a proper Table number.</td>
<td>X</td>
<td>Change: 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.</td>
<td>Also in the instructions on P24L3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># 376</td>
<td>23</td>
<td>31</td>
<td># 376</td>
<td>Wienckowski, Natalie</td>
<td>General Motors</td>
<td>E</td>
<td>A comma is not needed after &quot;and&quot; when it is a list of only 2 items.</td>
<td>X</td>
<td>Change: staircase forward error correction (SC-FEC), and soft decision forward error correction</td>
<td>Also in the instructions on P24L3.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comment ID:** 378

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**8/17/2022 12:06:29 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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<th>SC</th>
<th>P</th>
<th>L</th>
<th>Comment Text</th>
</tr>
</thead>
</table>
| 379        | 155| 155.1.3 | 33 | 36   | Wienckowski, Natalie General Motors  
Comment Type: E  
Comment Status: X  
wording  
Suggested Remedy: Change: Transcoding from 66-bit blocks to (from) 257-bit blocks.  
To: Transcoding of 66-bit blocks to (from) 257-bit blocks.  
Proposed Response: Response Status: O |
| 380        | 155| 155.1.4.2 | 34 | 15   | Wienckowski, Natalie General Motors  
Comment Type: E  
Comment Status: X  
wording  
Suggested Remedy: Change: PMA service interface.  
To: The PMA service interface.  
Proposed Response: Response Status: O |
| 381        | 155| 155.1.4.2 | 34 | 17   | Wienckowski, Natalie General Motors  
Comment Type: E  
Comment Status: X  
grammar: you are talking about 2 sublayers, not 1 sublayer.  
Suggested Remedy: Change: between the PCS and PMA sublayer.  
To: between the PCS and PMA sublayers.  
Proposed Response: Response Status: O |
| 382        | 155| 155.2.4.3 | 38 | 14   | Wienckowski, Natalie General Motors  
Comment Type: E  
Comment Status: X  
Payload should not be capitalized.  
Suggested Remedy: Change: The Payload area.  
To: The payload area.  
Proposed Response: Response Status: O |
| 383        | 155| 155.2.4.9 | 43 | 13   | Wienckowski, Natalie General Motors  
Comment Type: E  
Comment Status: X  
The equation should be numbered.  
Suggested Remedy: Add Equation number to the scrambler equation, e.g. (155-1).  
Proposed Response: Response Status: O |
| 384        | 155| 155.2.5.3 | 46 | 26   | Wienckowski, Natalie General Motors  
Comment Type: E  
Comment Status: X  
You should refer to the equation.  
Suggested Remedy: Change: polynomial given in 155.2.4.9.  
To: polynomial given by Equation (155-1).  
Proposed Response: Response Status: O |
### 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>
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<tr>
<td>#385</td>
<td>155</td>
<td>155.3.2</td>
<td>51</td>
<td>31</td>
<td>E</td>
<td>X</td>
<td>It's hard to see the text with the line through it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>155.3.2</td>
<td>51</td>
<td>31</td>
<td>inkle, Natalie</td>
<td>General Motors</td>
<td>Add a box around &quot;400GBASE-ZR PMA sublayer&quot; so the line is &quot;behind&quot; it.</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>#386</td>
<td>155</td>
<td>155.2.4.3</td>
<td>38</td>
<td>1</td>
<td>E</td>
<td>X</td>
<td>Section 155.2.4.5 defines/describes how the OH works</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>155.2.4.3</td>
<td>38</td>
<td>1</td>
<td>ink, Jeff</td>
<td>Broadcom</td>
<td>Change &quot;discussed&quot; to &quot;described&quot;</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>#387</td>
<td>155</td>
<td>155.2.4.4.1</td>
<td>38</td>
<td>50</td>
<td>E</td>
<td>X</td>
<td>The name of the section include 400GBASE-ZR, why? Cl119 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></td>
<td></td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>155.2.4.4.1</td>
<td>38</td>
<td>50</td>
<td>ink, Jeff</td>
<td>Broadcom</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></td>
<td>O</td>
</tr>
<tr>
<td>#388</td>
<td>155</td>
<td>155.2.4.7</td>
<td>42</td>
<td>42</td>
<td>TR/technical required</td>
<td></td>
<td>Figure 155-6 does not show the 6x119b pad</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>155.2.4.7</td>
<td>42</td>
<td>42</td>
<td>Slavick, Jeff</td>
<td>Broadcom</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>O</td>
</tr>
<tr>
<td>#389</td>
<td>155</td>
<td>155.2.4.5.2</td>
<td>39</td>
<td>51</td>
<td>TR/technical required</td>
<td></td>
<td>Cut 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>
<td></td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>155.2.4.5.2</td>
<td>39</td>
<td>51</td>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Change &quot;in bit 1&quot; to &quot;the first bit&quot;</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>#390</td>
<td>155</td>
<td>155.2.4.5.2</td>
<td>39</td>
<td>32</td>
<td>TR/technical required</td>
<td></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>
<td></td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>155.2.4.5.2</td>
<td>39</td>
<td>32</td>
<td>Slavick, Jeff</td>
<td>Broadcom</td>
<td>Remove the RES text from Figure 155-4 and change the color of the box to be grey</td>
<td></td>
<td>O</td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.2.4.8 P 43 L 4 # 391
Slavick, Jeff Broadcom

Comment Type TR Comment Status X
What is the contents of the PAD?

Suggested Remedy
Change "pad bits added" to "pad bits of all zeroes added"

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 38 L 6 # 394
Slavick, Jeff Broadcom

Comment Type TR Comment Status X
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

Suggested Remedy
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".

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 37 L 31 # 392
Slavick, Jeff Broadcom

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

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

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 38 L 11 # 393
Slavick, Jeff Broadcom

Comment Type TR Comment Status X
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

Suggested Remedy
Change 9.4.3.2 to 19.4.3.2

Proposed Response Response Status O

Cl 155 SC 155.2.4.3 P 40 L 22 # 396
Slavick, Jeff Broadcom

Comment Type ER Comment Status X
Everywhere else uses the word four not the number

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

Proposed Response Response Status O
Comment Type TR Comment Status X
The OH section of the 400GBASE-ZR frame is 1280 bits in size. This intro sentence states that OH is only a 40-byte is only 320 bits of data.

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

155.2.4.5 Overhead (OH)

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

155.2.4.5.1 40-byte overhead frame

The 40-byte overhead frame is a 40-byte frame structure that uses a four-frame multi-frame, as shown in Figure 155-4 and described in 155.2.4.5.1 through 155.2.4.5.1.3. The contents of the 40-byte overhead frame is dependent upon the two LSB bits of the MFAS (see 155.2.4.5.1.1) 155.2.4.5.1.1 Multi-frame alignment signal (MFAS)
The MFAS is in the first byte of the 40-byte overhead frame. It is a wrapping counter that is incremented each frame to provide a 256-frame multi-frame sequence as defined by ITU-T G.709.1 Clause 9.2.1.

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

Proposed Response Response Status O
Slavick, Jeff
Broadcom

Comment Type: TR  Comment Status: X

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.

Suggested Remedy:
Add references to the MDIO registers to control and observe link degrade.

Proposed Response: Response Status: O

Slavick, Jeff
Broadcom

Comment Type: TR  Comment Status: X

Uncorrectable blocks are not tracked in MDIO registers.

Suggested Remedy:
Add references to the MDIO register for counting corrected and uncorrected FEC CW and bits.

Proposed Response: Response Status: O

Slavick, Jeff
Broadcom

Comment Type: TR  Comment Status: X

Reference is to 155.4 which is all the FSM blocks, call out the specific AM lock one.

Suggested Remedy:
Change 155.4 to Figure 155-16.

Proposed Response: Response Status: O

Slavick, Jeff
Broadcom

Comment Type: E  Comment Status: X

The reference to 155.3.3.3.1 is not hyperlinked in faw_valid.

Suggested Remedy:
make it a link.

Proposed Response: Response Status: O

Slavick, Jeff
Broadcom

Comment Type: T  Comment Status: X

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".

Proposed Response: Response Status: O
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.

Proposed Response
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.

**Suggested Remedy**

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 non-overlapping SC-FEC frames of FEC\_degraded\_SER\_interval (see 155.4.2.1). If the SC-FEC decoder determines that a codeword is uncorrectable or errors are detected by the CRC32 check (see 155.2.5.6), the number of symbol errors detected is increased by 957 x 257. When the number of bit errors exceeds the threshold set in FEC\_degraded\_SER\_activate\_threshold (see 155.5.1), the FEC\_degraded\_SER bit (see 155.5.1) is set. At the end of each interval, if the number of symbol errors is less than FEC\_degraded\_SER\_deactivate\_threshold, the FEC\_degraded\_SER bit is cleared. If either FEC\_degraded\_SER\_ability or FEC\_degraded\_SER\_enable is de-asserted then the FEC\_degraded\_SER bit is cleared.

- Bring in 45.2.3.60.1 and add “155.2.5.5” to the see list
- Bring in 45.2.3.61.1 and add “155.4.2.1” to the see list
- Bring in 45.2.3.61.3 and add “155.2.5.5” to the see list
- Bring in 45.2.3.61.4 and add “155.4.2.1” to the see list

**Proposed Response**

Response Status O

---

FEC high SER is not a feature of 400GBASE-ZR

**Suggested Remedy**

Remove the FEC high SER row from Table 155-9

**Proposed Response**

Response Status O

---

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"

**Proposed Response**

Response Status O

---

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". This should match the abstract on page 2.

**Proposed Response**

Response Status O
### Proposed Response

<table>
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<tr>
<th>Comment ID</th>
<th>SC</th>
<th>Type</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>412</td>
<td>1.4.144b</td>
<td>TR</td>
<td>TR</td>
<td>X</td>
<td>&quot;using 400GBASE-R encoding&quot; doesn't represent what's in this draft: the BASE-R encoded signal is transported, but what is actually used is GMP, SC-FEC, SD-FEC, DP-16QAM and coherent transmission and detection. But we would call any 80 km-capable PHY &quot;Z&quot; 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.</td>
</tr>
<tr>
<td>413</td>
<td>1.4.144b</td>
<td>E</td>
<td>E</td>
<td>X</td>
<td>&quot;family of Physical Layer devices&quot; 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.</td>
</tr>
<tr>
<td>414</td>
<td>1.4.144c</td>
<td>TR</td>
<td>TR</td>
<td>X</td>
<td>Defining this PHY as &quot;using 400GBASE-R encoding ... DP-16QAM, and coherent detection&quot; 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.</td>
</tr>
<tr>
<td>415</td>
<td>1.5</td>
<td>ER</td>
<td>ER</td>
<td>X</td>
<td>As the base 802.3 uses PAM2, PAM4, PAM5, PAM16, DSQ128, QAM8, QAM16 and QAM128</td>
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</table>

<table>
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<th>SC</th>
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<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
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<tr>
<td>416</td>
<td>45.2.1.150.1</td>
<td>E</td>
<td>E</td>
<td>X</td>
<td>It would help to point out that these the channel plans differ in more ways than that one has more channels than the other.</td>
</tr>
<tr>
<td>417</td>
<td>45.2.1.150.1</td>
<td>ER</td>
<td>ER</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Proposed Response

#417

Cl 116 SC 116.1.3 P 27 L 22 # 417

Dawe, Piers Nvidia

Comment Type TR Comment Status X

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

SuggestedRemedy

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

Proposed Response Response Status O

#418

Cl 116 SC 116.1.3 P 27 L 22 # 418

Dawe, Piers Nvidia

Comment Type T Comment Status X

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

SuggestedRemedy

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

Proposed Response Response Status O

#419

Cl 116 SC 116.1.3 P 27 L 22 # 419

Dawe, Piers Nvidia

Comment Type TR Comment Status X

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

SuggestedRemedy

I can think of three options:

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

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

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

Proposed Response Response Status O

#420

Cl 116 SC 116.2.3 P 29 L 2 # 420

Dawe, Piers Nvidia

Comment Type TR Comment Status X

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

SuggestedRemedy

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

Proposed Response Response Status O
Comment Type TR Comment Status X
This paragraph summarizing the PCS needs a new sentence specifically for the Clause 155 PCS, which does clock domain translation and uses a concatenated FEC scheme, neither part of which is a BASE-R FEC.

Suggested Remedy
Add new sentence.

Proposed Response Response Status O

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

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

Proposed Response Response Status O

Comment Type E Comment Status X
"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.

Suggested Remedy

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

Proposed Response Response Status O
<table>
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<tr>
<th>CI</th>
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<tbody>
<tr>
<td>155</td>
<td>155.1.5</td>
<td>TR</td>
<td>X</td>
<td>This PCS is too complicated for just a &quot;directive&quot; specification. We need examples.</td>
<td>O</td>
</tr>
<tr>
<td>155</td>
<td>155.1.5</td>
<td>T</td>
<td>X</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>O</td>
</tr>
<tr>
<td>155</td>
<td>155.1.5</td>
<td>E</td>
<td>X</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>
<td>O</td>
</tr>
<tr>
<td>155</td>
<td>155.1.5</td>
<td>E</td>
<td>X</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>
<td>O</td>
</tr>
<tr>
<td>155</td>
<td>155.2.1</td>
<td>E</td>
<td>X</td>
<td>Add sentence explaining that m is an implementation choice, for SD-FEC.</td>
<td>O</td>
</tr>
<tr>
<td>155</td>
<td>155.2.1</td>
<td>E</td>
<td>X</td>
<td>Add an informative NOTE saying why it's m-1 not 7, and referring to the appropriate subclause.</td>
<td>O</td>
</tr>
<tr>
<td>Comment ID</td>
<td>Type</td>
<td>Comment Status</td>
<td>Response Status</td>
<td>Comment Text</td>
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<td></td>
</tr>
<tr>
<td>433</td>
<td>T</td>
<td>X</td>
<td>O</td>
<td>&quot;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&quot;: this is intuitive but not the accepted (Forney's) use of inner and outer.</td>
<td></td>
</tr>
<tr>
<td>434</td>
<td>T</td>
<td>X</td>
<td>O</td>
<td>As interleavers are a significant feature of this scheme</td>
<td></td>
</tr>
<tr>
<td>435</td>
<td>E</td>
<td>X</td>
<td>O</td>
<td>Suddenly talking about receiver without warning - hard to understand at first.</td>
<td></td>
</tr>
<tr>
<td>436</td>
<td>E</td>
<td>X</td>
<td>O</td>
<td>SC-FEC blocks of 510 x 512</td>
<td></td>
</tr>
<tr>
<td>437</td>
<td>E</td>
<td>X</td>
<td>O</td>
<td>PCS Receive function or PCS receive process</td>
<td></td>
</tr>
<tr>
<td>438</td>
<td>E</td>
<td>X</td>
<td>O</td>
<td>SC-FEC codewords (as on line 39)</td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>SC</td>
<td>P</td>
<td>L</td>
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<td>155.2.4.3</td>
<td>38</td>
<td>20</td>
<td>446</td>
<td>E</td>
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<td>447</td>
<td>E</td>
<td>X</td>
<td>O</td>
<td>Remove</td>
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<tr>
<td>448</td>
<td>TR</td>
<td>X</td>
<td>O</td>
<td>Remove GMP, define the 256-frame multi-frame sequence here, or add the reference</td>
<td></td>
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<tr>
<td>449</td>
<td>E</td>
<td>X</td>
<td>O</td>
<td>Add extra words to make the context clear. &quot;in the transmitted&quot; would help, but more may be needed</td>
<td></td>
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<tr>
<td>450</td>
<td>TR</td>
<td>X</td>
<td>O</td>
<td>Add extra words to make the context clear. &quot;in the transmitted&quot; would help, but more may be needed</td>
<td></td>
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<tr>
<td>451</td>
<td>T</td>
<td>X</td>
<td>O</td>
<td>Add extra words to make the context clear. &quot;in the transmitted&quot; would help, but more may be needed</td>
<td></td>
</tr>
<tr>
<td>452</td>
<td>T</td>
<td>X</td>
<td>O</td>
<td>Add extra words to make the context clear. &quot;in the transmitted&quot; would help, but more may be needed</td>
<td></td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155  SC 155.2.4.5.3  P 40  L 17  # 453
Dawe, Piers  Nvidia
Comment Type  TR  Comment Status  X
Reference to OIF-400ZR-01.0, March 10, 2020, subclause 8.9. Note that this document is subject to active maintenance
SuggestedRemedy
If feasible, write the specification here. If not, check that the reference is complete, correct and detailed enough, add a normative reference. Refer to a later OIF-400ZR if appropriate.
Proposed Response  Response Status  O

Cl 155  SC 155.2.4.6  P 40  L 50  # 454
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  X
Needs a figure showing the 400GBASE-ZR frame rows, SC-FEC blocks, CRC32 and MBAS
SuggestedRemedy
Please add a figure per comment.
Proposed Response  Response Status  O

Cl 155  SC 155.2.4.6  P 40  L 50  # 455
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  X
between source and sink
SuggestedRemedy
eh? Change to the usual terminology
Proposed Response  Response Status  O

Cl 155  SC 155.2.4.9  P 43  L 9  # 456
Dawe, Piers  Nvidia
Comment Type  E  Comment Status  X
sequence 65 535
SuggestedRemedy
sequence length 65 535?
Proposed Response  Response Status  O

Cl 155  SC 155.2.4.9  P 43  L 12  # 457
Dawe, Piers  Nvidia
Comment Type  E  Comment Status  X
x
SuggestedRemedy
italic
Proposed Response  Response Status  O

Cl 155  SC 155.2.4.9  P 43  L 12  # 458
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  X
x
SuggestedRemedy
define x
Proposed Response  Response Status  O

Cl 155  SC 155.2.4.9  P 43  L 12  # 459
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  X
which end goes first?
SuggestedRemedy
Proposed Response  Response Status  O
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 10 # 460
Dawe, Piers Nvidia
Comment Type TR Comment Status X
More iformation needed. Given the "generating polynomial", what has to be done? There are examples of scrambler definitions in the base document.

SuggestedRemedy
?
Proposed Response Response Status O

Cl 155 SC 155.2.4.9 P 43 L 12 # 461
Dawe, Piers Nvidia
Comment Type T Comment Status X
is row 1 the first or second row?

SuggestedRemedy
?
Proposed Response Response Status O

Cl 155 SC 155.2.4.10 P 43 L 21 # 462
Dawe, Piers Nvidia
Comment Type TR Comment Status X
G.709.3 is not a normative reference

SuggestedRemedy
Add the content locally or add the reference and any information that is needed to make the definition accessible, complete and unambiguous
Proposed Response Response Status O

Cl 155 SC 155.2.4.11 P 44 L 36 # 463
Dawe, Piers Nvidia
Comment Type TR Comment Status X
generic operation ... in ITU-T G.709.3 Annex D: but that contains undefined symbols and terms.

SuggestedRemedy
As it seems it is not very long, write it out cleanly here
Proposed Response Response Status O

Cl 155 SC 155.2.4.11 P 44 L 45 # 464
Dawe, Piers Nvidia
Comment Type T Comment Status X
This says 8-bit symbols, 155.2.1 says two streams of 4-bit data. PMA:IS_UNITDATA_i.request is 7 wide.

SuggestedRemedy
The difference may matter when we are discussing Skew limits
Proposed Response Response Status O

Cl 155 SC 155.2.4.12 P 45 L 33 # 465
Dawe, Piers Nvidia
Comment Type E Comment Status X
hamming

SuggestedRemedy
Hamming
Proposed Response Response Status O
<table>
<thead>
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<th>Suggested Remedy</th>
<th>Proposed Response</th>
<th>Response Status</th>
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</thead>
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<tr>
<td>466</td>
<td>T</td>
<td>X</td>
<td>The Hamming SD-FEC decoder is a soft decision decoder.</td>
<td>Dawe, Piers Nvidia</td>
<td>O</td>
</tr>
<tr>
<td>467</td>
<td>TR</td>
<td>X</td>
<td>&quot;Logic described generically in ITU-T G.709.3 Annex D&quot;: generically - vague, and Annex D doesn't address FEC decoding at all, only check-block generation.</td>
<td>Dawe, Piers Nvidia</td>
<td>O</td>
</tr>
<tr>
<td>468</td>
<td>E</td>
<td>X</td>
<td>interleaver</td>
<td>Dawe, Piers Nvidia</td>
<td>O</td>
</tr>
<tr>
<td>469</td>
<td>E</td>
<td>X</td>
<td>incoming block 10 ...?</td>
<td>Dawe, Piers Nvidia</td>
<td>O</td>
</tr>
<tr>
<td>470</td>
<td>T</td>
<td>X</td>
<td>base block*: not defined, used only once</td>
<td>Dawe, Piers Nvidia</td>
<td>O</td>
</tr>
<tr>
<td>471</td>
<td>E</td>
<td>X</td>
<td>Figure 155-9 is an orphan</td>
<td>Dawe, Piers Nvidia</td>
<td>O</td>
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</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
Cl 155  SC 155.2.5.7.1  P 47  L 33  # 473
Dawe, Piers  Nvidia
Comment Type  E  Comment Status  X
Figure 155-9 seems to be identical to Figure 155-4
SuggestedRemedy
Remove it, refer to 155-4 instead
Proposed Response  Response Status  O

Cl 155  SC 155.2.5.7.2  P 48  L 5  # 474
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  X
upstream, downstream
SuggestedRemedy
Rx, Tx. Compare base doc.
Proposed Response  Response Status  O

Cl 155  SC 155.2.5.7.2  P 48  L 9  # 475
Dawe, Piers  Nvidia
Comment Type  E  Comment Status  X
detailed in 155.2.5.7.2 - but this is 155.2.5.7.2
SuggestedRemedy
?
Proposed Response  Response Status  O

Cl 155  SC 155.2.5.7.2  P 48  L 22  # 476
Dawe, Piers  Nvidia
Comment Type  T  Comment Status  X
framing of frame or multi-frame loss - eh?
SuggestedRemedy
In the case of a loss of 400GBASE-ZR frame sync or multi-frame sync?
Proposed Response  Response Status  O
Cl 155 SC 155.3.1.2 P 49 L 16 # 481
Dawe, Piers Nvidia
Comment Type E Comment Status X
relationship with
SuggestedRemedy
relationship to
Also 156.1
Proposed Response Response Status O

Cl 155 SC 155.3.2 P 50 L 16 # 482
Dawe, Piers Nvidia
Comment Type TR Comment Status X
* ~50.212875 Gb/s: ~ too vague, signaling rate should be in GBd
SuggestedRemedy
Specify the rate without approximation
Proposed Response Response Status O

Cl 155 SC 155.3.3 P 52 L 5 # 483
Dawe, Piers Nvidia
Comment Type T Comment Status X
I don't see any loopback here. The only test signal comes from the PCS.
SuggestedRemedy
Delete "and optionally to provide test signals and loop-back"
Proposed Response Response Status O

Cl 155 SC 155.3.3.1 P 52 L 21 # 484
Dawe, Piers Nvidia
Comment Type TR Comment Status X
This says the PMA does Gray de-mapping then it says it doesn't the PCS does it.
SuggestedRemedy
Remove lines 20-25, add appropriate material to PCS section.
Proposed Response Response Status O

Cl 155 SC 155.3.3.1 P 52 L 21 # 481
Dawe, Piers Nvidia
Comment Type E Comment Status X
split table (not properly indicated). Also Table 155-6—PS
SuggestedRemedy
Proposed Response Response Status O

Cl 155 SC 155.3.3.3 P 57 L 14 # 486
Dawe, Piers Nvidia
Comment Type E Comment Status X
Missing arrowheads on 3 vertical paths
SuggestedRemedy
Add them
Proposed Response Response Status O

Cl 155 SC 155.3.3.3 P 57 L 32 # 487
Dawe, Piers Nvidia
Comment Type E Comment Status X
Table 155-6—PS
SuggestedRemedy
Use whole words. Pilot sequence
Proposed Response Response Status O

Cl 155 SC 155.3.3.3 P 57 L 3 # 488
Dawe, Piers Nvidia
Comment Type E Comment Status X
The following objects apply to: objects?
SuggestedRemedy
Reword
Proposed Response Response Status O

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 488  Page 100 of 113  8/17/2022  12:06:29 PM
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
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<th>Comment ID</th>
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<td>155</td>
<td>155.5.1</td>
<td>E</td>
<td>X</td>
<td>in 45</td>
<td>489</td>
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<tr>
<td>28</td>
<td>155.5.1</td>
<td>TR</td>
<td>X</td>
<td>Delete the four FEC degraded SER rows</td>
<td>490</td>
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<td>47</td>
<td>155.5.1</td>
<td>E</td>
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<td>Widen the right column width until they fit</td>
<td>491</td>
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<th>Comment ID</th>
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<tr>
<td>156</td>
<td>156.1</td>
<td>E</td>
<td>X</td>
<td>in Clause 45 and why green when line 4 has black?</td>
<td>492</td>
</tr>
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<td>156.1.1</td>
<td>E</td>
<td>X</td>
<td></td>
<td></td>
<td>493</td>
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<td>156.2</td>
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**Comment IDs:**
- 489
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- 491
- 492
- 493
- 494

**Response Status:**
- O (Open)
- W (Written)
- C (Closed)
- U (Unsatisfied)
- Z (Withdrawn)

**Comment Type:**
- E (Editorial)
- T (Technical)
- G (General)

**Comment Status:**
- D (Dispatched)
- A (Accepted)
- R (Rejected)

**Page:** 101 of 113

**Date:** 8/17/2022 12:06:30 PM
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<tr>
<td>495</td>
<td>75</td>
<td>22</td>
<td>X</td>
<td>O</td>
<td>&quot;the variable SIGNAL_DETECT parameter&quot;: 156.5.4 says it's a parameter, this and that say not variable.</td>
</tr>
<tr>
<td>496</td>
<td>75</td>
<td>26</td>
<td>X</td>
<td>O</td>
<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>497</td>
<td>75</td>
<td>35</td>
<td>X</td>
<td>O</td>
<td>2048 bit times</td>
</tr>
<tr>
<td>498</td>
<td>75</td>
<td>30</td>
<td>X</td>
<td>O</td>
<td>8192 bit times</td>
</tr>
<tr>
<td>499</td>
<td>77</td>
<td>40</td>
<td>X</td>
<td>O</td>
<td>Revise to limits that are appropriate to DP-16PAM technology and the channel.</td>
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<tr>
<td>500</td>
<td>77</td>
<td>52</td>
<td>X</td>
<td>O</td>
<td>The mapping of the analog values to the symbol amplitudes is listed in Table 155-2.</td>
</tr>
<tr>
<td>501</td>
<td>78</td>
<td>3</td>
<td>X</td>
<td>O</td>
<td>No SD!</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 ID 502

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<td>156</td>
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Dawe, Piers Nvidia

**Comment Type:** E

misuse of TP2

**Suggested Remedy:**

**Proposed Response**

**Response Status:** O

---

Comment ID 503

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Dawe, Piers Nvidia

**Comment Type:** E

blank line

**Suggested Remedy:**

**Proposed Response**

**Response Status:** O

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Comment ID 504

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<td>156</td>
<td>156.6</td>
<td>79</td>
<td>52</td>
<td>504</td>
</tr>
</tbody>
</table>

Dawe, Piers Nvidia

**Comment Type:** E

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

**Proposed Response**

**Response Status:** O

---

Comment ID 505

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<tr>
<td>156</td>
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Dawe, Piers Nvidia

**Comment Type:** E

blank lines 1 to 3

**Suggested Remedy:**

**Proposed Response**

**Response Status:** O

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Comment ID 506

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Dawe, Piers Nvidia

**Comment Type:** E

f not defined

**Suggested Remedy:**

**Proposed Response**

**Response Status:** O

---

Comment ID 507

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</table>

Dawe, Piers Nvidia

**Comment Type:** E

square or round brackets

**Suggested Remedy:**

**Proposed Response**

**Response Status:** O

---

Comment ID 508

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<td>82</td>
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<td>508</td>
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</table>

Dawe, Piers Nvidia

**Comment Type:** E

Why 59.84375?

**Suggested Remedy:**

59.84375

**Proposed Response**

**Response Status:** O

---

Comment ID 509

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<td>509</td>
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Dawe, Piers Nvidia

**Comment Type:** E

Why +/-20 ppm?

**Suggested Remedy:**

**Proposed Response**

**Response Status:** O
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</table>

**Dawe, Piers Nvida**

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

**Average channel output power**

**Suggested Remedy:**

Average launch power as for single-wavelength duplex fibre PMDs such as 100GBASE-DR, 100GBASE-FR1, and 100GBASE-LR1

**Proposed Response**

Response Status O

---

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

**RRC Roll-Off**

**Suggested Remedy:** ?

**Proposed Response**

Response Status O

---

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

**I-Q (max instantaneous), I-Q (mean)**

**Suggested Remedy:** ?

**Proposed Response**

Response Status O

---

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

**Transmitter In-band OSNR**

**Suggested Remedy:** Change In to in

**Proposed Response**

Response Status O

---

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

**Several things with max and min, others without. Definition of 156.9.14 in I-Q phase error doesn't define its sign**

**Proposed Response**

Response Status O

---

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

**bottom line of table**

**Proposed Response**

Response Status O

---

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

**Definition of 156.9.14 in I-Q phase error doesn't define its sign**

**Proposed Response**

Response Status O

---

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

**Definition of 156.9.14 in I-Q phase error doesn't define its sign**

**Proposed Response**

Response Status O
Cl 156 SC 156.7.2 P 84 L 24 # 516
Dawe, Piers Nvidia

Comment Type E Comment Status X
says that receiver OSNR tolerance "is informative and compliance is not required"

SuggestedRemedy
Table needs a footnote. Example of current wording from 140: Receiver sensitivity (OMAouter) (max) for 100GBASE-DR is optional and is defined for a transmitter with a value of SECO up to 3.4 dB. 140.7.12.1 Receiver sensitivity for 100GBASE-DR. The receiver sensitivity for 100GBASE-DR is optional and is defined for a transmitter with a value of SECO up to 3.4 dB. Receiver sensitivity for 100GBASE-DR should meet Equation (140-1), which is illustrated in Figures 140-9. The normative requirement for the 100GBASE-DR receiver is stressed receiver sensitivity.

Proposed Response Response Status O

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

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

SuggestedRemedy

Proposed Response Response Status O

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

Comment Type E Comment Status X
Some clarification of the requirements in Table 156-8 is provided in informative Annex 156A, as well as examples of compliant DWDM black links.

SuggestedRemedy
Leftover from 100GBASE-ZR (154.8). Delete? refer to 154A?

Proposed Response Response Status O

Cl 156 SC 156.8 P 85 L 5 # 519
Dawe, Piers Nvidia

Comment Type E Comment Status X
Average output power at TP3

SuggestedRemedy

Proposed Response Response Status O

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

Comment Type E Comment Status X
DGD-max

SuggestedRemedy
Is there a spec to make the Rx tolerate it?

Proposed Response Response Status O

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

Comment Type E Comment Status X
Adjacent channel isolation

SuggestedRemedy
? see G.671

Proposed Response Response Status O

Cl 156 SC 156.8 P 85 L 29 # 522
Dawe, Piers Nvidia

Comment Type E Comment Status X
Interferometric crosstalk at TP3

SuggestedRemedy
?

Proposed Response Response Status O
<table>
<thead>
<tr>
<th>Comment ID</th>
<th>Cl</th>
<th>SC</th>
<th>Page</th>
<th>Line</th>
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<th>Comment Type</th>
<th>Suggested Remedy</th>
<th>Comment Status</th>
<th>Response Status</th>
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<td>523</td>
<td>156</td>
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<td>156.8</td>
<td>85</td>
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<td>E</td>
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<td>X</td>
<td>O</td>
<td>Dawe, Piers Nvidia:</td>
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<td>156.9.1</td>
<td>86</td>
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<td></td>
<td>E</td>
<td>Scrambled idle encoded by CFEC</td>
<td>X</td>
<td>O</td>
<td>Dawe, Piers Nvidia:</td>
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<td>526</td>
<td>156</td>
<td>156.9.1</td>
<td>86</td>
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<td>E</td>
<td>valid 400GBASE-R</td>
<td>X</td>
<td>O</td>
<td>Dawe, Piers Nvidia:</td>
</tr>
<tr>
<td>527</td>
<td>156</td>
<td>156.9.1</td>
<td>87</td>
<td>13</td>
<td></td>
<td></td>
<td>E</td>
<td>I-Q phase error (max), I-Q phase error (min)</td>
<td>X</td>
<td>O</td>
<td>Dawe, Piers Nvidia:</td>
</tr>
<tr>
<td>528</td>
<td>156</td>
<td>156.9.1</td>
<td>87</td>
<td>25</td>
<td></td>
<td></td>
<td>E</td>
<td>Average receive power</td>
<td>X</td>
<td>O</td>
<td>Dawe, Piers Nvidia:</td>
</tr>
<tr>
<td>529</td>
<td>156</td>
<td>156.9.4</td>
<td>87</td>
<td>52</td>
<td></td>
<td></td>
<td>E</td>
<td>Compliant transmitters ... are required to ... by applying minimum and maximum masks to the spectrum acquired using an optical spectrum analyzer.</td>
<td>X</td>
<td>O</td>
<td>Dawe, Piers Nvidia:</td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment ID:** 530

**Comment:**
As this mask is a normative spec

**Suggested Remedy:**
Write out the frequency-domain equations for a RRC response with a damping factor of 0.4

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X

---

**Comment ID:** 531

**Comment:**
set at -9 dB up to the -9 dB of an RRC

**Suggested Remedy:**
set at -9 dB up to 30.8 GHz offset for an RRC

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X

---

**Comment ID:** 532

**Comment:**
Blank line

**Suggested Remedy:**
Remove

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X

---

**Comment ID:** 534

**Comment:**
within the limits

**Suggested Remedy:**
below the limit?

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X

---

**Comment ID:** 535

**Comment:**
1-sided noise power spectral density [Hz^2/Hz]

**Suggested Remedy:**
but noise power should be in watts, or dBc. Figure title has "spectral power density"

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X

---

**Comment ID:** 536

**Comment:**
fbaud

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X

---

**Comment ID:** 537

**Comment:**
1-sided noise power spectral density [Hz^2/Hz]

**Suggested Remedy:**
but noise power should be in watts, or dBc. Figure title has "spectral power density"

**Response:**
Dawe, Piers
Nvidia

**Comment Status:** X
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<th>L</th>
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<tr>
<td>538</td>
<td>E</td>
<td>X</td>
<td>I-Q (max instantaneous)</td>
<td></td>
<td>Cl 156</td>
<td>SC 156.9.11</td>
<td>P 90</td>
<td>L 26</td>
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<tr>
<td>539</td>
<td>E</td>
<td>X</td>
<td>I-Q (mean)</td>
<td></td>
<td>Cl 156</td>
<td>SC 156.9.12</td>
<td>P 90</td>
<td>L 30</td>
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<td>540</td>
<td>E</td>
<td>X</td>
<td>I-Q amplitude imbalance (mean)</td>
<td>proportional amplitude difference?</td>
<td>Cl 156</td>
<td>SC 156.9.13</td>
<td>P 90</td>
<td>L 35</td>
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<td>&quot;proportional&quot; phase difference</td>
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<td>Cl 156</td>
<td>SC 156.9.14</td>
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<td>X</td>
<td>local oscillator</td>
<td></td>
<td>Cl 156</td>
<td>SC 156.9.14</td>
<td>P 90</td>
<td>L 41</td>
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<td>543</td>
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<td>X</td>
<td>ditto. why is this separate?</td>
<td></td>
<td>Cl 156</td>
<td>SC 156.9.15</td>
<td>P 90</td>
<td>L 45</td>
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<tr>
<td>544</td>
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<td>X</td>
<td>who is supposed to act on this &quot;shall&quot;? Black link, as it points to Table 156-8. 156.8 has the necessary &quot;shall&quot;. Don't write in the passive voice.</td>
<td></td>
<td>Cl 156</td>
<td>SC 156.9.17</td>
<td>P 90</td>
<td>L 3</td>
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<td>545</td>
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<td>X</td>
<td>shall with no PICS</td>
<td></td>
<td>Cl 156</td>
<td>SC 156.9.17</td>
<td>P 90</td>
<td>L 3</td>
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<td>13</td>
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</table>

**Comment Type**: E (Editorial required)  Suggested Remedy

**Comment Status**: X ( Unsatisfied)

**Response Status**: O (Open)

---

**Comment 546**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: unused / undefined

**Proposed Response**: Response Status: O (Open)

---

**Comment 547**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: Define in-band

**Proposed Response**: Response Status: O (Open)

---

**Comment 548**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: No verb

**Proposed Response**: Response Status: O (Open)

---

**Comment 549**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: The average receive power shall be within the limits given in Table 156-7.

**Proposed Response**: Response Status: O (Open)

---

**Comment 550**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: see earlier for table footnote and "optional"

**Proposed Response**: Response Status: O (Open)

---

**Comment 551**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: has to be met with a worst-case compliant transmitter, but it does not have to be met

**Proposed Response**: Response Status: O (Open)

---

**Comment 552**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: pre-FEC BER level lower than the CFEC threshold

**Proposed Response**: Response Status: O (Open)

---

**Comment 553**

Dawe, Piers, Nvidia

**Comment Type**: E (Editorial required)  **Comment Status**: X (Unsatisfied)

**Suggested Remedy**: insertion loss

**Proposed Response**: Response Status: O (Open)
<table>
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<th>Page</th>
<th>Line</th>
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<th>Suggested Remedy</th>
<th>Proposed Response</th>
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<td>554</td>
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<td>156.9.26</td>
<td>92</td>
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<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>[Optical path OSNR penalty, defined in Recommendation ITU-T G.698.2, qv]</td>
<td></td>
<td>O</td>
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<td>555</td>
<td>156</td>
<td>156.9.29</td>
<td>92</td>
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<td>Dawe, Piers</td>
<td>Nvidia</td>
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<td>X</td>
<td>[Adjacent channel isolation, defined in Recommendation ITU-T G.671, qv]</td>
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<td>156.9.30</td>
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<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>[Interferometric crosstalk at TP3, defined in Recommendation ITU-T G.698.2, qv]</td>
<td></td>
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<tr>
<td>557</td>
<td>156</td>
<td>156.1</td>
<td>92</td>
<td>44</td>
<td></td>
<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>Should be under 156.9.10</td>
<td></td>
<td>O</td>
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<td>558</td>
<td>156</td>
<td>156.10.1</td>
<td>92</td>
<td>49</td>
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<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>Connect the 400 Gb/s DP-16QAM transmitter to 40GBASE-ZW transmitter</td>
<td></td>
<td>O</td>
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<tr>
<td>559</td>
<td>156</td>
<td>156.10.1</td>
<td>93</td>
<td>9</td>
<td></td>
<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>It would be helpful to show the patch cord, between Tx and TP2</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>560</td>
<td>156</td>
<td>156.10.1</td>
<td>93</td>
<td>8</td>
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<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>Calibrated Coherent Receiver and so on, also in other figures</td>
<td></td>
<td>O</td>
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<tr>
<td>561</td>
<td>156</td>
<td>156.10.1</td>
<td>93</td>
<td>8</td>
<td></td>
<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>E</td>
<td>X</td>
<td>Calibrated coherent receiver and so on, also in other figures</td>
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<td>O</td>
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</table>
Cl 156 SC 156.10.1 P 93 L 8 # 562
Dawe, Piers Nvidia
Comment Type E Comment Status X
Digital Signal Processing
SuggestedRemedy
A to D and analysis? 156.10.1.2 says it’s Offline
Proposed Response Response Status O

Cl 156 SC 156.10.1.2 P 94 L 3 # 563
Dawe, Piers Nvidia
Comment Type E Comment Status X
blank line
SuggestedRemedy
Proposed Response Response Status O

Cl 156 SC 156.10.1.2.2 P 94 L 36 # 564
Dawe, Piers Nvidia
Comment Type TR Comment Status X
Need a bigger block size for at least one of these, to go with the jitter corner frequency
SuggestedRemedy
Proposed Response Response Status O

Cl 156 SC 156.10.1.2.4 P 94 L 45 # 565
Dawe, Piers Nvidia
Comment Type E Comment Status X
3rd-order super Gaussian filter with RRC = 0.2
SuggestedRemedy
Proposed Response Response Status O

Cl 156 SC 156.10.1.2.5 P 94 L 47 # 566
Dawe, Piers Nvidia
Comment Type E Comment Status X
IQ Offset
SuggestedRemedy
IQ offset (twice)
Proposed Response Response Status O

Cl 156 SC 156.10.1.2.6 P 94 L 3 # 567
Dawe, Piers Nvidia
Comment Type E Comment Status X
FIR filter with 15 real taps
SuggestedRemedy
Where is the cursor?
Proposed Response Response Status O
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

### Proposed Response

**Comment ID** 570

**Cl** 156  **SC** 156.10.1.2.6  **P** 94  **L** 4  **#** 570

Dawe, Piers  
Nvidia  

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

using the signal with additive white Gaussian noise considering the Receiver OSNR(min)

**Suggested Remedy**

- do what?

**Proposed Response**

**Response Status** O

---

**Comment ID** 571

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 20  **#** 571

Dawe, Piers  
Nvidia  

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

- define k and K

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

**Comment ID** 572

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 20  **#** 572

Dawe, Piers  
Nvidia  

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

- It would be better to count from 1 to K in the usual way

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

**Comment ID** 573

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 25  **#** 573

Dawe, Piers  
Nvidia  

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

- l_delta and Q_delta not norm then norm

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

**Comment ID** 574

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 31  **#** 574

Dawe, Piers  
Nvidia  

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

- Do what with alpha_peak? add equation

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

**Comment ID** 575

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 45  **#** 575

Dawe, Piers  
Nvidia  

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

- n and eta are the same thing? Why not k?

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

**Comment ID** 576

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 49  **#** 576

Dawe, Piers  
Nvidia  

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

- starting at 0

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

**Comment ID** 577

**Cl** 156  **SC** 156.10.1.2.7  **P** 95  **L** 51  **#** 577

Dawe, Piers  
Nvidia  

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

- N vs K vs 1000

**Suggested Remedy**

**Proposed Response**

**Response Status** O

---

Note: The document contains a list of comments and responses with their respective IDs, pages, and lines. The comments are related to technical aspects of DWDM systems and the proposed responses address these comments. The status of each comment is indicated as X for 'accepted', 'rejected', 'unsatisfied', or 'withdrawn', and the status of each response is indicated as O for 'open', W for 'written', or C for 'closed'. The document includes details such as comment types (E for editorial, T for technical, G for general), comment statuses, and suggested remedies. The page number is 112 of 113, and the date is 8/17/2022.
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<td>X</td>
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<td></td>
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<td>579</td>
<td>E</td>
<td>(compare 156A)</td>
<td>X</td>
<td>Make it clear that there is one fibre per direction at the MDI even if there is bidirectional fibre between mux/demuxes</td>
<td></td>
<td>O</td>
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<tr>
<td>580</td>
<td>E</td>
<td>PMD_global_transmit_disable _variable</td>
<td>X</td>
<td>rogue underscore, column widths</td>
<td></td>
<td>O</td>
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<tr>
<td>581</td>
<td>E</td>
<td>two 400GMII and 400GAUI-8 interfaces</td>
<td>X</td>
<td>Only one 400GAUI-8 interface</td>
<td></td>
<td>O</td>
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</tbody>
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