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

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<td>Make the amendment order consistent with the order prescribed by the Working Group chair and update their descriptions as required. See response to comment 1. With editorial license.</td>
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<td>List of amendments is not current. IEEE Std 802.3dd-2022 is approved and can be referenced by year; and cs, db, ck, and de are all at RevCom and depending on when your D2.1 is produced might also be able to be listed with approval year of 2022. Amendment 6 is cx, Amendment T is cz.</td>
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|    | Dawe, Piers | Nvidia | | | | |
| Comment Type | T | Comment Status | R | | | |
|                | for operation over DWDM systems - not. Figure 156-1 has it right: "PMD FOR DWDM CHANNEL OVER A DWDM BLACK LINK" | | | | | |
| SuggestedRemedy | | | | | | |
|                | Change for operation over DWDM systems to "for DWDM operation" | | | | | |
| Response | | | | | | |
|                | REJECT. | | | | | |
|                | There was no consensus to make a change. The approved project title per the PAR is "Standard for Ethernet Amendment: Physical Layers and Management Parameters for 400 Gb/s Operation over DWDM (dense wavelength division multiplexing) systems". | | | | | |
|                | The same language is used 802.3ct-2021 amendment title and abstract. | | | | | |

**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Status:** D/dispatched  A/accepted  R/rejected  RESPONSE STATUS: O/open  W/written  C/closed  U/unsatisfied  Z/withdrawn  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:** Clause, Subclause, page, line
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**Comment Type** ER, **Comment Status** D, **bucket**

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

**Suggested Remedy**

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

**Proposed Response** Response Status W

PROPOSED ACCEPT.

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

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

**Suggested Remedy**

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

**Proposed Response** Response Status W

PROPOSED ACCEPT.

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

Section 9 goes up Clause 160

**Suggested Remedy**

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

**Proposed Response** Response Status W

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

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**Marris, Arthur**  
Cadence Design Systems

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

*Swap cx and de and add cz*

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

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

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

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**Wienckowski, Natalie**  
General Motors

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

*bucket*

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

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

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

PROPOSED ACCEPT.

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**Grow, Robert**  
RMG Consulting

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

*bucket*

*P802.3cz has been designated Amendment 7.*

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

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

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

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**Wienckowski, Natalie**  
General Motors

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

*bucket*

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

**Suggested Remedy:**  
*Number based on current designations from the WG Chair.*

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

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 21

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**Wienckowski, Natalie**  
General Motors

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

*bucket*

*cw is amendment 8*

**Suggested Remedy:**  
*Change: Amendment x  
To: Amendment 8*

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

PROPOSED ACCEPT IN PRINCIPLE.

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

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**Comment Type** E  **Comment Status** R

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

**Suggested Remedy**

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

This should match the abstract on page 2.

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

REJECT.

See response to comment 410

---

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

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

**Suggested Remedy**

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

PROPOSED ACCEPT IN PRINCIPLE.

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

---

**Comment Type** E  **Comment Status** R

802.3 has been approved

**Suggested Remedy**

Change: IEEE Std 802.3-202x

To: IEEE Std 802.3-2022 throughout the document

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

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 1

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

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

**Suggested Remedy**

Delete 1.4.144b

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

ACCEPT IN PRINCIPLE.

Delete 1.4.144b. Replace 400GBASE-Z with 400GBASE-ZR throughout draft.
The term 400BASE-Z seems to only once in the specification, and there is no description of the "family" described in this definition. Further, based on where it is used appears to be in error. I only find it in connection with Figure 155-2 (page 35) in the sentence "A functional block diagram of the 400BASE-Z PCS sublayer is shown in Figure 155-2". The figure itself calls this the 400BASE-ZR PCS, and 400BASE-ZR is used everywhere else. Suggest this definition may be left over from some earlier thought...

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

Response
ACCEPT IN PRINCIPLE.

See response to comment 170

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

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

Response
ACCEPT IN PRINCIPLE.

See response to comment 170

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

SuggestedRemedy
Delete "family of"

Response
ACCEPT IN PRINCIPLE.

See response to comment 170

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

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

Response
ACCEPT IN PRINCIPLE.

See response to comment 170

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

SuggestedRemedy
Modify definition to
IEEE 802.3 Physical Layer specification for 400 Gb/s dense wavelength division multiplexing (DWDM) PHY using 400BASE-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.)

Response
ACCEPT IN PRINCIPLE.

Change 1.4.144c to
"400BASE-ZR: IEEE 802.3 Physical Layer specification for 400 Gb/s dense wavelength division multiplexing (DWDM) PHY using 400BASE-ZR PCS and PMA encoding, dual polarization 16-state quadrature amplitude (DP-16QAM) modulation, and coherent detection with reach up to at least 80 km. (See IEEE Std 802.3, Clause 155 and Clause 156.)"
Defining this PHY as "using 400BASE-R encoding ... DP-16QAM, and coherent detection" is highly misleading. The BASE-R encoded signal is transported, but what is actually used is GMP, SC-FEC, SD-FEC DP-16QAM and coherent transmission and detection. Although it is debatable whether GMP is useful, or just included because it's there. In a short definition we need to say something about the GMP and FEC because neither are BASE-R, but we don't need the detail.

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

**Response**
ACCEPT IN PRINCIPLE.

See response to comment 171

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

**Suggested Remedy**
delete inserted abbreviation

**Response**
REJECT.

The term "DAC" is used in the base standard as well as this document but is not in the base standard abbreviation list so consensus of the CRG was it should be added.

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...

**Suggested Remedy**
delete inserted abbreviation

**Response**
REJECT.

The term "ADC" is used in the base standard as well as this document but is not in the base standard abbreviation list so consensus of the CRG was it should be added.

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

**Suggested Remedy**
Change 16QAM to QAM16 and DP-16QAM to DP-QAM16 throughout

**Response**
REJECT.

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

The term "GMP" is used 42 times in the draft and is not listed in the abbreviation table.

**Suggested Remedy**
Add "GMP: generic mapping procedure" to the entries.

**Response**
REJECT.

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

Cl 1 SC 1.5 P 18 L 30 # 148
Lusted, Kent Intel Corporation

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

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

Response Response Status W
REJECT.

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

Cl 30 SC 30.5.1.1.2 P 19 L 12 # 196
Huber, Thomas Nokia

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

SuggestedRemedy
Change SR16 to VR4 in the editing instruction

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

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

Cl 45 SC 45.2.1 P 20 L 14 # 374
Wienckowski, Natalie General Motors

Comment Type E Comment Status D bucket
The style

SuggestedRemedy
Add an ellipses in the first blank row in Table 45-3. Delete the blank row after the row for 1.825 through 1.899.

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 45 SC 45.2.1.9 P 21 L 32 # 159
Grow, Robert RMG Consulting

Comment Type E Comment Status D bucket
Incorrect subclause number.

SuggestedRemedy
Change to 45.2.1.22

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

Cl 45 SC 45.2.1.22.13 P 22 L 1 # 25
Marris, Arthur
Cadence Design Systems

Comment Type ER Comment Status D
Needs to reference modification made by 802.3db and change paragraph number to 45.2.1.22.1aa

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Comment Type E Comment Status D
bucket

Cl 45 SC 45.2.1.22.13 P 22 L 1 # 160
Grow, Robert
RMG Consulting

Comment Type E Comment Status D
bucket

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

SuggestedRemedy
Insert new subclause 45.2.1.22.1c after 45.2.1.22.1b (as inserted by IEEE Std 802.3db-2022) as follows:

Renumber subclause as 45.2.1.22.1c.

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 25

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

Comment Type E Comment Status R

Cl 45 SC 45.2.1.150.1 P 22 L 11 # 161
Grow, Robert
RMG Consulting

Comment Type E Comment Status D
bucket

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

Comment Type E Comment Status A

SuggestedRemedy
Maybe NOTE--These two tables are significantly different?

Response Response Status C
REJECT.

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

Cl 45 SC 45.2.1.153.1a P 23 L 4 # 221

Wienckowski, Natalie
General Motors

Comment Type E Comment Status D
bucket
typo 154.6 is not a proper Table number.

SuggestedRemedy
Change: 154.6
To: 154-5

Proposed Response Response Status W
PROPOSED ACCEPT.

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 198
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 45 SC 45.2.1.153.1a P 23 L 31 # 376
Wienckowski, Natalie General Motors

Comment Type E Comment Status D

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

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 162

Cl 45 SC 45.2.1.153.1a P 23 L 35 # 198
Huber, Thomas Nokia

Comment Type ER Comment Status A

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

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

Response Response Status C
ACCEPT.

Cl 45 SC 45.2.1.153a P 22 L 19 # 162
Grow, Robert RMG Consulting

Comment Type E Comment Status D

Insert point is after the subclauses of 45.2.1.153.

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

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

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 162

---

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.

**Suggested Remedy**

Change: 45.2.1.157.1a

To: 45.2.1.157a.1

Also in the instructions on P24L3.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 163

---

Insert point is after the subclauses of 45.2.1.157.1.

**Suggested Remedy**

Insert 45.2.1.157a and 45.2.1.157.1a after 45.2.1.157.1 as follows:

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

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

---

802.3cw does not have an objective to support EEE.

The usage of EEE in current high-speed Ethernet applications is practically non-existent.

Therefore there is no need to list new PHYs as supporting EEE, nor to add LPI specific features to new PCSs that are added for these PHYs. Having optional features that are never used is a burden for readers and implementers.

**Suggested Remedy**

Remove clause 78 from this amendment.

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

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

Implement additional changes as necessary with editorial license.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 78 SC 78.1.4 P 26 L 16 # 172
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

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

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

**SuggestedRemedy**

Change entry in Clause field to:
155, 156

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

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

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

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

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

**SuggestedRemedy**

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

**Response**

ACCEPT IN PRINCIPLE.

See response to comment 173

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

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

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

**SuggestedRemedy**

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

**Response**

ACCEPT IN PRINCIPLE.

See response to comment 173

Cl 116 SC 116.1.3 P 27 L 22 # 419
Dawe, Piers Nvidia

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

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

**SuggestedRemedy**

I can think of three options:

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

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

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

**Response**

REJECT.

No consensus within the CRG to change the name of the 400GBASE-ZR PHY
D'Ambrosia, John
Futuurewei, US Subsidiary of Huawei

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

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)

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

ACCEPT IN PRINCIPLE.

**Comment Status**: A  **Response Status**: C

D'Ambrosia, John
Futuurewei, US Subsidiary of Huawei

**Comment Type**: ER  **Comment Status**: A

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

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

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

ACCEPT IN PRINCIPLE.

**Comment Status**: A  **Response Status**: W

Grow, Robert
RMG Consulting

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

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

**Suggested Remedy**
Add note C to entry for Clause 118.

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

REJECT.

This comment was WITHDRAWN by the commenter.

**Comment Status**: D  **Response Status**: W

Ran, Adee
Cisco

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

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

Also, the table ruling should be cleaned up.

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

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

See response to comment 4

**Comment Status**: A  **Response Status**: W

Grow, Robert
RMG Consulting

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

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

**Suggested Remedy**
Add note C to entry for Clause 118.

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

REJECT.

This comment was WITHDRAWN by the commenter.
Comment Type TR Comment Status A

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

Suggested Remedy

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

Response Response Status C

ACCEPT IN PRINCIPLE.

For the 400GBASE-ZR row in Table 116-5 delete "O" (optional) in following clauses (119, 120, 120B – 120G)

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

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

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

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

Suggested Remedy

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.).'
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.

Suggested Remedy

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

D'Ambrosia, John
Futuurewei, US Subsidiary of Huawei

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".

Suggested Remedy

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

Dawe, Piers
Nvidia

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.

Dawe, Piers
Nvidia

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 for 116.2.3
recommended text will be provided in a follow-up presentation.

D'Ambrosia, John
Futuurewei, US Subsidiary of Huawei

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 for 116.2.4
recommended text will be provided in a follow-up presentation.

Dawe, Piers
Nvidia

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 for 116.2.4
recommended text will be provided in a follow-up presentation.

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

Huber, Thomas
Nokia

Comment Type: E
Comment Status: A

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."

Response
ACCEPT IN PRINCIPLE.

See response to comment 6

Brown, Matt
Huawei

Comment Type: ER
Comment Status: A

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.

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

Response
ACCEPT IN PRINCIPLE.

In 116.2.4 change editing instruction to "Replace 116.2.4 with"

With the following text

"The PMA provides a medium-independent means for the PCS to support the use of a range of physical media.

The 200GBASE-R and 400GBASE-R PMAs perform the mapping of transmit and receive data streams between the PCS and PMA via the PMA service interface, and the mapping and multiplexing of transmit and receive data streams between the PMA and PMD via the PMD service interface. In addition, the PMA performs retiming of the received data stream when appropriate, optionally provides data loopback at the PMD service interface, and optionally provides test pattern generation and checking. The 200GBASE-R and 400GBASE-R PMAs are specified in Clause 120.

The 400GBASE-ZR PHY uses the PMA specified in Clause 155"

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

D'Ambrosia, John
Fuuturewei, US Subsidiary of Huawei

**Comment Type** TR  **Comment Status** A
The changes to the base text are incorrect as 400GBASE-ZR is not a member of 400GBASE-R family.

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

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

See response to comment 7

---

D'Ambrosia, John
Fuuturewei, US Subsidiary of Huawei

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

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

**Proposed Response**  **Response Status** W
PROPOSED ACCEPT IN PRINCIPLE.

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

---

D'Ambrosia, John
Fuuturewei, US Subsidiary of Huawei

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

**Suggested Remedy**
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."

**Response**  **Response Status** W
ACCEPT IN PRINCIPLE.

Delete existing 116.2.5 D2.0 text
Add as new last paragraph:

"The 400GBASE-ZR PMD and its corresponding media is specified in Clause 156."

---

D'Ambrosia, John
Fuuturewei, US Subsidiary of Huawei

**Comment Type** TR  **Comment Status** A
Note a and b for Table 116-7 only provide respective definitions for 400GBASE-R.

**Suggested Remedy**
Modify notes to provide definitions for 400GBASE-ZR.

**Proposed Response**  **Response Status** W
PROPOSED ACCEPT IN PRINCIPLE.

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

---

Brown, Matt
Huawei

**Comment Type** ER  **Comment Status** A
In the editorial instruction, statement "unchanged rows not shown" is incorrect since the two rows shown are inserted, not changed.

**Suggested Remedy**
Change "unchanged rows not shown" to "some unchanged rows not shown".

**Proposed Response**  **Response Status** W
PROPOSED ACCEPT.
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Comment Type: T
Comment Status: D

D'Ambrosia, John
Futurewei, US Subsidiary of Huawei

Comment Type: TR
Comment Status: D

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

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

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: W
PROPOSED ACCEPT IN PRINCIPLE.

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

Comment Type: TR
Comment Status: D

D'Ambrosia, John
Futurewei, US Subsidiary of Huawei

Comment Type: TR
Comment Status: D

400GBASE-ZR has no PCS lanes -

Suggested Remedy:
- all of these notes need to remove any references to clause 156

Proposed Response: W
PROPOSED ACCEPT IN PRINCIPLE.

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

Comment Type: TR
Comment Status: D

Grow, Robert
RMG Consulting

Comment Type: E
Comment Status: A

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

Suggested Remedy:
- Delete Clause 119 from the draft.

Response: C
ACCEPT.

Comment Type: E
Comment Status: A

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

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

Response: C
ACCEPT IN PRINCIPLE.

See response to comment 165.
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>P</th>
<th>L</th>
<th>#</th>
<th>Comment</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
<th>Response Status</th>
<th>SuggestedRemedy</th>
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<tr>
<td>120A</td>
<td>120A.6</td>
<td>103</td>
<td>8</td>
<td>2</td>
<td>Hajduczenia, Marek</td>
<td>E</td>
<td>D</td>
<td>bucket</td>
<td>Text of the editorial instruction should be bolded and italics</td>
<td>PROPOSED ACCEPT.</td>
</tr>
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<td>120A.6</td>
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<td>3</td>
<td>Hajduczenia, Marek</td>
<td>E</td>
<td>D</td>
<td>bucket</td>
<td>Missing space between &quot;400GXS&quot; and &quot;+&quot;</td>
<td>PROPOSED ACCEPT.</td>
</tr>
<tr>
<td>120A</td>
<td>120A.6</td>
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<td>Dawe, Piers</td>
<td>E</td>
<td>D</td>
<td>bucket</td>
<td>two 400GMI and 400GAUI-8 interfaces</td>
<td>PROPOSED ACCEPT.</td>
</tr>
<tr>
<td>155</td>
<td>155.1.1</td>
<td>32</td>
<td>3</td>
<td>126</td>
<td>Nicholl, Gary</td>
<td>TR</td>
<td>D</td>
<td>bucket</td>
<td>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.</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. Review supporting presentation. For comment resolution group (CRG) consideration.</td>
</tr>
<tr>
<td>155</td>
<td>155.1.1</td>
<td>32</td>
<td>10</td>
<td>3</td>
<td>Brown, Matt</td>
<td>E</td>
<td>D</td>
<td>bucket</td>
<td>PHY name breaks across two rows.</td>
<td>PROPOSED ACCEPT.</td>
</tr>
<tr>
<td>155</td>
<td>155.1.1</td>
<td>32</td>
<td>10</td>
<td>125</td>
<td>Nicholl, Gary</td>
<td>ER</td>
<td>D</td>
<td>bucket</td>
<td>In 400BASE-ZR change hyphen to non-breaking hyphen (ESC,[,-],[h]). Same for &quot;DP-16QAM&quot; on line 18.</td>
<td>PROPOSED ACCEPT. Review supporting presentation, for comment resolution group (CRG) consideration.</td>
</tr>
</tbody>
</table>
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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<tr>
<th>Cl</th>
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<tr>
<td>155</td>
<td>155.1.1</td>
<td>E</td>
<td>D</td>
<td>Missing space</td>
<td><strong>PROPOSED ACCEPT.</strong>&lt;br&gt;Change &quot;characters. The&quot; to &quot;characters. The&quot;</td>
<td>W</td>
</tr>
<tr>
<td>155</td>
<td>155.1.1</td>
<td>TR</td>
<td>A</td>
<td>PCS description</td>
<td><strong>ACCEPT IN PRINCIPLE.</strong>&lt;br&gt;Globally replace &quot;16QAM&quot; with &quot;16-QAM&quot; and &quot;DP-16QAM&quot; with &quot;DP-16-QAM&quot;.</td>
<td>W</td>
</tr>
<tr>
<td>155</td>
<td>155.1.1</td>
<td>E</td>
<td>D</td>
<td>Superfluous comma before &quot;and&quot;</td>
<td><strong>PROPOSED ACCEPT.</strong>&lt;br&gt;Delete the comma</td>
<td>W</td>
</tr>
</tbody>
</table>

---

Marris, Arthur<br>Cadence Design Systems

Maguire, Valerie<br>Copperopolis

Dawe, Piers<br>Nvidia

Ran, Adee<br>Cisco

---

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.

Response: REJECT.

See response to comment 415

---

"This clause specifies the physical coding sublayer (PCS) and physical medium attachment (PMA) sublayer for the physical layer implementation known as 400GBASE-ZR. The 400GBASE-ZR PCS and 400GBASE-ZR PMA are sublayers of the 400GBASE-ZR PHY listed in Table 116–2. The term 400GBASE-ZR is used when referring to the 400GBASE-ZR PHY, which uses the PCS and PMA defined in this clause."

---

"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.

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

Cl 155 SC 155.1.2 P 32 L 30 # 378
Wienckowski, Natalie General Motors

Comment Type: E  Comment Status: D  bucket
A comma is not needed after "and" when it is a list of only 2 items.

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

Proposed Response: Response Status: W
PROPOSED ACCEPT.

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

Comment Type: E  Comment Status: D  bucket
SC-FEC is used throughout the draft, but is not detailed in 1.5

SuggestedRemedy
- add abbreviation SD-FEC - staircase forward error correction

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

Cl 155 SC 155.1.2 P 33 L 18 # 181
D'Ambrosia, John Futurewei, US Subsidiary of Huawei

Comment Type: ER  Comment Status: D  bucket
See Figure 155-1. The bottom of the stack should include a label that is the PMD.
Reference Figure 124-1 for a similar diagram.

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

Proposed Response: Response Status: W
PROPOSED ACCEPT.

Cl 155 SC 155.1.3 P 33 L 36 # 379
Wienckowski, Natalie General Motors

Comment Type: E  Comment Status: D  bucket
wording

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

Proposed Response: Response Status: W
PROPOSED ACCEPT.

Cl 155 SC 155.1.3 P 33 L 40 # 127
Nicholl, Gary Cisco Systems

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

SuggestedRemedy
This is just a question for clarification.

Proposed Response: Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.
G.709 is already in the list of normative references at 1.3. The latest version, including Annex D is available at:
https://www.itu.int/rec/T-REC-G.709/en

Cl 155 SC 155.1.3 P 33 L 42 # 128
Nicholl, Gary Cisco Systems

Comment Type: ER  Comment Status: D  bucket
Item e) and f) mention SC-FEC, but there is no definiton of "SC-FEC" in the definitions section (1.4).

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

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

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

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: Clause, Subclause, page, line
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.1.4 P 33 L 49 # 129
Nicholl, Gary Cisco Systems

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

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

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

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

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

SuggestedRemedy
Delete noted sentence.

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

Cl 155 SC 155.1.4 P 34 L 2 # 425
Dawe, Piers Nvidia

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

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

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

Cl 155 SC 155.1.4 P 34 L 2 # 42
Ran, Adee Cisco

Comment Type E Comment Status D
The letter x should be replaced by the multiplication sign ? (twice)

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

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 155 SC 155.1.4 P 34 L 2 # 424
Dawe, Piers Nvidia

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

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Change: The 400GBASE-ZR PCS has a nominal rate at the PMA service interface of 8 x 59.84375 x (28/29) Gb/s +/- 20 ppm (~462.2414 Gb/s) to The 400GBASE-ZR PCS has a nominal rate per lane at the PMA service interface of 59.84375 x (28/29) Gb/s (~57.780172 Gb/s)
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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<tr>
<td>155</td>
<td>155.1.4.2</td>
<td>T</td>
<td>D</td>
<td>The nominal rate is a specific number, and should not include range (in ppm). Also in 155.3.2.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>SuggestedRemedy: Either delete &quot;+/- 20 ppm&quot; or delete &quot;nominal&quot;, in both subclauses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proposed Response: PROPOSED ACCEPT IN PRINCIPLE. At 155.1.4, delete +/- 20 ppm. At 155.3.2, delete +/- 20 ppm in two places.</td>
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</table>

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<tr>
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<td>D</td>
<td>bucket</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SuggestedRemedy: Missing word &quot;The&quot;</td>
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<td>D</td>
<td>bucket</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SuggestedRemedy: Change to &quot;The PMA service interface&quot;</td>
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<table>
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<th>SC 155.1.4.2</th>
<th>Comment Type</th>
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<td>155.1.4.2</td>
<td>E</td>
<td>D</td>
<td>bucket</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SuggestedRemedy: add &quot;The&quot; at the beginning of the sentence.</td>
</tr>
</tbody>
</table>

**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:** Clause, Subclause, page, line

---

**Wiencowski, Natalie** General Motors

**Comment Type:** E editorial required

**Comment Status:** D

**PCS description:** bucket

**SuggestedRemedy:**

- Change: PMA service interface
- To: The PMA service interface

**Proposed Response:**

- Proposed Accept in Principle.
- Review supporting presentation. For comment resolution group (CRG) consideration.

---

**D'Ambrosia, John** Futurewei, US Subsidiary of Huawei

**Comment Type:** ER editorial required

**Comment Status:** D

**PCS description:** bucket

**SuggestedRemedy:**

- delete the word FEC.

**Proposed Response:**

- Proposed Accept in Principle.

---

**Wiencowski, Natalie** General Motors

**Comment Type:** E editorial required

**Comment Status:** D

**PCS description:** bucket

**SuggestedRemedy:**

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

**Proposed Response:**

- Proposed Accept.
Comment Type: TR
Comment Status: D
Stated sentence: The PMA service interface is defined in 155.3. The link for 155.3 does not go to a PMA service interface sub clause.

Suggested Remedy: Pointer should be to 155.3.2.

Proposed Response: PROPOSED ACCEPT.

Comment Type: TR
Comment Status: D
This PCS is too complicated for just a "directive" specification. We need examples.

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

Proposed Response: PROPOSED REJECT.

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

Comment Type: E
Comment Status: D
"400GBASE-Z" should be "400GBASE-ZR".

Suggested Remedy: Change "400GBASE-Z" to "400GBASE-ZR".

Response: ACCEPT IN PRINCIPLE.

See response to comment 170.

Comment Type: E
Comment Status: D
"SC-FEC adapt & encoding", "SC-FEC decoding & adapt" - it would help to know that there is interleaving here as well as below.

Suggested Remedy: "SC-FEC adapt, encoding and interleaving", "SC-FEC de-interleaving, decoding & adapt"?

Proposed Response: PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.
**IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments**

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

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

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

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

PROPOSED ACCEPT IN PRINCIPLE.

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

**Comment Status:** D  **Response Status:** W

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

PROPOSED ACCEPT.

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

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

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

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

ACCEPT IN PRINCIPLE.

See response to comment 170

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

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

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

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

ACCEPT IN PRINCIPLE.

**Comment Status:** D  **Response Status:** W

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

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.

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

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

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

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

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

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.

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

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:** W

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

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

Suggested Remedy

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

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

"receives two streams of digitally encoded m-bit 16QAM symbols" bucket markers

Suggested Remedy

Insert a space.

Proposed Response Response Status W
PROPOSED ACCEPT.
D'Ambrosia, John, Futurewei, US Subsidiary of Huawei

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<td><strong>PCS description</strong></td>
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<tr>
<td>TR</td>
<td>D</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Suggested Remedy**
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**
PROPOSED ACCEPT IN PRINCIPLE.
See the response to comment 20.

---

Dawe, Piers, Nvidia

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC 155.2.1</th>
<th>P 36</th>
<th>L 22</th>
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<td><strong>PCS description</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>D</td>
<td>As interleavers are a significant feature of this scheme</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Proposed Response**
PROPOSED ACCEPT IN PRINCIPLE.
See the response to comment 20.

---

Gustlin, Mark, Cisco

<table>
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<tr>
<th>Cl</th>
<th>SC 155.2.1</th>
<th>P 36</th>
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<td><strong>PCS description</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>D</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Suggested Remedy**
Reverse the usage to: "an outer SC-FEC code" and "an inner Hamming code SD-FEC"
**IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments**

---

**Comment**

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

Nicholl, Gary Cisco Systems

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

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

**Suggested Remedy**

Change

From:

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

To:

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

**Proposed Response**

**Response Status** W

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.

---

**Comment**

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

Ran, Adee Cisco

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

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

**Suggested Remedy**

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

**Proposed Response**

**Response Status** W

PROPOSED ACCEPT IN PRINCIPLE.

A contribution with the proposed test pattern is needed.

---

**Comment**

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

Dawe, Piers Nvidia

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

PCS Receive function or PCS receive process

**Suggested Remedy**

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

**Proposed Response**

**Response Status** W

PROPOSED ACCEPT IN PRINCIPLE.

Change:

"...decodes a stream of 128-symbol codewords.”

to

"...decodes a stream of 128-bit codewords.”

Change:

"...the resulting 119-symbol codewords.”

to

"...the resulting 119-bit codewords.”

---

**Comment**

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

Dawe, Piers Nvidia

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

PCS Receive process

**Suggested Remedy**

PCS Receive function or PCS receive process

**Proposed Response**

**Response Status** W

PROPOSED ACCEPT IN PRINCIPLE.

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

47

Cl 155 SC 155.2.1 P 36 L 38 # 47
Ran, Adee Cisco
Comment Type E Comment Status D
"SC-FEC blocks of 510 ? 512"
I assume it is the number of bits (otherwise, what is it?)
SuggestedRemedy
Add "bits" after "510 ? 512".
Proposed Response Response Status W
PROPOSED ACCEPT.

439

Cl 155 SC 155.2.1 P 36 L 38 # 439
Dawe, Piers Nvidia
Comment Type T Comment Status D
SC-FEC codewords (as on line 39)
SuggestedRemedy
SC-FEC codewords (as on line 39)
Proposed Response Response Status W
PROPOSED ACCEPT.

438

Cl 155 SC 155.2.1 P 36 L 38 # 438
Dawe, Piers Nvidia
Comment Type E Comment Status D
SC-FEC blocks of 510 x 512
SuggestedRemedy
What? bits? bytes?
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Change:
"...blocks of 510 ? 512 are."
to
"...blocks of 510 ? 512 bits are."

Cl 155 SC 155.2.1 P 36 L 40 # 224
Law, David Hewlett Packard Enterprise
Comment Type E Comment Status D
The terms 'overhead fields' (page 36, line 40) and 'OH fields' (page 38, line 46), 'OH bytes' (page 38, line 2) then 'OH blocks' on the next line, and 'GMP overhead' (page 38, line 12), seem to be used interchangeable.
SuggestedRemedy
Please use a consistent term, 'overhead field' seems to be the most common.
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
At item 3 of the list in 155.2.4.3, change: "carry OH bytes" to "carries the overhead field"
At the last sentence of the 3rd paragraph of 155.2.4.3, change:
"details of the encoding of the GMP overhead" to
"details of the encoding of the GMP justification control bytes that are carried in the 400GBASE-ZR frame's overhead field"
At 155.2.4.4, change:
"The AM, pad and OH fields are" to
"The AM, pad and overhead fields are"

Cl 155 SC 155.2.1 P 36 L 41 # 29
Marris, Arthur Cadence Design Systems
Comment Type E Comment Status D
PCS description
Is "frame" the correct word to use here?
SuggestedRemedy
Consider changing "each 400GBASE-ZR frame" to "each 400GBASE-ZR PCS lane" or define what "frame" means in this context. Perhaps add a link to Figure 155-3.
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Change:
"The PCS then removes the alignment markers and overhead fields from each 400GBASE-ZR frame and passes the data to the GMP de-mapper."
to
"The PCS then removes the alignment marker, pad and overhead fields from the received data and passes the remaining payload bits, shown in Figure 155-3, to the GMP de-mapper."
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
<tr>
<th>Cl/SC</th>
<th>P/L</th>
<th>#</th>
<th>Ran, Adee</th>
<th>Cisco</th>
</tr>
</thead>
<tbody>
<tr>
<td>155/1</td>
<td>36</td>
<td>48</td>
<td>&quot;257B blocks&quot; is inconsistent with &quot;257-bit blocks&quot; used earlier. &quot;B&quot; is not used to denote bits elsewhere (except as abbreviations in coding scheme names). Similarly &quot;66b&quot;, &quot;120b&quot;, and other instances in this draft.</td>
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<td></td>
<td>SuggestedRemedy</td>
<td>Change &quot;257B&quot; to &quot;257-bit&quot; across the draft except where it is part of &quot;256B/257B&quot;. Similarly, change &quot;66b&quot; to &quot;66-bit&quot; in 155.2.2, &quot;120b&quot; to &quot;120-bit&quot; in 155.2.4.3, and similar instances as necessary.</td>
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<td></td>
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<td>Proposed Response</td>
<td>PROPOSED ACCEPT</td>
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</tbody>
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<thead>
<tr>
<th>Cl/SC</th>
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<th>Nicholl, Gary</th>
<th>Cisco Systems</th>
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</thead>
<tbody>
<tr>
<td>155/4.1</td>
<td>37</td>
<td>132</td>
<td>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?</td>
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<td></td>
<td>SuggestedRemedy</td>
<td>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).</td>
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<td>Proposed Response</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. A contribution with the suggested diagram and description is needed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cl/SC</th>
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<th>Law, David</th>
<th>Hewlett Packard Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>155/2.4</td>
<td>37</td>
<td>225</td>
<td>The only 'shall' statement regarding the PCS transmit path (155.2.4) is in subclause 155.2.4.9 'Frame synchronous scrambler', similarly the only 'shall' statement regarding the PCS receive path (155.2.5) is in subclause 155.2.5.3 'Descrambler' and 155.2.5.6 CRC32 check and error marking'. Mandatory PCS transmit requirements, mandatory PCS receive requirements and other mandatory requirements need to be covered by 'shall' statements.</td>
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<td>SuggestedRemedy</td>
<td>Rewrite the text as follows: The transmit PCS generates 66-bit blocks based upon the TXD&lt;63:0&gt; and &lt;TXC&lt;7:0&gt; signals received from the 400GMII, as specified in the transmit state diagram shown in Figure 119-14. One 400GMII data transfer is encoded into one 66-bit block. The contents of each block are contained in a vector tx_coded&lt;65:0&gt;, which is passed to the 64B/66B to 256B/257B transcoder. tx_coded&lt;1:0&gt; 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.</td>
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<td>Proposed Response</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. A contribution is needed to list where PCS mandatory requirements are described.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Cl/SC</th>
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<th>#</th>
<th>Huber, Thomas</th>
<th>Nokia</th>
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</thead>
<tbody>
<tr>
<td>155/2.4.1</td>
<td>37</td>
<td>203</td>
<td>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.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>SuggestedRemedy</td>
<td>Rewrte the text as follows: The transmit PCS generates 66-bit blocks based upon the TXD&lt;63:0&gt; and &lt;TXC&lt;7:0&gt; signals received from the 400GMII, as specified in the transmit state diagram shown in Figure 119-14. One 400GMII data transfer is encoded into one 66-bit block. The contents of each block are contained in a vector tx_coded&lt;65:0&gt;, which is passed to the 64B/66B to 256B/257B transcoder. tx_coded&lt;1:0&gt; 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.</td>
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<td>Proposed Response</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. Replace the text at 155.2.4.1 with: &quot;The transmit PCS generates 66-bit blocks based upon the TXD&lt;63:0&gt; and TXC&lt;7:0&gt; signals received from the 400GMII, as specified in the transmit state diagram shown in Figure 119-14. One 400GMII data transfer is encoded into one 66-bit block. The contents of each block are contained in a vector tx_coded&lt;65:0&gt;, which is passed to the 64B/66B to 256B/257B transcoder. tx_coded&lt;1:0&gt; 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.&quot;</td>
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<tr>
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<td>155.2.4.3</td>
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</tbody>
</table>

Law, David
Hewlett Packard Enterprise

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

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

Subclause 155.2.4.3 however then says that 'The Payload area of a four-frame multi-frame is divided into 10 220 GMP words ... 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**

Cl 155 SC 155.2.4.3 P 37 L 29 # 226

<table>
<thead>
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<td>155.2.4.3</td>
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</tr>
</tbody>
</table>

Ran, Adee
Cisco

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

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

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

**Suggested Remedy**

Cl 155 SC 155.2.4.3 P 37 L 31 # 592

Slavick, Jeff
Broadcom

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

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

**Suggested Remedy**

Cl 155 SC 155.2.4.3 P 37 L 44 # 441

Dawe, Piers
Nvidia

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

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

**Suggested Remedy**

Cl 155 SC 155.2.4.3 P 37 L 49 # 595

Dawe, Piers
Nvidia

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

"257b blocks": many places. Compare base doc. "256B/257B" can stay.

**Suggested Remedy**

Cl 155 SC 155.2.4.3 P 37 L 54 # 598

Dawe, Piers
Nvidia

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

"Bucket": undefined term not used elsewhere, rogue capitals

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

Dawe, Piers  Nvidia  
Comment Type: E  Comment Status: D  bucket
16 x 120b markers
SuggestedRemedy: 120-bit
Proposed Response: Response Status: W  PROPOSED ACCEPT.

Slavick, Jeff  Broadcom  
Comment Type: E  Comment Status: D  bucket
Section 155.2.4.5 defines/describes how the OH works
SuggestedRemedy: Change "discussed" to "described"
Proposed Response: Response Status: W  PROPOSED ACCEPT.

Marris, Arthur  Cadence Design Systems  
Comment Type: E  Comment Status: D  bucket
Define OH acronym as it is the first use in the Clause
SuggestedRemedy: Change "OH bytes" to "overhead (OH) bytes"
Proposed Response: Response Status: W  PROPOSED ACCEPT.

Huber, Thomas  Nokia  
Comment Type: T  Comment Status: D  GMP mapper
The description of the 20-bit pad says it is inserted after the OH blocks, but the OH is a 1280 bit field (which is later described as four chunks of 320 bits that are interleaved). Since much of the text talks about 66b blocks or 257 blocks, it is probably better to refer to the OH bits rather than blocks.
SuggestedRemedy: Change "A 20 bit pad of all zeros is added after the OH blocks" to "A 20 bit pad of all zeros is added after the 1280 OH bits."
Proposed Response: Response Status: W  PROPOSED ACCEPT.

Law, David  Hewlett Packard Enterprise  
Comment Type: T  Comment Status: D  GMP mapper
Subclause 155.2.4.3 says 'The 400GBASE-ZR PCS payload is mapped ...' however this is the only use of the term '400GBASE-ZR PCS payload" in the draft.
SuggestedRemedy: Suggest that the text 'The 400GBASE-ZR PCS payload is mapped ...' is changed to read 'The 400GBASE-ZR PCS payload of the serialized stream of 257B blocks is mapped ...'.
Proposed Response: Response Status: W  PROPOSED ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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

Comment Type TR  Comment Status D row and column numbering in item 5 it refers to the PCS payload beginning at column 5141 which would be true for a indexing that begins at 1, but Table 155-1 appears to use column indexing that begins with 0

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

Proposed Response  Response Status W PROPOSED ACCEPT.

Cl 155 SC 155.2.4.3 P 38 L 8 # 228
Law, David Hewlett Packard Enterprise

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

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

Proposed Response  Response Status W PROPOSED ACCEPT.

Cl 155 SC 155.2.4.3 P 38 L 11 # 205
Huber, Thomas Nokia

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

SuggestedRemedy
Change the principles of the GMP mapper described in ITU-T G.709 (06/2020) Annex D to:

The principles of the GMP mapper are described in ITU-T G.709 (06/2020) Annex D. Details of the overhead encoding for 400GBASE-ZR are in 155.2.4.5.3.

Proposed Response  Response Status W PROPOSED ACCEPT.

Cl 155 SC 155.2.4.3 P 38 L 11 # 443
Dawe, Piers Nvidia

Comment Type E  Comment Status D ITU-T G.709 Clause 9.4.3.2

SuggestedRemedy
ITU-T G.709 Clause 19.4.3.2

Proposed Response  Response Status W PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 205

Cl 155 SC 155.2.4.3 P 38 L 8 # 228
Law, David Hewlett Packard Enterprise

Comment Type E  Comment Status D ITU-T G.709 Clause 19.4.3.2

SuggestedRemedy
Change 9.4.3.2 to 19.4.3.2

Proposed Response  Response Status W PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 205

Cl 155 SC 155.2.4.3 P 38 L 12 # 229
Law, David Hewlett Packard Enterprise

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

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

Proposed Response  Response Status W PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 205
Payload should not be capitalized.

Suggested Remedy

Change: The Payload area
To: The payload area

PROPOSED ACCEPT.

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 blocks and stuffing blocks to be pre-computed."

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

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

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

to
"GMP word numbers of stuffing block locations"

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

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

PROPOSED ACCEPT.
Comment Type: T
Comment Status: D

Cl 155  SC 155.2.4.3  P 38  L 17  # 444
Dawe, Piers  Nvidia

Comment Type: T  Comment Status: D  GMP mapper

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

Suggested Remedy:
Change 401.5625 to 401.542892 mention both

Proposed Response: Response Status: W

PROPOSED REJECT.
The suggested remedy is not clear.
The rate of 401.542892 is before insertion of the alignment marker block. Referring to Figure 119-8, the rate before AM insertion is: (163,832 / 163,840) x 401.5625 = 401.542892

Comment Status: D
Response Status: W
GMP mapper

Cl 155  SC 155.2.4.3  P 38  L 20  # 446
Dawe, Piers  Nvidia

Comment Type: E  Comment Status: D

Cl 155  SC 155.2.4.3  P 38  L 20  # 51
Ran, Adee  Cisco

Comment Type: E  Comment Status: D

Cl 155  SC 155.2.4.3  P 38  L 20  # 123

Proposed Response: Response Status: W

PROPOSED ACCEPT IN PRINCIPLE.
The GMP rate is a multiple of the line rate of 59.84375 GBd from Table 156-6. The presentation of the GMP rate requires a table showing the rate expansion between the GMP clock and the line clock.
The "(row, column)" column seems redundant with the GMP word numbers. Also, "rows" is only used for illustration and "column" is not defined.

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

Proposed Response
PROPOSED ACCEPT IN PRINCIPLE.

Delete the 3rd column from Table 155-1.

Cl: 155 SC: 155.2.4.3 P: 38 L: 30 #: 53
Ran, Adee Cisco
Comment Type: E Comment Status: D

Cl: 155 SC: 155.2.4.3 P: 38 L: 30 #: 52
Ran, Adee Cisco
Comment Type: T Comment Status: D GMP mapper

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

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

Proposed Response
PROPOSED ACCEPT IN PRINCIPLE.

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

See the response to comment 150.

Cl: 155 SC: 155.2.4.3 P: 38 L: 42 #: 447
Dawe, Piers Nvidia
Comment Type: E Comment Status: D bucket

SuggestedRemedy
Remove

Proposed Response
PROPOSED ACCEPT.

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

SuggestedRemedy
Change to "10970-bit row aligned".

Proposed Response
PROPOSED ACCEPT.

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

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

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

Proposed Response
PROPOSED ACCEPT.

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

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

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

Suggested Remedy
Remove "400BASE-ZR" from the section title of 155.2.4.4.1 and 155.2.4.4.2

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

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.

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

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

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

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

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

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: Clause, Subclause, page, line
The 400GBASE-ZR overhead is a 40-byte frame structure that uses a four-frame multi-frame, as shown in Figure 155-4.

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

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

Suggested Remedy
Change to "The 400GBASE-ZR overhead is a 160-octet block that is divided into four 40-octet frames, as shown in Figure 155-4".
Change "byte" to "octet" globally.
In 151.2.4.5.1, change "a 256-frame multi-frame sequence" to "a 256-frame sequence".
In 155.2.4.5.3 change "four-frame multi-frame" to "OH".
Change elsewhere as appropriate.
Implement with editorial license.

Proposed Response
PROPOSED ACCEPT.

MFAS is not listed in abbreviations
Suggested Remedy
Add to 1.5
MFAS Multi-frame alignment signal

Proposed Response
PROPOSED ACCEPT.
### Comment 449

**Comment Type:** TR

**Comment Status:** D

**Suggested Remedy:**
- G.709.1 is not a normative reference
- Remove GMP, define the 256-frame multi-frame sequence here, or add the reference

**Proposed Response**

**Response Status:** W

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 59.

---

### Comment 390

**Comment Type:** TR

**Comment Status:** D

Law, David

**Comment:**

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

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

**Proposed Response**

**Response Status:** W

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 449.

---

### Comment 230

**Comment Type:** TR

**Comment Status:** D

Slavick, Jeff

**Comment:**

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.

**Suggested Remedy:**
- If the RPF bit is mapped from the PMA:IS_SIGNAL.indication primitive, replace the second sentence of the second paragraph of subclause 155.2.4.5.2 with 'The bit is set based on the most recently received SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive. It is "0" if the value was OK and "1" if the value was FAIL.'.
- If the RPF bit is not mapped from the PMA:IS_SIGNAL.indication primitive, please define where it is mapped from, or the conditions for when it is set and cleared.

**Proposed Response**

**Response Status:** W

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 449.

Add a sentence after the 1st sentence, 2nd paragraph of 155.2.4.5.2:
"The bit is set based on the most recently received SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive. It is "0" if the value was OK and "1" if the value was FAIL."
"signal fail status was detected by the remote 400GBASE-ZR receive function in the upstream direction". But see 1.4.586 upstream: In an access network, transmission away from the subscriber end of the link. Applicable to networks where there is a clear indication in each deployment as to which end of a link is closer to a subscriber. A status is generated, maybe based on detecting something.

**Suggested Remedy:**

Something like:

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

**Proposed Response:**

PROPOSED ACCEPT IN PRINCIPLE.

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

---

The RPF field is in bit location 0 of the Status Octect. But the Text states it's bit location 1.

**Suggested Remedy:**

If the idea is that a 400GBASE-ZR PHY should continue to transmit data while its input is bad, then changes elsewhere would be needed for unidirectional operation.

**Proposed Response:**

PROPOSED ACCEPT IN PRINCIPLE.

This bit appears to be carried over from OIF 400ZR, which referenced it from FlexO (G.709.1). The task force can decide if it's needed for Ethernet and if not, we can make it a reserved bit.
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?

Please rephrase to clarify.

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.

Two sections, both called "Link status monitoring and signaling", say different things about e.g. STAT<6> 155.2.5.7.2 says "in the received STAT<6>", this earlier Tx one doesn't have the equivalent.

Add extra words to make the context clear. "in the transmitted" would help, but more may be needed

PROPOSED ACCEPT IN PRINCIPLE.

In the first sentence of the 4th paragraph of 155.2.4.5.2 change:

"If there is an adjacent PHY 400GXS sublayer then the value of RD in STAT<6> is equal." to:

"If there is an adjacent PHY 400GXS sublayer then the value of RD in the transmitted STAT<6> is equal."

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

See comment.

PROPOSED ACCEPT.
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 D

Reference to OIF-400ZR-01.0, March 10, 2020, subclause 8.9. Note that this document is subject to active maintenance

SuggestedRemedy
If feasible, write the specification here. If not, check that the reference is complete, correct and detailed enough, add a normative reference. Refer to a later OIF-400ZR if appropriate.

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Add a reference to the latest version of OIF-400ZR. The correct reference is to subclause 8.9.2 "GMP overhead encoding"

Cl 155 SC 155.2.4.5.3 P 40 L 17 # 52
Ran, Adee Cisco

Comment Type T Comment Status D

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

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

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

Preferably provide a URL to the specific document.

SuggestedRemedy
Add a reference in 1.3 with either dated or undated version, preferably with a URL.

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Current OIF website has the same version. There may be an updated version there soon. See: https://www.oiforum.com/technical-work/implementation-agreements-ias/

Cl 155 SC 155.2.4.5.3 P 40 L 24 # 17
Gorshe, Steve Microchip Technology

Comment Type E Comment Status D

It seems worthwhile to provide some basic context regarding the meaning of Cm(t) and SCn(t). Although G.709 provides the details, it may be worthwhile expanding this statement somewhat.

SuggestedRemedy
I suggest adding the following sentences to the end of this paragraph: "Note that Cm(t) indicates the number of 1028-bit GMP data words that will be transmitted during the next multi-frame, with SCnD(t) nominally indicating the running remainder. Averaging the Cm(t) plus SCnD(t) values across multiple multi-frames, the average represent the incoming serial stream rate as the number of information bytes arriving at the GMP encoder per multi-frame."

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 155 SC 155.2.4.5.3 P 40 L 24 # 57
Ran, Adee Cisco

Comment Type T Comment Status D

GMP description
C_m(t) and CnD(t) are used but not defined. I assume they are defined in an external reference, but it is unclear. If all control bytes are defined externally then there is no need for this text.

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 17.
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 25 # 207**

Huber, Thomas  
Nokia

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

The ‘nD’ in CnD(t) should be subscripted  

**SuggestedRemedy**  
Change the nD to subscript.

**Proposed Response Response Status W**  
PROPOSED ACCEPT.

---

**Cl 155 SC 155.2.4.5.4 P 40 L 30 # 348**

Maniloff, Eric  
Ciena

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

A figure showing the interleaving of the 4 OH instances would help clarify the OH structure.

**SuggestedRemedy**  
Add a figure showing the interleaved OH mapping.

**Proposed Response Response Status W**  
PROPOSED ACCEPT IN PRINCIPLE.  
Add a figure based on Figure 14 of the 400ZR IA.

---

**Cl 155 SC 155.2.4.5.4 P 40 L 32 # 247**

Law, David  
Hewlett Packard Enterprise

**Comment Type T**  
**Comment Status D**  
**OH mapping**

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

**SuggestedRemedy**  
Specify the 10-bit interleaver.

**Proposed Response Response Status W**  
PROPOSED ACCEPT IN PRINCIPLE.  
See response to comment 348.

---

**Cl 155 SC 155.2.4.6 P 40 L 37 # 248**

Law, David  
Hewlett Packard Enterprise

**Comment Type T**  
**Comment Status D**  
**SC-FEC blocks**

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

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

**Proposed Response Response Status W**  
PROPOSED ACCEPT.

---

**Cl 155 SC 155.2.4.6 P 40 L 39 # 283**

Ran, Adee  
Cisco

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

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

**SuggestedRemedy**
Change "5" to "five".

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

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

Comment on Subclause 155.2.4.6 'CRC32 and Multi-block alignment signal (MBAS) insertion'

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

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 least-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

PROPOSED ACCEPT.

Comment on Subclause 155.2.4.6 'CRC32 and MBAS'

The 32 bits of the CRC value are placed with the x31 term as the left-most bit of the CRC32 field and the x0 term as the right-most bit of the CRC32 field.

There is no illustration of the CRC32 block, so "right" and "left" are not really meaningful; the subsequent sentence defines the transmission order, so this sentence seems redundant.

Suggested Remedy

Delete the quoted sentence.

Proposed Response

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

Comment Type: T  Comment Status: D  SC-FEC blocks

Suggest that subclause 155.2.4.7 be retitled 'SC-FEC adapt and encoding' to match the equivalent block in Figure 155-2.

Suggested Remedy
See comment.

Proposed Response  Response Status: W  PROPOSED ACCEPT.

Comment Type: E  Comment Status: D  SC-FEC blocks

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: W  PROPOSED ACCEPT IN PRINCIPLE.

Law, David  Hewlett Packard Enterprise

Comment Type: T  Comment Status: D  SC-FEC blocks

There is no specification of how the 8 parity blocks are mapped into bits 10280 to 10970 of the 400GBASE-ZR SC-FEC encoded frames.

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: W  PROPOSED ACCEPT IN PRINCIPLE.

This requires a contribution.

Law, David  Hewlett Packard Enterprise

Comment Type: T  Comment Status: D  SC-FEC blocks

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

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

Proposed Response  Response Status: W  PROPOSED ACCEPT IN PRINCIPLE.

Add a new paragraph to subclause 155.4.7
"The block labeled 7.11 in Figure 155-5 includes an added 72 bits containing the CRC32, the MBAS bits and a 34-bit pad. Only the information bits of 7.11 are a part of the 244 664 information bits of each input block in Figure 155-6. The CRC32 and MBAS are transmitted after the 16 384 parity bits of the prior input block Bj-1. The pad bits are not transmitted."
### IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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<th>Comment Type</th>
<th>Comment Status</th>
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<th>Proposed Response</th>
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<tr>
<td>155</td>
<td>155.2.4.7</td>
<td>42</td>
<td>12</td>
<td>E</td>
<td>D</td>
<td>The &quot;dark&quot; line appears to be on the wrong side of the CRC+MBAS grey box. Should be on the right edge of all boxes but that's not true for 3 of them. And the last one isn't part of it's Bj+3 box.</td>
<td>Thicken the right edge of the grey boxes that represent the CRC+MBAS.</td>
<td>PROPOSED ACCEPT.</td>
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<table>
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<th>P 42</th>
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<td>155</td>
<td>155.2.4.7</td>
<td>42</td>
<td>42</td>
<td>TR</td>
<td>D</td>
<td>Figure 155-6 does not show the 6x119b pad</td>
<td>Add box at the end of the i+119 row to the right of the CRC+MBAS labeled 6x119b PAD</td>
<td>PROPOSED ACCEPT.</td>
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<tr>
<td>155</td>
<td>155.2.4.9</td>
<td>43</td>
<td>9</td>
<td>TR</td>
<td>D</td>
<td>&quot;a frame-synchronous scrambler of sequence 65 535&quot; Unclear; should it be &quot;with sequence length of 65535&quot;? 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?</td>
<td>Rewrite as appropriate.</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. A contribution is needed with the scrambler details.</td>
<td></td>
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<tr>
<td>155</td>
<td>155.2.4.9</td>
<td>43</td>
<td>4</td>
<td>TR</td>
<td>D</td>
<td>What is the contents of the PAD?</td>
<td>PROPOSED ACCEPT.</td>
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<td>155</td>
<td>155.2.4.9</td>
<td>43</td>
<td>10</td>
<td>TR</td>
<td>D</td>
<td>More information needed. Given the &quot;generating polynomial&quot;, what has to be done? There are examples of scrambler definitions in the base document.</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. See response to comment 65</td>
<td>PROPOSED ACCEPT IN PRINCIPLE. See response to comment 65</td>
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<td>P 43</td>
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</table>

Dawe, Piers  
Nvidia  

Comment Type: T  Comment Status: D
scrambler

which end goes first?

Suggested Remedy

Proposed Response: PROPOSED REJECT.
No suggested remedy.

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<tr>
<th>Cl</th>
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<td>461</td>
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</tbody>
</table>

Dawe, Piers  
Nvidia  

Comment Type: T  Comment Status: D
scrambler

is row 1 the first or second row?

Suggested Remedy

Proposed Response: PROPOSED REJECT.
No suggested remedy.

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<th>Cl</th>
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</table>

Dawe, Piers  
Nvidia  

Comment Type: T  Comment Status: D
scrambler

x

Suggested Remedy
define x

Proposed Response: PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 65,

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<thead>
<tr>
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<th>SC 155.2.4.9</th>
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</tbody>
</table>

Dawe, Piers  
Nvidia  

Comment Type: E  Comment Status: D
bucket x

Suggested Remedy

Proposed Response: PROPOSED ACCEPT.

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<tr>
<th>Cl</th>
<th>SC 155.2.4.9</th>
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<td>598</td>
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</table>

Slavick, Jeff  
Broadcom  

Comment Type: E  Comment Status: D
bucket

Extra ".".

Suggested Remedy

Proposed Response: PROPOSED ACCEPT.

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<td>383</td>
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</table>

Wienckowski, Natalie  
General Motors  

Comment Type: E  Comment Status: D
The equation should be numbered.

Suggested Remedy

Proposed Response: PROPOSED ACCEPT.

<table>
<thead>
<tr>
<th>Cl</th>
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</tbody>
</table>

Marris, Arthur  
Cadence Design Systems  

Comment Type: T  Comment Status: D
scrambler

Is resetting the scrambler a functional requirement?

Suggested Remedy

Proposed Response: PROPOSED ACCEPT.
Comment Type: T  Comment Status: D  scrambler
The definition of the scrambler is ambiguous; The choice of coefficient order, shift direction, and the point from which the output is taken can create different results.

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

Proposed Response  Response Status: W  PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 65.

Comment Type: TR  Comment Status: D  scrambler
The scrambler stops advancing during the PAD bits? So the 714b of PAD will be either all 0's or all 1's?

SuggestedRemedy
Define the pad to be a random pattern or change "the scrambling state advances during each bit of the five SC-FEC blocks" to "the scrambling state advances for each transmitted bit"

Proposed Response  Response Status: W  PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 65.

Comment Type: E  Comment Status: D  bucket
Suggest that `... SC-encoder ...' should read `... SC-FEC encoder ...'.

SuggestedRemedy
See comment.

Proposed Response  Response Status: W  PROPOSED ACCEPT.
IEEE Std 802.3 doesn't specify implementations.

**SuggestedRemedy**

Suggest, based on the in subclause 155.2.4.9 above (page 43, line 8), that the text 'The convolutional interleaver is described in ITU-T G.709.3 subclause 15.4.3. It contains 16 parallel delay lines that are accessed sequentially for each block of 119 bits.' is changed to read 'The convolutional interleaver shall be functionally equivalent to the convolutional interleaving process described in ITU-T G.709.3 subclause 15.4.3'.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 68

---

**Huber, Thomas**

**Nokia**

**Comment Type** TR

**Comment Status** D

**convolutional interleaver**

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

**SuggestedRemedy**

Change 10970 to 10976 in Figure 155-7.

**Proposed Response**

PROPOSED ACCEPT.

---

**Marris, Arthur**

**Cadence Design Systems**

**Comment Type** E

**Comment Status** D

**bucket**

119b

**SuggestedRemedy**

Change "119b" to "119-bit"

**Proposed Response**

PROPOSED ACCEPT.
"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.

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

Proposed Response
PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 463

The 128-bit code word referenced in subclause 155.2.4.11 'Hamming SD-FEC encoder' is called the 'SD-FEC codeword' in Figure 155-8, subclause 155.2.5.1 (page 46, line 5) and subclause 155.3.3.2 (page 53, line 36). Suggest the same terminology should be used in subclause 155.2.4.11 'Hamming SD-FEC encoder'.

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

Comment Type: T
Comment Status: D
Transmit bit ordering

Suggest that Figure 155-8 and the last paragraph of subclause 155.2.4.11 be updated to describe how the 128-bit code word from the SD-FEC encoder is passed across the PMA service interface. In addition, the fourth paragraph of subclause 155.3.3.1 should be updated to note that the 128-bit code word is passed across the PMA service interface to the PMA where the Gray mapping and polarization distribution described occurs.

SuggestedRemedy

[1] Suggest that the PMA service interface be added to Figure 155-8. To do this suggest that the label 'PMA:IS_UNITDATA_0.request' be added to the leftmost arrow at the bottom of the figure, with the label 'PMA:IS_UNITDATA_1.request' and 'PMA:IS_UNITDATA_2.request' staggered above on the next two arrows to the right. The label 'PMA:IS_UNITDATA_7.request' should be added to the rightmost arrow. As an existing example, see Figure 119-10 '200GBASE-R Transmit bit ordering and distribution'.

[2] Suggest that the last paragraph of subclause 155.2.4.11 be changed to read 'The 128-bit code word is then passed across the 8 lane PMA service interface to the PMA sublayer as 16 groups of 8 bits, each representing a DP-16QAM symbol. The first group of 8 bits are c0 through c7, the last group of 8 bits are c120 through C127, with the LSB through the MSB or each group of 8 bits mapped in order to the symbol parameter of the PMA:IS_UNITDATA_0.request through the PMA:IS_UNITDATA_7.request primitive respectively (see Figure 155-8)'.

[3] Suggest that the text 'Each 128-bit code word from the SD-FEC encoder c = [c0, c1, ..., c127], is mapped ...' in the fourth paragraph of subclause 155.3.3.1 should be changed to read 'Each 128-bit code word from the SD-FEC encoder is passed across the PMA service interface as described in 155.2.4.11. Each 128-bit code word c = [c0, c1, ..., c127], is mapped ...'.

Proposed Response

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

Comment Type: E
Comment Status: D

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

SuggestedRemedy

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

Proposed Response

PROPOSED ACCEPT.
The vast majority of references to the in-phase and quadrature-phase X and Y polarization use the symbols $I_{X}$, $Q_{X}$, $I_{Y}$, and $Q_{Y}$ (e.g., Figure 155-10 on page 51, line 28 and subclause 155.3.3, page 52, line 9). There, however, seem to be a few instances where the X and Y are not in subscript, or the phase and polarization symbols are reversed.

**Suggested Remedy**

On the assumption that they are referencing the same signals, please use $I_{X}$, $Q_{X}$, $I_{Y}$, and $Q_{Y}$ in the following locations:

- Subclause 155.2.5.1, page 46, line 12
- Table 155-3, page 55, line 38
- Table 155-4, page 56, line 35
- Table 155-7, page 59, line 5 through 16

** Proposed Response **

PROPOSED ACCEPT.

---

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

On the assumption that they are referencing the same signals, please use $I_{X}$, $Q_{X}$, $I_{Y}$, and $Q_{Y}$ in the following locations:

- Subclause 155.2.5.1, page 46, line 12
- Table 155-3, page 55, line 38
- Table 155-4, page 56, line 35
- Table 155-7, page 59, line 5 through 16

** Proposed Response **

PROPOSED ACCEPT.

---

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

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

**Suggested Remedy**

Add non-breaking space.

** Proposed Response **

PROPOSED ACCEPT.

---

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

interleaver

**Suggested Remedy**

Missing full stop

** Proposed Response **

PROPOSED ACCEPT.

---

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

Annex D

**Suggested Remedy**

"The SC-FEC decoder function is described in ITU-T G.709.2 Annex A."

The text in this subclause is insufficient to understand/implement the SD-FEC decoder function.

If it isn't fully defined (defined only in an external document) then there is no need for the details in the first paragraph.

**Suggested Remedy**

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

** Proposed Response **

PROPOSED ACCEPT IN PRINCIPLE.

---

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

delete all but the first sentence of the first paragraph of 155.2.5.5.

** Proposed Response **

PROPOSED ACCEPT.
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<td>36</td>
<td>469</td>
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<td>Dawe, Piers</td>
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<td>Suggested Remedy</td>
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<td>incoming block 10 ...</td>
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<td>See response to comment 70</td>
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<td>210</td>
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<td>Nokia</td>
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<td>Suggested Remedy</td>
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<td>Missing a subscript in Bi_corrected.</td>
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<td>Broadcom</td>
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<td>Comment Type</td>
<td>Suggested Remedy</td>
<td>Proposed Response</td>
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<tr>
<td>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</td>
<td>Add references to the MDIO registers to control and observe link degrade</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
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<td>71</td>
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<tr>
<td>Ran, Adee</td>
<td>Cisco</td>
<td><strong>E</strong></td>
<td><strong>D</strong></td>
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<td>Comment Type</td>
<td>Comment Status</td>
<td>Comment Type</td>
<td>Suggested Remedy</td>
<td>Proposed Response</td>
</tr>
<tr>
<td>The third paragraph &quot;The 400GBASE-ZR PCS provides detection and signaling of link degrade for use by network equipment...&quot; is repeated verbatim in 155.2.5.7.2. No need to write it twice.</td>
<td>PROPOSED ACCEPT.</td>
<td></td>
<td></td>
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**SORT ORDER:** Clause, Subclause, page, line

**COMMENT STATUS:** D/dispatched A/accepted R/rejected G/general

**RESPONSE STATUS:** O/open W/written C/closed U/unsatisfied Z/withdrawn

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

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9/13/2022 11:26:35 AM
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 nonoverlapping SC-FEC frames of FEC_degraded_SER_interval (see 155.4.2.1). If the SC-FEC decoder determines that a codeword is uncorrectable or errors are detected by the CRC32 check (see 155.2.5.6), the number of symbol errors detected is increased by 957 x 257. When the number of bit errors exceeds the threshold set in FEC_degraded_SER_activate_threshold (see 155.5.1), the FEC_degraded_SER bit 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**

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

<table>
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<tr>
<td>155</td>
<td>155.2.5.7</td>
<td>E</td>
<td>X</td>
<td>Change other instances as necessary.</td>
<td>O</td>
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<td>155</td>
<td>155.2.5.7</td>
<td>E</td>
<td>D</td>
<td>Suggest a direct reference to the Alignment marker lock state diagram is provided in subclause 155.2.5.7.</td>
<td>W</td>
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#### Proposed Response

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<td>155</td>
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<td>TR</td>
<td>D</td>
<td>Reference is to 155.4 which is all the FSM blocks, call out the specific AM lock one.</td>
<td>W</td>
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<td>T</td>
<td>D</td>
<td>There are multiple state machines (diagrams) in 155.4.</td>
<td>W</td>
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<tbody>
<tr>
<td>155</td>
<td>155.2.5.7</td>
<td>T</td>
<td>D</td>
<td>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.</td>
<td>W</td>
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<td>155</td>
<td>155.2.5.7</td>
<td>TR</td>
<td>D</td>
<td>Change &quot;will have&quot; to &quot;has&quot;.</td>
<td>W</td>
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<tr>
<td>155</td>
<td>155.2.5.7</td>
<td>TR</td>
<td>D</td>
<td>Change &quot;follows the state machine in 155.4&quot; to &quot;is depicted by the state diagram in Figure 155-16&quot;.</td>
<td>W</td>
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<tr>
<td>155</td>
<td>155.2.5.7</td>
<td>T</td>
<td>D</td>
<td>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.</td>
<td>W</td>
</tr>
</tbody>
</table>

#### Comment on SuggestedRemedy

- **Cl 155 SC 155.2.5.7 P 47 L 9**: "will" is deprecated. Suggested Remedy: Change "will have" to "has". Change other instances as necessary.

- **Cl 155 SC 155.2.5.7 P 47 L 9**: Will have. Suggested Remedy: has

- **Cl 155 SC 155.2.5.7 P 47 L 14**: 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

- **Cl 155 SC 155.2.5.7 P 47 L 14**: 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".

- **Cl 155 SC 155.2.5.7 P 47 L 19**: 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.

- **Cl 155 SC 155.2.5.7 P 47 L 19**: 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.
Cl 155 SC 155.2.5.7.1 P 47 L 33 # 395
Slavick, Jeff Broadcom
Comment Type TR Comment Status D cross reference
Figure 155-9 is identical to 155-4 and is not referenced
SuggestedRemedy
Delete Figure 155-9. Add "(see Figure 155-4)" to the end of last paragraph
Proposed Response Response Status W PROPOSED ACCEPT.

Cl 155 SC 155.2.5.7.1 P 47 L 33 # 472
Dawe, Piers Nvidia
Comment Type E Comment Status D
Figure 155-9 is an orphan
SuggestedRemedy
Reference it or remove it. See another comment.
Proposed Response Response Status W PROPOSED ACCEPT.

Cl 155 SC 155.2.5.7.1 P 47 L 33 # 473
Dawe, Piers Nvidia
Comment Type E Comment Status D
Figure 155-9 seems to be identical to Figure 155-4
SuggestedRemedy
Remove it, refer to 155-4 instead
Proposed Response Response Status W PROPOSED ACCEPT.

Cl 155 SC 155.2.5.7.1 P 47 L 33 # 474
Dawe, Piers Nvidia
Comment Type T Comment Status D Link status monitoring
upstream, downstream
SuggestedRemedy
Rx, Tx. Compare base doc.
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Change: "The RPF bit indicates, in the upstream direction, that.." to "The RPF bit indicates to its link partner, that.."
Change: "...are defined to indicate to the downstream 400GBASE-ZR PHY the quality.." to "...are defined to indicate to the link partner the quality.."

Cl 155 SC 155.2.5.7.2 P 48 L 5 # 475
Dawe, Piers Nvidia
Comment Type E Comment Status D
detailed in 155.2.5.7.2 - but this is 155.2.5.7.2
SuggestedRemedy
?
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Replace 155.2.5.7.2 with 155.2.4.5.2.

Cl 155 SC 155.2.5.7.2 P 48 L 21 # 476
Huber, Thomas Nokia
Comment Type E Comment Status D
It looks like there is an 'of' that should be 'or' - I think the intent is that if the receiver can't frame to the DSP frame, or the 400ZR frame or multi-frame, it inserts LF
SuggestedRemedy
Change "In the case of a DSP framing of 400GBASE-ZR frame or multi-frame loss." to "In the case of a DSP framing loss or 400GBASE-ZR frame or multi-frame loss."
Proposed Response Response Status W
PROPOSED ACCEPT.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.2.5.7.2 P 48 L 22 # 476
Dawe, Piers Nvidia

Comment Type T Comment Status D Link status monitoring

f raming of frame or multi-frame loss - eh?

Suggested Remedy

In the case of a loss of 400GBASE-ZR frame sync or multi-frame sync?

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 212

Cl 155 SC 155.2.5.7.2 P 48 L 23 # 74
Ran, Adee Cisco

Comment Type T Comment Status D Link status monitoring

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

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

Suggested Remedy

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

(or another ordered set if so intended)

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 155 SC 155.2.5.8 P 48 L 36 # 19
Gorshe, Steve Microchip Technology

Comment Type E Comment Status D

Gorshe, Steve Microchip Technology

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 Z
REJECT.

This comment was WITHDRAWN by the commenter.

Cl 155 SC 155.2.5.10 P 48 L 53 # 477
Dawe, Piers Nvidia

Comment Type T Comment Status D

PCS decoder

The PCS receives decode blocks

Suggested Remedy

The PCS receive function decodes blocks?

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 155 SC 155.3.1 P 49 L 3 # 135
Nicholl, Gary Cisco Systems

Comment Type ER Comment Status X

The first several sub-sections of 155.3.1 appear to repeat the same format as section 155.1. It appears that this overview information for the PCS sublayer is in 155.1 and the same overview information for the PMA sublayer is in 155.3.

Suggested Remedy

I would propose to delete section 155.1, and put all of the corresponding overview information into either the PCS section (155.2) or the PMA section (155.3) respectively.

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

Cl 155 SC 155.3.1.1 P 49 L 9 # 262
Law, David Hewlett Packard Enterprise

Comment Type E Comment Status X
Since [1] the subclause of 156.5 'PMD functional specifications' lists more than just a transmit and receive function, and [2] to parallel the text 'The PMA allows the 400GBASE-ZR PCS (specified in 155.2) ...', suggest that '... media-independent way to a coherent transmitter and receiver specified in Clause 156.' should be changed to read '... media-independent way to the 400GBASE-ZR PMD (specified in 156).'

Suggested Remedy
See comment.

Proposed Response Response Status O

Cl 155 SC 155.3.1.1 P 49 L 11 # 478
Dawe, Piers Nvidia

Comment Type T Comment Status X
The interfaces for the inputs of

Suggested Remedy
The interfaces of ?

Proposed Response Response Status O

Cl 155 SC 155.3.1.2 P 49 L 16 # 481
Dawe, Piers Nvidia

Comment Type E Comment Status X
relationship with

Suggested Remedy
relationship to Also 156.1

Proposed Response Response Status O

Cl 155 SC 155.3.1.3 P 49 L 23 # 75
Ran, Adee Cisco

Comment Type T Comment Status X
PMA description
The term "symbol" seems to be overloaded in the PMA subclause, sometimes meaning bit, other times an element of the set {-3, -1, +1, +3}, and other times a pair of such elements (DP-16QAM symbol).

This is confusing.

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

Cl 155 SC 155.3.1.3 P 49 L 51 # 544
Zimmerman, George CME Consulting/APL Group, Cisco, Commscope, Ma

Comment Type E Comment Status X
PMA description
Figure 155-10 is separated from the text which describes it, by the intervening description of the service interface.

Suggested Remedy
Beat on frame, and move the figure 155-10 be after 155.3.1.3 and before 155.3.2 (one way to do this may be forcing a page break before 155.3.2)

Proposed Response Response Status O

Cl 155 SC 155.3.1.3 P 51 L 3 # 479
Dawe, Piers Nvidia

Comment Type T Comment Status X
PMA block diagram
"m is ... the number of bits of resolution of the DP-16QAM symbols"

Suggested Remedy
Is a symbol for one polarisation or both? Is this off by 2?

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
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<td>Align CFEC and FAW/TS symbols (X) remove</td>
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<td><strong>Suggested Remedy</strong></td>
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<td>Align CFEC and remove FAW/TS symbols (X) ?</td>
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<th>L 26</th>
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</tbody>
</table>

**Cl 155 SC 155.3.2 P 50 L 1 # 263**
Law, David | Hewlett Packard Enterprise | Comment Type | TR | Comment Status | D |

**PMA service interface**

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

It, therefore, doesn't seem correct to define the 400GBASE-ZR PMA service interface through reference to the lane-based PMA service interface definition in 116.3 when it doesn't support the features of a lane-based service Interface. Based on this, suggest that the 400GBASE-ZR PMA service interface be defined using a single .request and .indicate primitive, with a tx_symbol and rx_symbol parameter respectively, to reflect the synchronous data path nature of the interface.

**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_1.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.

155.3.2.1.1 Semantics of the primitive

PMA_UNITDATA.request (tx_symbol)

During transmission, the PMA_UNITDATA.request simultaneously conveys 8 bits of a 128-bit code word generated by the SD-FEC encoder (see 155.2.4.11) representing an encoded DP-16QAM symbol to the PMA. The encoding used for the in-phase and quadrature-phase components of the X and Y polarization is defined in subclause 155.3.3.1.

155.3.2.1.2 When generated

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

155.3.2.1.3 Effect of receipt

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

155.3.2.2 PMA_UNITDATA.indication

This primitive defines the transfer of encoded DP-16QAM symbols in the rx_symbol parameter from the 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.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

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

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

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

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

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

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

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

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

Law, David Hewlett Packard Enterprise

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

Suggested Remedy
Suggest that 'The 400GBASE-ZR PMA service interface is provided ...' should be changed to read 'The 400GBASE-ZR PMA service interface (see 155.1.4.2) is provided ...'.

Proposed Response Response Status O

Ran, Adee Cisco

Comment Type T Comment Status X PMA service interface
"The primitives are defined for i = 0 to 7, and for j = 0 to m-1, where m is the number of bits of the received digitized DP-16QAM symbols"

The next paragraph says the nominal signaling rate is approximately 57.78 Gb/s in the transmit side and 57.78 GBd in the receive side.

Each DP-16QAM symbol corresponds to 4 bits, so with this definition, the rate of the receive direction DP-16QAM symbols should be a quarter of the transmit direction bit rate.

Alternatively m should be the number of bits of resolution per bit of information.

The meaning of tx_symbol and rx_symbol is unclear in this subclause, and may be changed e.g. if the tx_symbols are defined as Gray-coded PAM4 symbols or SD-FEC encoder codewords (suggested by another comments).

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

Proposed Response Response Status O
Subclause 155.3.2 says ‘... sends eight parallel bit streams to the PMA, each at a nominal signaling rate of ...’. Since this is a signalling rate, the unit of measurement should be in Bd rather than Hz (see the following paragraph).

Suggested Remedy
Suggest that ‘... ~50.212875 Gb/s +/-20 ppm (~57.78 Gb/s).’ should read ‘... ~50.212875 GBd +/-20 ppm (~57.78 GBd).’ (where +/- is a plus-minus symbol).

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

Comment
Why is the approximate sign used in the term ‘(512/511) x (5485/5140) x (5488/5485) x (128/119) x ~50.212875 Gb/s/20 ppm’. Isn't the nominal signalling rate known exactly? I don't remember seeing the "approximate" sign used in other IEEE standards when referring to the nominal signaling rate?

Suggested Remedy
This is more of a question of clarification?

Proposed Response
Proposed ACCEPT IN PRINCIPLE.
Cl 155 SC 155.3.2 P 51 L 28 # 267
Law, David Hewlett Packard Enterprise

Comment Type T Comment Status X PMA block diagram
Subclause 155.3.3.4.1 says that 'All of the coherent signal to physical lane mappings in Table 155-7 are allowed for the Tx signal. This is because receivers can determine which physical lane is carrying which signal based on the contents of the FAW.' As a result, it seems that the in-phase and quadrature-phase components of the X and Y polarizations can be mapped to the receive PMD service interface primitives in any of the eight ways listed in Table 155-7.

Further, subclause 155.3.3.7 'FAW, TS, and PS symbol removal' says 'The 400GBASE-ZR PMA receive path attains alignment lock to the 22-symbol FAW that is transmitted on each of the two transmission polarizations on the in-phase and quadrature-phase lanes.' and 'When the X and Y polarization symbol streams are identified and aligned to the super-frame format of Figure 155-12, the FAW, TS, and PS symbols are removed ...'. As a result, it seems the X and Y polarizations identification is performed by the FAW lock function, and pilot removal occurs after the FAW lock function.

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

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

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

FAW alignment
Remove FAW, PS, TS symbols

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

FAW alignment
Remove FAW, PS, TS symbols

Proposed Response Response Status O

Cl 155 SC 155.3.2 P 51 L 31 # 385
Wienckowski, Natalie General Motors

Comment Type E Comment Status X
It's hard to see the text with the line through it.

SuggestedRemedy
Add a box around "400GBASE-ZR PMA sublayer" so the line is "behind" it.

Proposed Response Response Status O

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

Comment Type E Comment Status X
Text and arrow intersect.

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

Proposed Response Response Status O

Cl 155 SC 155.3.2 P 51 L 48 # 268
Law, David Hewlett Packard Enterprise

Comment Type E Comment Status X

SuggestedRemedy
See comment.

Proposed Response Response Status O
Signal health should not be "based on receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer" because this indication is always OK.

Suggested Remedy

Delete "receipt of the PMD:IS_SIGNAL.indication from the 400GBASE-ZR PMD sublayer," and the comma after "functions".

In Figure 155-10 delete PMD:IS_SIGNAL.indication as input to the SIL.

Based on the signal indication logic (SIL) contained in the PMA sublayer described in subclause 155.3.2, and subclause 155.2.1 describing only the use of the SIGNAL_DETECT parameter in the PCS sublayer, it doesn't seem correct to say in subclause 156.5.4 that a valid signal is determined only by the PCS sublayer. And based on subclause 156.5.4 setting the SIGNAL_DETECT parameter of the PMD:IS_SIGNAL.indication to a fixed 'OK' value, it doesn't seem correct to say that the SIL will report signal health based on the PMD:IS_SIGNAL.indication primitive since it is fixed.

Suggested Remedy

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

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 155 SC 155.3.2 P 51 L 53 # 233

Law, David Hewlett Packard Enterprise

Comment Type E Comment Status D

SIGNAL_OK is a parameter that is passed by the PMA-IS_SIGNAL.indication primitive.

SuggestedRemedy
Suggest that "... the SIGNAL_OK primitive has the value FAIL." should be changed to read '... the SIGNAL_OK parameter has the value FAIL.'

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

Cl 155 SC 155.3.2 P 51 L 53 # 233

Law, David Hewlett Packard Enterprise

Comment Type T Comment Status D

Subclause 155.3.3 "Functions within the PMA" says 'The purpose of the PMA is to ... and optionally to provide test signals and loop-back.'.
There, however, doesn't appear to be any subclauses under subclause 155.3 'Physical Medium Attachment (PMA) sublayer, type 400GBASE-ZR' that define test signals or loop-back.

SuggestedRemedy
Either add definitions defining test signals and loop back within the PMA or remove this text from subclause 155.3.3.

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

Cl 155 SC 155.3.3 P 52 L 5 L 5 # 234

Huber, Thomas Nokia

Comment Type E Comment Status D

Awkward grammar in the first sentence

SuggestedRemedy
Change "* adapt between the PCS layer digital symbols to and from the four analog signals." to "* adapt the PCS layer digital signals to and from the four analog signals."

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

Cl 155 SC 155.3.3 P 52 L 5 L 5 # 234

Huber, Thomas Nokia

Comment Type E Comment Status D

In the rest of 802.3, loopback is not hyphenated

SuggestedRemedy
Change loop-back to loopback

Proposed Response Response Status W
PROPOSED ACCEPT.

Cl 155 SC 155.3.3 P 52 L 9 L 5 # 235

Law, David Hewlett Packard Enterprise

Comment Type T Comment Status D

Subclause 155.3.3 'Functions within the PMA' says "elements of a symbol, namely IX, QX, IY, or QY, ..., referencing IX, QX, IY, and QY as 'elements' of a DP-16QAM symbol. Subclause 155.3.3.1 'Gray mapping and polarization distribution' says '-(c8i, c8i+1) maps to the in-phase (I) component of the X-polarization of si' referencing IX, QX, IY, and QY as 'components' of a DP-16QAM symbol.

SuggestedRemedy
Suggest that either 'element' or 'component' be used consistently to describe IX, QX, IY, and QY used to form a DP-16QAM symbol.

Proposed Response Response Status O

Cl 155 SC 155.3.3 P 52 L 9 L 5 # 235

Law, David Hewlett Packard Enterprise

Comment Type T Comment Status D

Subclause 155.3.3 'Functions within the PMA' says 'elements of a symbol, namely IX, QX, IY, or QY, ..., referencing IX, QX, IY, and QY as 'elements' of a DP-16QAM symbol. Subclause 155.3.3.1 'Gray mapping and polarization distribution' says '-(c8i, c8i+1) maps to the in-phase (I) component of the X-polarization of si' referencing IX, QX, IY, and QY as 'components' of a DP-16QAM symbol.

SuggestedRemedy
Suggest that either 'element' or 'component' be used consistently to describe IX, QX, IY, and QY used to form a DP-16QAM symbol.

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

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

Proposed Response | Response Status | 0

Comment Type | E | Comment Status | D | bucket
"Gray-coded signals" should be "Gray-coded symbols".

SuggestedRemedy
Per comment

Proposed Response | Response Status | W
PROPOSED ACCEPT.

Comment Type | TR | Comment Status | X | PMA description
This says the PMA does Gray de-mapping then it says it doesn't the PCS does it.

SuggestedRemedy
Remove lines 20-25, add appropriate material to PCS section.

Proposed Response | Response Status | O

Comment Type | TR | Comment Status | X | PMA description
"The received symbol signals are digitized into more than 4 discrete levels by the analog to digital converters (ADC) in the PMA sublayer and the number of bits for each signal is m/4 bits." This is a description of an implementation and is inappropriate for an interoperability standard. If some description is needed, one could rewrite this more generally, as is suggested in the remedy. Further, it appears that the "m/4 bits" is a detail that is unused in the draft (I searched). If it is used somewhere, please provide a pointer to where it is relevant. Otherwise delete the unnecessary detail which looks like a specification but isn't.

SuggestedRemedy
Preferably - delete the indicated sentence. Alternatively, change the indicated sentence to read "The received symbol signals are sampled and quantized in the PMA sublayer."

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

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

Proposed Response  Response Status: O

Comment Type: T  Comment Status: X  Symbol distribution
"Each 128-bit code word from the SD-FEC encoder c = \[c_0, c_1, .., c_{127}\], is mapped to sixteen DP-16QAM symbols (S)"

Does the PMA have to be aligned with the SD-FEC encoder codewords?

If so, the alignment function is not defined; it may be more appropriate to define the service interface in the Tx direction in terms of 128-bit codewords instead of bits on 8 lanes, such that the alignment is inherent.

If not, please clarify that the 128-bit blocks start point within the SD-FEC codeword is arbitrary.

A similar question holds for the Rx direction (based on the text in 155.3.3.8) - is the alignment of SD-FEC defined as a PMA function or a PCS function?

SuggestedRemedy
From 155.3.3.2 it seems that alignment is necessary, so the service interface should be defined with 128-element vectors (instead of lanes), and perhaps use tx_word instead of tx_symbol and rx_word instead of rx_symbol.

Proposed Response  Response Status: O

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

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

Proposed Response  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.

Comment Type: T  Comment Status: D  PMA description

Doesn't the symbol interleaving operate on groups of sixteen DP-16QAM symbols, mapped from the 128-bit SD-FEC codewords passed across the PMA service interface, as described in subclause 155.3.3.1.

SuggestedRemedy
Suggest that the text 'The symbol interleaver performs an 8-way interleaving of symbols from Hamming code words ...' be changed to read 'The symbol interleaver performs an 8-way interleaving of groups of sixteen symbols mapped from SD-FEC codewords ...'.

Proposed Response  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.
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  PMA description
On page 52, line 54, the symbol number is in normal font whereas it is in subscript font in the remainder of subclause 155.3.3.2.

Suggested Remedy
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

Law, David
Hewlett Packard Enterprise

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

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

Proposed Response

Huber, Thomas
Nokia

Comment Type  TR  Comment Status  X  Hamming code interleaver
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.

Proposed Response

Huber, Thomas
Nokia

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

Suggested Remedy
Change S0,2 to S1,1

Proposed Response

Law, David
Hewlett Packard Enterprise

Comment Type  T  Comment Status  X  DSP frame
Subclause 155.3.3.3 'Insert FAW, TS and PS symbols' however says 'A super-frame is defined as a set of 181 888 symbols in each of the X and Y polarizations including ...'. Since a separate super-frame for each of the X and Y polarizations, the 'symbols' seem to be 16QAM symbols rather than DP-16QAM symbols.

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 175 616 payload symbols and 6272 additional symbols.' be changed to read 'A super-frame is defined as a set of 181 888 16QAM symbols for each of the X and Y polarizations including 175 616 16QAM symbols and 6272 additional 16QAM symbols.'.

Proposed Response

Huber, Thomas
Nokia

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

Suggested Remedy
Add the missing line

Proposed Response

Law, David
Hewlett Packard Enterprise

Comment Type  T  Comment Status  X  DSP frame
Subclause 155.3.3.3 'Insert FAW, TS and PS symbols' however says 'A super-frame is defined as a set of 181 888 symbols in each of the X and Y polarizations including ...'. Since a separate super-frame for each of the X and Y polarizations, the 'symbols' seem to be 16QAM symbols rather than DP-16QAM symbols.

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 175 616 payload symbols and 6272 additional symbols.' be changed to read 'A super-frame is defined as a set of 181 888 16QAM symbols for each of the X and Y polarizations including 175 616 16QAM symbols and 6272 additional 16QAM symbols.'.

Proposed Response

Law, David
Hewlett Packard Enterprise

Comment Type  T  Comment Status  X  DSP frame
Subclause 155.3.3.3 'Insert FAW, TS and PS symbols' however says 'A super-frame is defined as a set of 181 888 symbols in each of the X and Y polarizations including ...'. Since a separate super-frame for each of the X and Y polarizations, the 'symbols' seem to be 16QAM symbols rather than DP-16QAM symbols.

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 175 616 payload symbols and 6272 additional symbols.' be changed to read 'A super-frame is defined as a set of 181 888 16QAM symbols for each of the X and Y polarizations including 175 616 16QAM symbols and 6272 additional 16QAM symbols.'.

Proposed Response
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".

**Proposed Response**

Response Status O

The second paragraph of subclause 155.3.3.3 'Insert FAW, TS and PS symbols' says 'The first sub-frame of a super-frame includes ... 76 reserved symbols (rsvd<0:75>) ...'; however, there is no specification of what 16QAM symbol should be transmitted for these reserved symbols.

**Suggested Remedy**

Define the 16QAM symbol to be transmitted for these 76 reserved symbols.

**Proposed Response**

Response Status O
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>.

Suggested Remedy

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

SuggestedRemedy

Either remove the 3 to 0 annotation for sub-frames 1 and 48 or add to sub-frames 0 and define the meaning.

Proposed Response

Response Status O

SuggestedRemedy

Rewrite to clarify.

Proposed Response

Response Status O
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, 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, \([P_0, ..., P_{115}]\) 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, \([P_0, ..., P_{115}]\), 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

---

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

**Suggested Remedy**

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

**Proposed Response**

Response Status: W

PROPOSED ACCEPT.

---

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

**Suggested Remedy**

See comment.

**Proposed Response**

Response Status: O
Table 155-6--PS

<table>
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</table>

Proposed Response:

Use whole words. Pilot sequence

---

<table>
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<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
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<td>X</td>
<td></td>
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</table>

Proposed Response:

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

---

<table>
<thead>
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<th>Comment Status</th>
<th>Proposed Response</th>
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</thead>
<tbody>
<tr>
<td>TR</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Proposed Response:

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.
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Comment Type: T  Comment Status: X  symbol mapping
The title says "Symbol mapping to physical lanes", but in the text it is "coherent signal to physical lane mappings".
The conversion of symbols to signals is done in the PMD.

Suggested Remedy:
Change "All of the coherent signal to physical lane mappings" to "All options for symbol mapping to physical lanes". Change Table 155-7 title accordingly.

Proposed Response  Response Status: O

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

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

Proposed Response  Response Status: W
PROPOSED ACCEPT.

Comment Type: ER  Comment Status: D
The last sentence states ". which correspond to the inter-sublayer signals
PMD/S_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 PMD service interface directly.

Proposed Response  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CRG) consideration.
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**Comment Type:** T  **Comment Status:** X  **Received signals**

The signals IX/QX/IY/QX are just signals (per 155.3.3.4 and 156.1), and are not "coherent" by themselves. The coherency is part of the PMD.

**Suggested Remedy**

Change "Four coherent signals" to "Four continuous signals".

In 155.3.3.4.1 and in Table 155-7 change "coherent signal" to "symbol".

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

### Comment Type:** T  **Comment Status:** X  **Receive signals**

"The encoding of 16QAM symbols is based on Table 155-2"  
This table does not define any encoding of input symbols - it defines mapping of bits tuples to output symbols.  
"but with a higher resolution than 4 bits"  
Resolution is for the digital representation of each analog value. The resolution here should be more than two bits (per dimension). The resolution seems to be left open to implementation.  
This should be written more clearly. The suggested remedy is my attempt, but other text may be used.

**Suggested Remedy**

Change from  
"The encoding of 16QAM symbols is based on Table 155-2 but with a higher resolution than 4 bits to enable the SD-FEC decoder to detect and correct symbol errors"  
to "The 16QAM symbols should be sampled with more than two bits per dimension, in order to enable the SD-FEC decoder to correct errors and recover the bits from the symbols based on the mapping in Table 155-2".

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

### Comment Type:** E  **Comment Status:** D  **bucket**

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

**Suggested Remedy**

See comment.

**Proposed Response**  **Response Status:** W  **PROPOSED ACCEPT.**

### Comment Type:** E  **Comment Status:** D  **bucket**

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

**Suggested Remedy**

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

**Proposed Response**  **Response Status:** W  **PROPOSED ACCEPT.**
Comment Type:  T  Comment Status:  X  Pol combining
"comprising sixteen symbols encoded as shown in Table 155-2 but at a higher resolution than 8 bits"

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

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

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

Suggested Remedy
Rewrite to clarify.

Proposed Response:  X  Response Status:  O

Comment Type:  E  Comment Status:  X
The subclause hierarchy below "State variables" is unnecessary, and includes subclauses that are not about state variables (155.4.2.2 through 155.4.2.4)

Suggested Remedy
Delete 155.4.2 and move its subclauses upper in the hierarchy (to become 55.4.2 through 155.4.5).

Proposed Response:  X  Response Status:  O

Comment Type:  T  Comment Status:  X  state variables
Assuming this is a boolean variable, suggest this should be noted in the variable description, as with other boolean variables.

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

Proposed Response:  X  Response Status:  O
The description of the 'reset' variable says that it is 'A boolean variable that controls the resetting of the PCS and PMA sublayers' and that 'It is true whenever a reset is necessary including when reset is initiated from the MDIO ... and when the MDIO has put the PCS and PMA sublayers into low-power mode.'.

The PMA and PCS are separate MMDs (see Table 45-1). The PMA/PMD reset bit is 1.0.15 and the low power bit is 1.0.11, both found in PMA/PMD control 1 register. The PCS reset bit is 3.0.15 and the low power bit is 3.0.11, both found in the PCS control 1 register. Since these registers are in separate MMDs, and since their state is not communicate across the PMA service interface, the PMA and PCS resets can operate independently.

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.'

Proposed Response  Response Status  W
PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation. For comment resolution group (CGR) consideration.
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**

**Comment Status** X

**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**

**Comment Status** X

**Response Status** O

---

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**

**Comment Status** X

**Response Status** O
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Comment Type: TR
Comment Status: X

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 FAWs inserted per polarization, so one FAW for X polarization and one FAW for Y polarization.

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

Proposed Response
Response Status: O

Comment Type: ER
Comment Status: X

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

SuggestedRemedy
Correct cross-references.

Proposed Response
Response Status: O

Comment Type: TR
Comment Status: X

The description of the 'faw_valid' variable says 'The FAW consists of one of the sequences listed in Table 155-3,' but then 'The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.1'. The sequence listed in Table 155-3, and the candidate sequences received over the PMD service interface, are both 22 DP-16QAM symbols, not 44 bits. Based on slide 4 of the contribution 'faw_valid analysis' from Mike Sluyski <https://www.ieee802.org/3/cw/public/22_0523/sluyski_3cw_01a_220523.pdf#page=4> referencing a 'QPSK FAW' value of 44 in the spreadsheet, I assume the reference to 36 bits matching the 44 known bits should be to 36 16QAM symbols matching the 44 16QAM symbols (which form the 22 DP-16QAM symbol FAW sequence), defined in Table 155-3.

Additionally, isn't it the case that the four components of the DP-16QAM symbols of the candidate 22 symbol block received over the four-lane PMD service interface can be mapped to the four lanes in any of eight ways defined in Table 155-7? If that is the case, suggest that this is also addressed in the description of the 'faw_valid' variable.

SuggestedRemedy
Suggest that the 'faw_valid' variable description should be changed to read:

A Boolean variable that is set to true if the candidate 22 DP-16QAM symbol block received over the four-lane PMD service interface is a valid FAW sequence. The candidate 22 DP-16QAM symbol block is compared to the FAW sequence defined in Table 155-3, considering all permitted PMD service interface lanes mappings defined in Table 155-7. The candidate 22 DP-16QAM symbol block is considered to be a valid FAW sequence if at least 36 of its component 16QAM symbols match, in value, sequence position, and the 44 known 16QAM symbols of the FAW sequence defined in Table 155-3.

Proposed Response
Response Status: O
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<th>SC</th>
<th>Page</th>
<th>Line</th>
<th>Comment Type</th>
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</thead>
<tbody>
<tr>
<td>155</td>
<td>155.4.2.1</td>
<td>61</td>
<td>11</td>
<td>TR</td>
<td>X</td>
<td>If needed, clarify the definition of the 'faw_valid' variable to account for the P1 symbol inserted between the faw&lt;20&gt; and faw&lt;21&gt; symbols.</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TR</td>
<td>X</td>
<td>For consistency replace: &quot;The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.1.&quot; with: &quot;The sequence is considered to be valid if at least 18 symbols match the 22 known symbols of the FAW pattern described in 155.3.3.1.&quot;</td>
<td>O</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>D</td>
<td>The reference to 155.3.3.1 is not hyperlinked in faw_valid</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>D</td>
<td>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&lt;0:21&gt;) ... and 3488 payload symbols (m&lt;0:3487&gt;).'. Based on this it seems that the FAW is not considered part of the payload.</td>
<td>W</td>
</tr>
</tbody>
</table>

Comments:
- 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.

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

- The reference to 155.3.3.1 is not hyperlinked in faw_valid

- 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.
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 155-3 where pma_lane_mapping<x> is mapped to register 3.400 through 3.403, which doesn't seem correct as these are PCS lane registers, not PMA lane registers (see my other comment on this). As a result, rather than add PMA lane numbers to subclause 155.3.3.3.1 and/or Table 155-3, suggest references to 'PMA lane numbers' be changed to 'PMA lane identifiers' with the values 'Ix', 'Qx', 'Ix' and 'Qy'. The state diagram can compare PMA lane identifiers to see if they match and can test for a unique PMA lane identifier for each PMA lane as easily as it can for PMA lane numbers.

In addition, the description of the 'faw_valid' variable says 'The sequence is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern described in 155.3.3.3.1.' The description of the variable 'current_pmal' however says 'The PMA lane number is determined by the FAW payloads based on the mapping defined in 155.3.3.3.1.' Similarly, the description of the variable 'pma_lane' says 'The PMA lane number is determined by matching the received 22-symbol sequence to the values in one of the columns of Table 155-3 ...'. Neither mention the '36 out 44' approach used for the 'faw_valid' variable.

The 'current_pmal' description could imply a requirement for a full match to a column of Table 155-3, and the 'pma_lane' description requires a full match to a column of Table 155-3. Since the entry into states where 'current_pmal' is used is based on faw_valid = TRUE, doesn't this mean that the use of the '36 out 44' approach, which permits 8 16QAM symbols to not match, needs to be considered when determining 'current_pmal' and 'pma_lane'. As a worst-case example, couldn't a faw_valid = TRUE result from eight 16QAM symbols not matching due to errors on just one phase of just one 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'. As a worst-case example, couldn't a faw_valid = TRUE result from eight 16QAM symbols not matching due to errors on just one phase of just one polarization.

Finally, as this variable is used by a state diagram within the PMA, which sits above the PMD, the text '... is recognized on a given lane of the PMA service interface.' should read '... is recognized on a given lane of the PMD service interface.'

**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:

pma_lane

A variable that holds the PMA lane identifier received on lane x of the PMD 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 ...'.

<table>
<thead>
<tr>
<th>CI 155</th>
<th>SC 155.4.2.1</th>
<th>P 68</th>
<th>L 26</th>
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<tr>
<td>Proposed Response</td>
<td>Response Status</td>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Definition of variable "pma_lane". The definition states that there can be 4 PMA lane numbers on the PMA service interface. But if I look at Figure 155-10 there are 8 lanes on the PMA service interface. There are however 4 lanes on the PMD service interface. I suspect the editor meant "PMD service interface (i.e. the interface below the PMA sublayer) and not the PMA service interface (the interface above the PMA sublayer).

Also the reference to Table 155-3 is not an active cross reference.

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

<table>
<thead>
<tr>
<th>CI 155</th>
<th>SC 155.4.2.1</th>
<th>P 61</th>
<th>L 28</th>
<th># 143</th>
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<td>Response Status</td>
<td>O</td>
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</tr>
</tbody>
</table>

Comment Type "super-frame". There are nine instances of 'super-frame' and two instances of 'DSP super-frame'. Suggest that one term is used consistently.

Suggested Remedy
Suggest that the two instances of '... DSP super-frame ...' (page 61, line 33 and page 63 and line 4) be changed to read '... super-frame ...'.

<table>
<thead>
<tr>
<th>CI 155</th>
<th>SC 155.4.2.1</th>
<th>P 62</th>
<th>L 1</th>
<th># 549</th>
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<tr>
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<tr>
<td>Proposed Response</td>
<td>Response Status</td>
<td>O</td>
<td></td>
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</tr>
</tbody>
</table>

A bad CW can be detected either by detecting errors after FEC decoding or by CRC errors. This should be clarified in the counter definition.

Suggested Remedy
Add the following to the definition of cw_bad: An uncorrected codeword is detected if either errors remain after FEC correction or if the CRC32 check fails.

<table>
<thead>
<tr>
<th>CI 155</th>
<th>SC 155.4.2.1</th>
<th>P 62</th>
<th>L 1</th>
<th># 549</th>
</tr>
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<td>Broadcom</td>
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<td>Proposed Response</td>
<td>Response Status</td>
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<td></td>
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</tr>
</tbody>
</table>

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

Suggested Remedy
Remove the FEC high SER row from Table 155-9.

<table>
<thead>
<tr>
<th>CI 155</th>
<th>SC 155.4.2.1</th>
<th>P 63</th>
<th>L 26</th>
<th># 291</th>
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<tr>
<td>Proposed Response</td>
<td>Response Status</td>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The description of the 'FAW_COMPARE' function in subclause 155.4.2.2 'Functions' says that 'If current_pmal and first_pmal both found a match and ... faw_match is set to true.' Since faw_valid '...is considered to be valid if at least 36 bits match the 44 known bits of the FAW pattern...'. I assume rather than a 'match', this really should say something along the lines of 'if at least 36 symbols of the current receive 22-symbol block match the 44 known bits of the FAW pattern'. It however seems simpler to just add faw_valid is TRUE as a condition to enter the COMP state, which would become 'faw_counter_done * faw_valid', and have a path from the 'COUNT_2' state to the 'INVALID_FAW' state if 'faw_counter_done * !faw_valid' is FALSE. This would also mirror the similar use of the 'FAW_COMPARE' function in the 'COMP_2ND' state where the condition to transition to the state is 'faw_counter_done * faw_valid' and 'faw_counter_done * !faw_valid' results in a transition to the 'FAW_SLIP' state.

SuggestedRemedy

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

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

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

Proposed Response Response Status O

——

The description of the 'restart_lock' variable says 'A boolean variable that is set by the frame alignment word (FAW) lock process to reset the synchronization process on all PMA lanes. It is set to TRUE when 15 FAWs in a row fail to match (15_BAD state)'. While the restart_lock variable is used in the frame alignment word (FAW) lock process described in Figure 155-14, it is also used in the Alignment marker lock process described in Figure 155-16.

SuggestedRemedy

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

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

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

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

Proposed Response Response Status O

——

The description on FAW synchronization seems to imply that there is a FAW synchronization process for each lane, for a total of 4 independent FAW synchronization processes. Actually there are 2 FAW synchronization processes, one per polarization (see figure 115.10 and clause 155.3.3.7)

SuggestedRemedy

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

Proposed Response Response Status O
As the PMA is 'above' the PMD, the PMA would detect alignment in the symbols for a given lane of the PMD service interface.

**Suggested Remedy**

Change the text '... the PMA service interface.' to read '... the PMD service interface.'.

---

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

**Suggested Remedy**

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

---

Based on the description of the 'faw_valid' variable, and slide 4 of the contribution 'faw_valid analysis' from Mike Sluyski<br>[
https://www.ieee802.org/3/cw/public/22_0523/sluyski_3cw_01a_220523.pdf#page=4
] referencing a 'QPSK FAW' value of 44, it seems a valid FAW sequence can only be detected across all four lanes. As a result, it will only be possible to achieve FAW lock on all lanes, or no lanes. There is no case where some lanes can be FAW locked, and others are not. There, therefore, seems no need to have four instances of the Frame alignment word lock state diagram (page 63, line 3). If there were, they wouldn't operate independently on each lane (page 63, line 5), and instead would operate in lock step.

It therefore seems that the frame alignment word lock state diagram can be collapsed in to one if the first_pmal and current_pmal variables hold the mapping number found in table 155-7 to achieve faw_valid rather than the lane number. The PMA deskew state diagram can then be removed.

**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 ...'.
<table>
<thead>
<tr>
<th>CI</th>
<th>SC</th>
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<td>155</td>
<td>155.4.2.4</td>
<td>64</td>
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<td>217</td>
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<tr>
<td>state variables</td>
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</tr>
<tr>
<td>The 'faw_counter' variable should be renamed 'dword'</td>
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<tr>
<td>The description of the 'faw_counter' variable says it '... of the next FAW on a PMA lane.' to read '... of the next FAW.' in the 'faw_counter' description.</td>
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<tr>
<td><strong>SuggestedRemedy</strong></td>
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<tr>
<td>Change the text '... of the next FAW on a PMA lane.' to read '... of the next FAW.' in the 'faw_counter' description.</td>
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<tr>
<td>state variables</td>
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<tr>
<td>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.'</td>
<td></td>
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<tr>
<td><strong>SuggestedRemedy</strong></td>
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<tr>
<td>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.'</td>
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<td><strong>Proposed Response</strong></td>
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<td>state diagrams</td>
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<tr>
<td>In the GET_BLOCK state, the variable slip_done should be faw_slip_done</td>
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<tr>
<td>The 'slip_done' variable assigned to FALSE in the GET_BLOCK state of the Figure 155-14 '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.</td>
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<tr>
<td><strong>SuggestedRemedy</strong></td>
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</tr>
<tr>
<td>Change the text 'slip_done &lt;= FALSE' in the GET_BLOCK state in Figure 155-14 to read 'faw_slip_done &lt;= FALSE'.</td>
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<table>
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</tr>
<tr>
<td>state variables</td>
<td></td>
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</tr>
<tr>
<td>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 &lt;= current_pmal' every cycle through the '2_GOOD' and 'GOOD_FAW' states. With that said, the assignment 'first_pmal &lt;= 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 FAWCOMPARE function, page 62, line 28).</td>
<td></td>
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<tr>
<td><strong>SuggestedRemedy</strong></td>
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</tr>
<tr>
<td>Consider removing the assignment 'first_pmal &lt;= current_pmal' from the '2_GOOD' and 'GOOD_FAW' states.</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: 0/open  W/written  C/closed  U/unsatisfied  Z/withdrawn
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<td>E</td>
<td>state diagrams</td>
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<tr>
<td>155</td>
<td>155.4.2.4</td>
<td>E</td>
<td>bucket</td>
<td>E</td>
<td>state diagrams</td>
</tr>
</tbody>
</table>

### Comment 1
**Comment Type:** T  
**Comment Status:** X  
**Subclause 155.4.2.3 'Counters'** defines the 'faws_bad_count' whereas the Figure 155-14 'Frame alignment word (FAW) lock state diagram' uses 'faw_bad_count' ('faw' vs 'faws').

**Suggested Remedy:**
- Suggest that:
  1. The transition from the 'INVALID_FAW' state to the '15_BAD' state be changed to read 'faws_bad_count = 15'.
  2. The transition from the 'INVALID_FAW' state to the 'COUNT_2' state be changed to read 'faws_bad_count < 15'.

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

### Comment 2
**Comment Type:** T  
**Comment Status:** X  
**Counters**

The 'restart_lock' variable is set to TRUE on entry to the '15_BAD' state. This will cause the state diagram to transition to the 'LOCK_INIT' state because 'restart_lock' is one of the OR conditions in the 'open arrow' entry to that state. The actions in the 'LOCK_INIT' state will be executed, but since 'restart_lock' remains set to TRUE, and 'open arrow' transitions are evaluated continuously whenever any state is evaluating its exit conditions (see 21.5.3), on exit the state diagram will loop back to the 'LOCK_INIT' state. The state diagram will then be locked in this loop permanently.

**Suggested Remedy:**
- Suggest that either the action 'restart_lock <= FALSE' be added to the 'LOCK_INIT' state or the 'restart_lock' be deleted and a 'UCT' be added from the '15_BAD' state to the 'LOCK_INIT' state.

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

### Comment 3
**Comment Type:** E  
**Comment Status:** D  
**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).**

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

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

### Comment 4
**Comment Type:** E  
**Comment Status:** D  
**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.**

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

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

### Comment 5
**Comment Type:** E  
**Comment Status:** D  
**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'.**

**Suggested Remedy:**
- Change 'amps_lock<x> <= FALSE' in the LOCK_INIT state to read 'amps_lock <= FALSE'.

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

---

**TYPE:** TR/technical required  
**COMMENT STATUS:** D/dispatched A/accepted R/rejected  
**SORT ORDER:** Clause, Subclause, page, line  
**Page:** 84 of 123  
**Date:** 9/13/2022 11:26:36 AM
The figure 155-16 PCS alignment marker lock state diagram uses the variable 'pma_align_status', however that variable is generated by the figure 155-14 PMA frame alignment word (FAW) lock state diagram, and it is not passed across the PMA service interface from the PMA to the PCS. As a result, it is not available to be used in the figure 155-16 PCS alignment marker lock state diagram.

Suggest that 'pma_align_status' being 'TRUE' be used as a condition to set the SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive to OK and therefore communicate it across the PMA service interface. Since 'signal_ok', derived from the SIGNAL_OK parameter, is already used as an 'open arrow' entry to the 'LOCK_INIT' state of the figure 155-16 PCS alignment marker lock state diagram, 'pma_align_status' can be deleted as an exit condition from that state.

**SuggestedRemedy**

[1] Add 'pma_align_status' being 'TRUE' as a condition to set the SIGNAL_OK parameter of the PMA:IS_SIGNAL.indication primitive to OK in subclause 155.3.2 '400GBASE-ZR PMA service interface'

[2] Delete that exit condition 'pma_align_status' from the LOCK_INIT state in figure 155-16.

**Proposed Response**

Response Status O

---

The following objects apply to: objects?

**SuggestedRemedy**

Reword

**Proposed Response**

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

#### Comment: 310

**Comment Type:** E  
**Comment Status:** X  
**Proposed Response:**  

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

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

**Response Status:** O

---

#### Comment: 311

**Comment Type:** E  
**Comment Status:** X  
**Proposed Response:**  

**Comment:**  
Subclause 155.5 '400GBASE-ZR PCS and PMA management' uses the term 'provided' yet the following subclause 155.5.1 'PCS and PMA MDIO function mapping' uses 'implemented' about the MDIO interface.

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

**Response Status:** O

---

#### Comment: 33

**Comment Type:** E  
**Comment Status:** X  
**Proposed Response:**  

**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).

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

**Response Status:** O

---

#### Comment: 489

**Comment Type:** E  
**Comment Status:** X  
**Proposed Response:**  

**Comment:**  
FEC degraded SER activate threshold register should be PCS FEC degraded SER activate threshold register, but it's for Clause 119 PCS RS(544,514) FEC and there is no FEC degraded SER feature in this draft.

**Suggested Remedy:**  
Delete the four FEC degraded SER rows

**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:** Clause, Subclause, page, line

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**Page 86 of 123**  
9/13/2022 11:26:36 AM
Comment Type  TR  Comment Status  X  SD FEC error count
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.

Comment Status  X
Response Status  O

Comment Type  T  Comment Status  X  AM lock
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_lock" 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_lock" be used to lock onto the SC-FEC frame? Are the AM frames and the SC-FEC frames aligned, and is the AM used by the SC-FEC decoding block to lock onto the SC-FEC frame?

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 Type  TR  Comment Status  X  MDIO mapping
The corrected bit and total bit MDIO registers refer to Clause 153 only but are being used in Clause 155 now.

Suggested Remedy
Add the following sub-clauses:
155.5.1.x FEC_total_bits_counter
See 153.2.5.3 for the definition of this counter.
155.5.1.y FEC_corrected_bits_counter
See 153.2.5.4 for the definition of this counter.
Bring in 45.2.1.229 and 45.2.1.230 and add appropriate references to these new sub-clauses

Proposed Response  Response Status  O
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

Response Status: O

---

Table 155-9 mentions the MDIO status variable "FEC degraded SER", but as pointed out in an earlier comment the draft provides no description as to how the "FEC degraded SER" status variable is set.

Suggested Remedy

The description for "FEC degraded SER" is missing from the draft.

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

Proposed Response

Response Status: O
Register bits 3.52.3:0 (IEEE Std 802.3-2022 clause 45.2.3.25) are PCS lane alignment lock status registers, yet they are mapped to PMA lane alignment lock variables (faw_lock<3:0>). Similarly, register bit 3.50.12 is the PCS alignment status, yet it is mapped to the PMA alignment status variable (pma_align_status).

If there was a 400GBASE-ZR framing issue on a link where the PMA framing was operating correctly, the faws_lock<3:0> bits and the pma_align_status would all be true based on the respective frame alignment word (FAW) lock state diagrams, while the PCS would not be aligned based on the alignment marker lock state diagram. In that case, the current 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 clause 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 provided 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 155.2.4.4.4.1) 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.

Proposed Remedy

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

Proposed Response

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation. For comment resolution group (CRG) consideration.
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". 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.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment:**

**Comment Type:** E  
**Comment Status:** D  
**Suggested Remedy:**

Dawe, Piers  
Nvidia  
**Comment Type:** E  
**Comment Status:** D  
**Suggested Remedy:**

- **Proposed Response:** PROPOSED REJECT.

It is common to point to locations outside the same subclause for additional information, see 156.9.3 as an example.

**Comment:**

**Comment Type:** T  
**Comment Status:** D  
**Suggested Remedy:**

Ran, Adee  
Cisco  
**Comment Type:** T  
**Comment Status:** D  
**Suggested Remedy:**

- **Proposed Response:** PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments.

**Comment:**

**Comment Type:** T  
**Comment Status:** D  
**Suggested Remedy:**

Law, David  
Hewlett Packard Enterprise  
**Comment Type:** T  
**Comment Status:** D  
**Suggested Remedy:**

- **Proposed Response:** PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.1.1 P 74 L 41 # 313
Law, David Hewlett Packard Enterprise

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

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Pending comment resolution group (CRG) discussion and resolution of PCS and PMA comments

Cl 156 SC 156.2 P 75 L 3 # 315
Ran, Adee Cisco

Comment Type E Comment Status D
"The 400GBASE-ZR PMD has four analog streams, in which case i = 0 to 3."
why "in which case"?

SuggestedRemedy
change "in which case" to "hence".

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.
Comment Type: T  Comment Status: D
As described here the PMA sends digital symbols (discrete and sampled) from a set of 4 levels), not "analog streams" (which is an undefined term).

Also applies to 156.5.2 which contains very similar text.

Suggested Remedy
Change "In the transmit direction, the PMA continuously sends four analog streams to the PMD" to "In the transmit direction, the PMA continuously sends four streams of quaternary symbols to the PMD".

Change "The PMD then converts these four analog streams" to "The PMD then converts these streams of symbols".

Apply in 156.5.2, if it is retained.

Proposed Response  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.

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

Comment Type: T  Comment Status: D
The values listed are not binary.

Also applies in 156.5.2.

Suggested Remedy
Delete "binary".

Proposed Response  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.

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

Comment Type: E  Comment Status: D
3, 1, -1, and -3

Suggested Remedy
Please count forwards in the usual way: -3, -1, 1, and 3, and in next paragraph and 156.5.2 and 156.5.3

Proposed Response  Response Status: W
PROPOSED ACCEPT IN PRINCIPLE.

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

Comment Type: T  Comment Status: D
Subclause '155.3.3 Functions within the PMA' says that 'The purpose of the PMA is to adapt between the PCS layer digital symbols to and from the four analog signals ...' and subclause 155.3.3.4 '16QAM encode and signal drivers' says that '... stream of symbols is converted to four analog signals ...' and that 'The analog signals are sent to the 400GBASE-ZR PMD sublayer over the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request sublayer signals.' It, therefore, appears that the PMD service interface is a set of analogue signals. Finally, Figure 155-10 shows a DEC block above the PMD service interface.

Subclause 156.2 'Physical Medium Dependent (PMD) service interface', however, says 'In the transmit direction, the PMA continuously sends four analog streams to the PMD ... with binary values of 3, 1, -1, and -3 using the PMD:IS_UNITDATA_i.request primitive.' Is it correct to say '... with binary values ...'.

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: W
PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.
### Proposed Accept in Principle

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

As described here the PMD sends analog signals (continuous, to be sampled and digitized in the PMA).

"Analog streams" is an undefined term and is not used in other clauses (previous instances of this term have been removed by 802.3dc and earlier revision projects).

Also applies to 156.5.3 which contains very similar text.

**Suggested Remedy**

Change "the PMD continuously sends four analog streams to the PMA, corresponding to the signals received from the MDI" to "the PMD continuously sends four analog signals to the PMA, corresponding to the optical signal received from the MDI".

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

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

---

### Proposed Reject

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

"the variable SIGNAL_DETECT parameter": 156.5.4 says it's a parameter, this and that say not variable

**Suggested Remedy**

Delete variable

**Proposed Response**

PROPOSED REJECT.

---

### Proposed Accept in Principle

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

The NOTE about signal detect is out of place since the value is always OK. "sufficient light" and "meeting the BER" are irrelevant for this PMD, since signal detect is not a function of light intensity and the PMD does not detect bits.

**Suggested Remedy**

Delete the NOTE.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

Same note is in IEEE Std 802.3-2022 clause 154 and was specifically added to clarity.

---

### Proposed Accept in Principle

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

2048 bit times

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

Change "no more than 2048 bit times (4 pause_quanta or 20.48 ns)" to "no more than 8192 bit times (16 pause_quanta or 20.48 ns)"
I suspect that skew variation cannot exist at SP2 (PMD service interface), because the PCS and PMA are defined as operating in one clock domain, not as multiple lanes with separate logic. This may be worth mentioning (as done in other cases where skew variation can’t exist, e.g. 140.3.2).

Is skew variation (as opposed to static skew) relevant on a single-lane, but coherent, PMD output?

If there is no skew variation between SP2 and SP3 then skew variation need not be specified at all.

**Suggested Remedy**

Add a statement that there is no skew variation at TP2.

If skew variation between the PMDs isn't relevant, change also the text about skew variation at SP3 and SP4, as in 140.3.2.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

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

---

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

**Suggested Remedy**

Revisit skew constraints as needed.

The diagram reference should be 116-4.

**Proposed Response**

PROPOSED ACCEPT IN PRINCIPLE.

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

---

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**

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.
Comment Type TR Comment Status D
Are these Skew and SV limits plausible? What does the PMA need? This is a hybrid of "parallel" and "serial", needs new numbers.

Suggested Remedy
Revise to limits that are appropriate to DP-16PAM technology and the channel.

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

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

Comment Status D
Response Status W

Comment Type T Comment Status D
There is no description of how the PMD_global_signal_detect variable, defined in subclause 156.4, should be driven. Subclause 156.5.4 'PMD global signal detect function' says that SIGNAL_DETECT is set to a fixed OK value, hence there is in effect no signal detect to report in the PMD.

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 W
PROPOSED ACCEPT IN PRINCIPLE.

Current wording aligns with IEEE Std 802.3-2022 subclause 154.4 and 802.3db D3.2 subclause 167.4, for comment resolution group (CRG) consideration.
<table>
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<tr>
<th>CI 156</th>
<th>SC 156.4</th>
<th>P 79</th>
<th>L 52</th>
<th># 324</th>
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<tr>
<td>Law, David</td>
<td>Hewlett Packard Enterprise</td>
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<td><strong>SuggestedRemedy</strong></td>
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<tr>
<td>T</td>
<td>D</td>
<td>The reference to the variable 'Rx_optical_frequency_index' here and on page 81 line 44 should be to 'Rx_optical_channel_index', see page 76, line 25.</td>
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**Proposed Response**  
See comment.  
**Response Status**  
W  
**PROPOSED ACCEPT IN PRINCIPLE.**  
Implement suggested remedies with editorial license

<table>
<thead>
<tr>
<th>CI 156</th>
<th>SC 156.5.2</th>
<th>P 77</th>
<th>L 35</th>
<th># 499</th>
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<tr>
<td>Dawe, Piers</td>
<td>Nvidia</td>
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<td><strong>Comment Type</strong></td>
<td><strong>Comment Status</strong></td>
<td><strong>SuggestedRemedy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>D</td>
<td>The text in this subclause practically repeats a paragraph in 156.2. Similarly for 156.5.3.</td>
<td></td>
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</table>

**Proposed Response**  
Review supporting presentation, for comment resolution group (CRG) consideration.  
**Response Status**  
W  
**PROPOSED ACCEPT IN PRINCIPLE.**  
Remove any blank lines with editorial license

<table>
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<tr>
<th>CI 156</th>
<th>SC 156.5.1</th>
<th>P 77</th>
<th>L 30</th>
<th># 326</th>
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<td><strong>Comment Type</strong></td>
<td><strong>Comment Status</strong></td>
<td><strong>SuggestedRemedy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>D</td>
<td>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.</td>
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**Proposed Response**  
See comment.  
**Response Status**  
W  
**PROPOSED ACCEPT IN PRINCIPLE.**  
Implement suggested remedies with editorial license

<table>
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<tr>
<th>CI 156</th>
<th>SC 156.5.1</th>
<th>P 77</th>
<th>L 18</th>
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<td><strong>Comment Type</strong></td>
<td><strong>Comment Status</strong></td>
<td><strong>SuggestedRemedy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>D</td>
<td>Since subclause 156.5.4 'PMD global signal detect function' says that 'The PMD global signal detect function shall set the state of the SIGNAL_DETECT parameter to a fixed OK value.' it doesn't seem correct to show the SIGNAL_DETECT emanating from the 'Optical receiver' block in Figure 156-2 'Block diagram for 400GBASE-ZR transmit/receive paths'.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Proposed Response**  
Suggest that SIGNAL_DETECT be removed from Figure 156-2.  
**Response Status**  
W  
**PROPOSED ACCEPT IN PRINCIPLE.**  
See response to comment 318

**PROPPOSED ACCEPT IN PRINCIPLE.**

**Remove any blank lines with editorial license**

**Review supporting presentation, for comment resolution group (CRG) consideration.**
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Law, David Hewlett Packard Enterprise

Comment Type: E  Comment Status: D

Rather than being requested by the PMD service interface messages, messages are passed across the PMD service interface, either from the PMA to the PMD or from the PMD to the PMA. In addition, abstract service interfaces pass data in the parameters of primitives. In the case of the inter-sublayer service interface primitives defined in subclause 116.3 referenced by IEEE P802.3cw, these parameters are tx_symbol (see 116.3.3.1.1) and rx_symbol (see 116.3.3.2.1).

SuggestedRemedy

Suggest:

[1] The text "The PMD Transmit function shall convert the four analog streams requested by the PMD service interface messages PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request into ..." (page 77, line 35) should be changed to read "The PMD Transmit function shall convert the four analog streams from the PMA passed across the PMD service interface in the tx_symbol parameters of the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request primitives into ...".

[2] The text "The PMD Receive function shall convert the composite optical signal received from the MDI into four analog streams for delivery to the PMD service interface using the messages PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication, all according ..." (page 77, line 45) should be changed to read "The PMD Receive function shall convert the composite optical signal received from the MDI into four analog streams passed across the PMD service interface to the PMA in the rx_symbol parameters of the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication primitives, all according ...".

[3] The text "The analog signals are sent to the 400GBASE-ZR PMD sublayer over the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request sublayer signals." in subclause 155.3.3.4 (page 58, line 33) is changed to read "The four analog signals are passed across the PMD service interface to the PMD in the tx_symbol parameters of the PMD:IS_UNITDATA_0.request to PMD:IS_UNITDATA_3.request 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 PMA over the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication." in subclause 155.3.3.5 (page 58, line 47) is changed to read "Four coherent signals IX, QX, IY, and QY received by the PMD are passed across the PMD service interface to the PMA in the rx_symbol parameters of the PMD:IS_UNITDATA_0.indication to PMD:IS_UNITDATA_3.indication primitives.

Proposed Response

PROPOSED ACCEPT IN PRINCIPLE.

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

Huber, Thomas Nokia

Comment Type: T  Comment Status: D

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

SuggestedRemedy

Change "binary values" to "symbol values".

Proposed Response

PROPOSED ACCEPT IN PRINCIPLE.

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

Huber, Thomas Nokia

Comment Type: T  Comment Status: D

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

PROPOSED ACCEPT.

Dawe, Piers Nvidia

Comment Type: E  Comment Status: D

The mapping of the analog values to the symbol amplitudes is listed in Table 155-2.

SuggestedRemedy

See response to comment 219

Proposed Response

PROPOSED ACCEPT IN PRINCIPLE.

Review supporting presentation, for comment resolution group (CRG) consideration.
Comment Type  T  Comment Status  D  bucket

Subclause 156.5.2 ‘PMD transmit function’ says ‘The mapping of the analog values to the symbol amplitudes is listed in Table 155–2.’ Is this correct, Table 155–2 seems to provide the mapping between the 128-bit digital code word from the SD-FEC encoder to the in-phase (I) and quadrature-phase (Q) components of the 16QAM symbols.

SuggestedRemedy
Change reference if required.

Proposed Response  Response Status  W
PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 219

Comment Type  E  Comment Status  D

No SD!

SuggestedRemedy

Proposed Response  Response Status  W
PROPOSED REJECT.

Comment unclear and no suggested remedy provided

Comment Type  ER  Comment Status  R

It would be helpful on figure 156-3 to also add TP2_0, TP2_n, TP3_0, and TP3_n

SuggestedRemedy
add TP2_0, TP2_n, TP3_0, and TP3_n

Response  Response Status  U
REJECT.

The 0 and n-1 PMDs connecting to TP2 and TP3 are included in the diagram. Figure matches same 100Z figure in IEEE Std 802.3-2022 154.6

Comment Type  E  Comment Status  R

misuse of TP2

SuggestedRemedy

Response  Response Status  C
REJECT.

Comment unclear and no suggested remedy provided
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.6 P 79 L 38 # 503
Dawe, Piers Nvidia
Comment Type E Comment Status D
blank line
SuggestedRemedy

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Remove any blank lines with editorial license

Cl 156 SC 156.6 P 79 L 48 # 101
Ran, Adee Cisco
Comment Type E Comment Status D
"Tx" and "Rx" should not be used as abbreviations of the terms "transmitter" and "receiver" (except in variable and register names, in diagram labels, or as qualifiers).
SuggestedRemedy
Change to "transmitter" and "receiver" here and in other places as appropriate.
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLED.
Change "Tx" to "transmitter" and change "Rx" to "receiver" through the document. With editorial license.

Cl 156 SC 156.6 P 79 L 52 # 504
Dawe, Piers Nvidia
Comment Type E Comment Status D
Rx_optical_frequency_index Tx_optical_frequency_index Tx_Rx_diff_opt_freq_ability
SuggestedRemedy
Tables 156-2, 3 and a later sentence have Tx_optical_channel_index Rx_optical_channel_index Tx_Rx_diff_opt_chan_ability
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
See responses to comments 324, 325 and 326

Cl 156 SC 156.6 P 80 L 1 # 505
Dawe, Piers Nvidia
Comment Type E Comment Status D
blank lines 1 to 3
SuggestedRemedy

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Remove any blank lines with editorial license

Cl 156 SC 156.6 P 80 L 7 # 506
Dawe, Piers Nvidia
Comment Type E Comment Status R
fi not defined
SuggestedRemedy

Response Response Status C
REJECT.
fi is defined on page 79, line 31 as "all channel frequencies fi." and is consistent with figure 154-3 in IEEE Std 802.3-2022
A straw poll was taken:
I support rejection of comment #506 as proposed
Yes: 16
No: 2

Cl 156 SC 156.6 P 80 L 28 # 507
Dawe, Piers Nvidia
Comment Type E Comment Status R
square or round brackets
SuggestedRemedy

Response Response Status C
REJECT.
Use of [ ] brackets consistent with Table 154-5 in IEEE Std 802.3-2022
Comment Type TR  Comment Status D
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
SuggestedRemedy
Need discussions on the intent

Proposed Response Response Status W
PROPOSED REJECT.

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

Comment Type TR  Comment Status R
Receive OSNR tolerance is not defined at point till one reads section 156.9.24
SuggestedRemedy
Please add reference to 156.9.24
Response Response Status C
REJECT.

All specifications in Tables 156-7, -8 and -9 including Receive OSNR tolerance are defined in 156.9 which is after the tables but consistent with multiple clauses in IEEE Std 802.3-2022.

Comment Type E  Comment Status D
"+/- 20 ppm" in Table 156-7
SuggestedRemedy
Change to "±20 ppm" (symbol and space)
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Change as suggested through the document. With editorial license.
### Comment 354

**Cl 156 SC 156.7.1 P 82 L 30 # 354**

Maniloff, Eric, Ciena

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

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

**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 W**

PROPOSED ACCEPT IN PRINCIPLE.

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

### Comment 353

**Cl 156 SC 156.7.1 P 82 L 30 # 353**

Maniloff, Eric, Ciena

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

Limiting Adjacent channel crosstalk penalty requires a reduction in the power deltas between channels. To ensure this, adjustable power must be specified.

**Suggested Remedy**

Add an entry "Adjustable Range of Tx Output Power" with Min limited to -13 to -9 dBm

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

PROPOSED ACCEPT IN PRINCIPLE.

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

### Comment 103

**Cl 156 SC 156.7.1 P 82 L 35 # 103**

Ran, Adee, Cisco

**Comment Type T**  
**Comment Status A**

"RRC Roll-Off" is not a unit. It is unclear what it means in this context.

Similarly for the (min) row.

The spectral mask is specified in 156.9.4 - reading this subclause it becomes clear that the "Value" in the table are the beta parameter values for the two masks.

Instead of listing numbers that are meaningless without reading the subclause text, simply point to the subclause.

**Suggested Remedy**

Change "Value" to "See 156.9.4" and use em-dash for "Unit" in both rows.

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

ACCEPT.

### Comment 329

**Cl 156 SC 156.7.1 P 82 L 35 # 329**

Ghiasi, Ali, Ghiasi Quantum/Marvell

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

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

**Suggested Remedy**

Add reference to 156.9.4

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

ACCEPT IN PRINCIPLE.

See response to comment 103

### Comment 337

**Cl 156 SC 156.7.1 P 82 L 48 # 337**

Ghiasi, Ali, Ghiasi Quantum/Marvell

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

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

**Suggested Remedy**

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

**Response**  
**Response Status U**

REJECT.

No suggested remedy provided
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Maniloff, Eric Ciena

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

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

**Response**: ACCEPT IN PRINCIPLE.

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

With editorial license

---

Dawe, Piers Nvidia

**Comment Type**: E  **Comment Status**: A
I-Q (max instantaneous), I-Q (mean)

**Suggested Remedy**
?

**Response**: ACCEPT IN PRINCIPLE.

See responses to comment 350 and 351

---

Maniloff, Eric Ciena

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

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

**Response**: ACCEPT IN PRINCIPLE.

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

With editorial license

---

Dawe, Piers Nvidia

**Comment Type**: E  **Comment Status**: D
bottom line of table

**Suggested Remedy**

**Proposed Response**: PROPOSED ACCEPT IN PRINCIPLE.
Remove any blank lines with editorial license

---

Dawe, Piers Nvidia

**Comment Type**: E  **Comment Status**: D
Transmitter In-band OSNR

**Suggested Remedy**
Change In to in

**Proposed Response**: PROPOSED ACCEPT IN PRINCIPLE.
See response to comment 352
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.7.1 P 83 L 8 # 104
Ran, Adee Cisco

Comment Type T Comment Status D

- dB(12.5 GHz) is not a unit. Also in Table 156–7.

Suggested Remedy
- Change to dB and move the 12.5 GHz to the description or add a footnote to explain if necessary.

Proposed Response
- PROPOSED REJECT.

- Same unit in IEEE Std 802.3-2022 clause 154 table 154.7

Cl 156 SC 156.7.1 P 83 L 8 # 352
Maniloff, Eric Ciena

Comment Type E Comment Status D

- In-band should not be capitalized

Suggested Remedy
- change In to in

Proposed Response
- PROPOSED ACCEPT.

Cl 156 SC 156.7.1 P 83 L 16 # 330
Ghiasi, Ali Ghiasi Quantum/Marvell

Comment Type TR Comment Status D

- Transmit output power stability can't be negative

Suggested Remedy
- Remove the negative line

Proposed Response
- PROPOSED ACCEPT IN PRINCIPLE.

- See responses to comments 353 and 354

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

Comment Type T Comment Status D

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

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

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

Cl 156 SC 156.7.2 P 83 L 16 # 105
Ran, Adee Cisco
Comment Type T Comment Status D
"Average receive power (max)" does not depend on the receiver, but on the channel output. So it can't be a receiver specification (as the text above the table states).

Maybe it should be "Average receive power tolerance (min)"?

Similarly for "Average receive power (min)" which may be a tolerance requirement.

Similarly for Receiver OSNR (also defined in Table 156-8 for the channel, with the same value).

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

Proposed Response Response Status W
PROPOSED REJECT.

"Average receive power (max)" is a receive characteristic in multiple IEEE Std 802.3-2022 subclauses including Table 151-8, Table 154-8 and 802.3db D3.2 Table 167.8.

Cl 156 SC 156.7.2 P 84 L 24 # 516
Dawe, Piers Nvidia
Comment Type E Comment Status D
says that receiver OSNR tolerance "is informative and compliance is not required"

Suggested Remedy
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 Figure 140-9. The normative requirement for the 100GBASE-DR receiver is stressed receiver sensitivity.

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Add note in Table 156-7 for Receiver OSNR tolerance stating "OSNR tolerance is optional and compliance is not required."

Same change in 156.9.xx

Cl 156 SC 156.8 P 84 L 33 # 517
Dawe, Piers Nvidia
Comment Type E Comment Status R
Are these specs for "black link" or for "DWDM channel"?

Suggested Remedy

Response Response Status C
REJECT.

No suggested remedy provided

Cl 156 SC 156.8 P 84 L 34 # 327
Law, David Hewlett Packard Enterprise
Comment Type E Comment Status A
Subclause 156.8 '400GBASE-ZR DWDM black link transfer characteristics' says 'Some clarification of the requirements in Table 156-8 is provided in informative Annex 156A, as well as examples of compliant DWDM black links.' however there don't appear to be any clarification of the requirements in Table 156-8 in annexe 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.'

Response Response Status C
ACCEPT.

Cl 156 SC 156.8 P 84 L 35 # 518
Dawe, Piers Nvidia
Comment Type E Comment Status D
Some clarification of the requirements in Table 156-8 is provided in informative Annex 156A, as well as examples of compliant DWDM black links.

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

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 367
<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>Page</th>
<th>Line</th>
<th>Comment</th>
<th>Commenter</th>
<th>Type</th>
<th>Suggested Remedy</th>
<th>Proposed Response</th>
<th>Status</th>
<th>Response Status</th>
<th>Proposed Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>5</td>
<td>Average output power at TP3</td>
<td>Dawe, Piers</td>
<td>E</td>
<td>DECREASE</td>
<td>PROPOSED REJECT.</td>
<td>D</td>
<td>W</td>
<td>No consensus to make a change. This requirement in the specifications defined in 156.9.23.</td>
</tr>
<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>8</td>
<td>Text for OSNR... should not be present</td>
<td>Maniloff, Eric</td>
<td>E</td>
<td>DECREASE</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>A</td>
<td>C</td>
<td>No suggested remedy provided</td>
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<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>13</td>
<td>Text for OSNR... should not be present</td>
<td>Maniloff, Eric</td>
<td>E</td>
<td>DECREASE</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>A</td>
<td>C</td>
<td>No suggested remedy provided</td>
</tr>
</tbody>
</table>
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
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<th>Line</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
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</thead>
<tbody>
<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>35</td>
<td>E</td>
<td>A</td>
<td>Only relevant</td>
</tr>
</tbody>
</table>

**Response**

**Response Status** C

ACCEPT IN PRINCIPLE.

In footnote d change:

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

...to...

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

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<table>
<thead>
<tr>
<th>Cl</th>
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<th>Line</th>
<th>Comment Type</th>
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<tbody>
<tr>
<td>156</td>
<td>156.8</td>
<td>85</td>
<td>44</td>
<td>E</td>
<td></td>
<td>why is the table like this, high? isolation at 0 and +/-75?</td>
</tr>
</tbody>
</table>

**Response**

**Response Status** Z

REJECT.

This comment was WITHDRAWN by the commenter.

---

<table>
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<tr>
<th>Cl</th>
<th>SC</th>
<th>Page</th>
<th>Line</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>156</td>
<td>156.9.1</td>
<td>86</td>
<td>35</td>
<td>T</td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**Response**

**Response Status** W

PROPOSED ACCEPT IN PRINCIPLE.

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

---

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
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<th>Line</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>156</td>
<td>156.9.1</td>
<td>86</td>
<td>35</td>
<td>E</td>
<td></td>
<td>Scrambled idle encoded by CFEC and not SD-FEC?</td>
</tr>
</tbody>
</table>

**Response**

**Response Status** C

REJECT.

Use of CFEC is correct as per 155.2.1. "The transmit data is encoded with a concatenated forward error correction (CFEC) code consisting of an inner SC-FEC code and an outer Hamming code SD-FEC"
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
<tr>
<th>Cl</th>
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<th>Type</th>
<th>Status</th>
<th>Suggested Remedy</th>
<th>Response</th>
<th>Response Status</th>
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</tr>
</thead>
<tbody>
<tr>
<td>156</td>
<td>156.9.1</td>
<td>86</td>
<td>42</td>
<td>526</td>
<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>valid 400GBASE-R</td>
<td>400GBASE-ZW</td>
<td>ACCEPT IN PRINCIPLE.</td>
<td>A</td>
<td>E</td>
</tr>
<tr>
<td>109</td>
<td>156.9.1</td>
<td>86</td>
<td>42</td>
<td>109</td>
<td>Ran, Adee</td>
<td>Cisco</td>
<td>It is unclear why some parameters have pattern &quot;valid 400GBASE-R signal, 5&quot; while other have only 5 (which is the only test pattern defined in this clause, and sufficient for measurement of all parameters). &quot;valid 400GBASE-R signal&quot; 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.</td>
<td>Change pattern to either &quot;5&quot; in all rows, or &quot;valid 400GBASE-ZR signal&quot; in all rows.</td>
<td>C</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>527</td>
<td>156.9.1</td>
<td>87</td>
<td>42</td>
<td>527</td>
<td>Dawe, Piers</td>
<td>Nvidia</td>
<td>I-Q phase error (max), I-Q phase error (min)</td>
<td>Combine, as for Average receive power</td>
<td>C</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

TYPE: TR/technical required ER/editorial required GR/general required T/technical E/editorial G/general
COMMENT STATUS: D/dispatched A/accepted R/rejected RESPONSE STATUS: O/open W/written C/closed U/unsatisfied Z/withdrawn
SORT ORDER: Clause, Subclause, page, line
 IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.9.1 P 87 L 25 #528
Dawe, Piers Nvidia

Comment Type E Comment Status D
Is Average receive power a kind of sensitivity/overload? If not, why not any 400GBASE-ZW signal? Same for Ripple? which is a channel (black link) property

Suggested Remedy

Proposed Response Response Status Z
REJECT.

This comment was WITHDRAWN by the commenter.

Cl 156 SC 156.9.4 P 87 L 52 #529
Dawe, Piers Nvidia

Comment Type E Comment Status D
Compliant transmitters ... are required to ... by applying minimum and maximum masks to the spectrum acquired using an optical spectrum analyzer.

Suggested Remedy
Not

Proposed Response Response Status W
PROPOSED REJECT.

No suggested remedy provided

Cl 156 SC 156.9.4 P 88 L 1 #530
Dawe, Piers Nvidia

Comment Type E Comment Status A
As this mask is a normative spec

Suggested Remedy

Response Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 359

Cl 156 SC 156.9.4 P 88 L 8 #531
Dawe, Piers Nvidia

Comment Type E Comment Status A
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 Response Status C
ACCEPT IN PRINCIPLE.

Change "is set at -9 dB up to the –9 dB of an RRC with ß of 0.05." to "is set at -9 dB up to 30.8 GHz offset and follows a RRC ß of 0.05 for higher frequencies."

Cl 156 SC 156.9.4 P 88 L 40 #532
Dawe, Piers Nvidia

Comment Type E Comment Status D
Blank line

Suggested Remedy
Remove

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Remove any blank lines with editorial license
**Comment:**

This clause defines the transmit mask as following a RRC. The RRC definition should be included.

**Suggested Remedy:**

Add an equation to 156.9.4 defining the RRC function and Beta used to define the mask, or a reference to a definition elsewhere in 802.3

**Response:**

ACCEPT IN PRINCIPLE.

Add footnote for RRC Roll-Off *"Root raised cosine (RRC) is the square root of the raised cosine which is calculated as"* (see piecewise-defined function at https://en.wikipedia.org/wiki/raised-cosine_filter)

See 11.3.1.2.3 for possible RRC formula.

**Comment:**

within the limits

**Suggested Remedy:**

below the limit?

**Response:**

ACCEPT IN PRINCIPLE.

Delete 156.9.5.

In 156.9.4 Change

*Spectral content above 40.4 GHz is limited to -20 dB.*

to

*Spectral content above 40.4 GHz is limited to -20 dB by the spectral floor.*
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.9.6 P 88 L 51 # 535
Dawe, Piers Nvidia

Comment Type E Comment Status D
the frequency of interest

Suggested Remedy

PROPOSED REJECT.

No suggested remedy provided.

Cl 156 SC 156.9.6 P 88 L 52 # 112
Ran, Adee Cisco

Comment Type T Comment Status D
"fbaud" is not defined in this clause.

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

PROPOSED ACCEPT IN PRINCIPLE.

Change "fbaud" to "half the operating baud rate"

Cl 156 SC 156.9.6 P 88 L 52 # 536
Dawe, Piers Nvidia

Comment Type E Comment Status D
fbaud

Suggested Remedy

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 112

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

Comment Type T Comment Status D
Table 156-12 and figure 156-6. Table 93-8 for example has units of V^2 / Hz and just want to check that the power density here really has units of Hz^2 / Hz. I think this is the first time a one-side spectral power density with these units shows up in 802.3 standard, but this is not my area and I'm just trying to help. Thank you!

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

PROPOSED REJECT.

The power spectral density of frequency noise has units of Hz^2 / Hz

Cl 156 SC 156.9.6 P 89 L 3 # 166
Abbott, John Corning Incorporated

Comment Type E Comment Status D
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.

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

PROPOSED ACCEPT.

Cl 156 SC 156.9.6 P 89 L 3 # 537
Dawe, Piers Nvidia

Comment Type E Comment Status D
1-sided noise power spectral density [Hz^2/Hz]

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

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 168
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

**Comment 113**

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

**Ran, Adee Cisco**

**Figure 156-5 is cluttered.**

This figure does not add any information beyond Table 156-12 (which is normative, whereas the figure is an illustration).

**Suggested Remedy**

Remove the marker labels (e.g. "X:1 x 10^4, Y: 1 x 10^9") and change "Hz2" to "Hz^2" in the y axis label.

Alternatively, delete the figure.

**PROPOSED ACCEPT IN PRINCIPLE.**

Retain table 156-5 and change "Hz2" to "Hz^2" in the y axis label.

**Comment 114**

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

**Abbott, John Corning Incorporated**

**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.

**Suggested Remedy**

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

**PROPOSED ACCEPT IN PRINCIPLE.**

**Comment 115**

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

**Maniloff, Eric Ciena**

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 EVMaxmax), and hinge the specifications to be EVMmax instead of EVM.

**PROPOSED ACCEPT IN PRINCIPLE.**

For comment resolution group (CRG) consideration.

**Comment 360**

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

**Maniloff, Eric Ciena**

I-Q is an insufficient name for this spec

**Suggested Remedy**

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

**ACCEPT IN PRINCIPLE.**

Change spec name to "Instantaneous I-Q offset per polarization"
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.9.11 P 90 L 24 # 361

Comment Type T  Comment Status A
Add a definition for I-Q Offset Measurement

SuggestedRemedy
Add the following Specification:

\[ \text{IQoffset} (\text{Max}) = 10 \log_{10} \left( \frac{\text{I}_{\text{mean}}^2 + \text{Q}_{\text{mean}}^2}{\text{P}_{\text{signal}}} \right) \]

with a measurement interval of 1 us

Response  Response Status C
ACCEPT IN PRINCIPLE.

Change 156.9.11 to "The instantaneous I-Q offset per polarization is calculated as IQoffset = 10log10[(I_{\text{mean}}^2 + Q_{\text{mean}}^2)/P_{\text{signal}}] with a measurement interval of 1 us. The instantaneous I-Q offset per polarization is the maximum value per polarization and shall be within the limits given in Table 156–6."

With editorial license

Cl 156 SC 156.9.11 P 90 L 26 # 117

Comment Type T  Comment Status A
The definition of I-Q (max instantaneous) is unclear. "peak value" of what per polarization? is it peak power?

Assuming it is not the difference between I and Q, the current name is confusing. Should it be "Max instantaneous power per polarization"?

Also, having the definition and the "shall" in the same sentence create poor language.

SuggestedRemedy
Consider renaming this parameter.
Rewrite the definition to make it clear, even if the name is not changed.
Make the "shall" statement separate from the definition.

Response  Response Status C
ACCEPT IN PRINCIPLE.

See response to comments 361

Cl 156 SC 156.9.11 P 90 L 26 # 116

Comment Type E  Comment Status D
Font size is inconsistent in the text, also in 156.9.12.

SuggestedRemedy
Make it consistent.

Proposed Response  Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Ensure consistent font in 156.9.11 and 156.9.12. With editorial license

Cl 156 SC 156.9.11 P 90 L 26 # 538

Comment Type E  Comment Status A
I-Q (max instantaneous)

SuggestedRemedy
?

Response  Response Status C
ACCEPT IN PRINCIPLE.

See response to comment 350

Cl 156 SC 156.9.11 P 90 L 28 # 562

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

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

Response  Response Status C
ACCEPT IN PRINCIPLE.

"Mean I-Q offset per polarization"
Add a definition for I-Q Offset Measurement

Suggested Remedy

Add the following Specification:

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

ACCEPT IN PRINCIPLE.

See response to comment #362. Change 156.9.12 to "The mean IQ offset is calculated as IQoffset(mean) = 10\log_{10}\left( \frac{(I_{\text{mean}}^2 + Q_{\text{mean}}^2)}{P_{\text{signal}}} \right). The mean I-Q offset per polarization is the mean value per polarization and shall be within the limits given in Table 156–6."

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

Cl 156 SC 156.9.12 P 90 L 30 # 118
Ran, Adee Cisco
Comment Type T Comment Status D bucket
"<=" should be a symbol
Suggested Remedy change to the \( \leq \) symbol
Proposed Response PROPOSED ACCEPT.

Cl 156 SC 156.9.12 P 90 L 30 # 539
Dawe, Piers Nvidia
Comment Type E Comment Status A I-Q (mean)
Suggested Remedy
Response Response Status C ACCEPT IN PRINCIPLE.
See responses to comments 351 and 363

Cl 156 SC 156.9.13 P 90 L 35 # 540
Dawe, Piers Nvidia
Comment Type E Comment Status D I-Q amplitude imbalance (mean)
Suggested Remedy proportional amplitude difference?
Proposed Response Response Status W PROPOSED REJECT.
Comment unclear and no suggested remedy provided

Cl 156 SC 156.9.14 P 90 L 40 # 541
Dawe, Piers Nvidia
Comment Type E Comment Status D *proportional* phase difference
Suggested Remedy
Proposed Response Response Status W PROPOSED REJECT.
Comment unclear and no suggested remedy provided

Cl 156 SC 156.9.14 P 90 L 41 # 542
Dawe, Piers Nvidia
Comment Type E Comment Status D local oscillator
Suggested Remedy
Proposed Response Response Status W PROPOSED REJECT.
Comment unclear and no suggested remedy provided

Cl 156 SC 156.9.15 P 90 L 45 # 543
Dawe, Piers Nvidia
Comment Type E Comment Status D ditto. why is this separate?
Suggested Remedy
Proposed Response Response Status W PROPOSED REJECT.
Comment unclear and no suggested remedy provided
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.9.17 P 91 L 3
Dawe, Piers Nvidia
Comment Type E Comment Status D
shall with no PICS

SuggestedRemedy

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Add "Optical signal-to-noise ratio (OSNR)" to 156.13.4.4. With editorial license

Cl 156 SC 156.9.17 P 91 L 3
Dawe, Piers Nvidia
Comment Type E Comment Status D
who is supposed to act on this "shall"? Black link, as it points to Table 156-8. 156.8 has the necessary "shall". Don't write in the passive voice.

SuggestedRemedy

Proposed Response Response Status W
PROPOSED REJECT.

No suggested remedy provided. Current language matches similar language in IEEE Std 802.3-2022 154.9.11

Cl 156 SC 156.9.17 P 91 L 4
Maniloff, Eric Ciena
Comment Type E Comment Status D
Both in-band and out-of-band OSNR use the same definition for Signal Power. 156.9.17 refers to this as average signal power, 156.9.19 refers to this as the total signal power. These should be the same.

SuggestedRemedy

Change Average to Total on line 4

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Change "ratio of the average signal power" to "ratio of the total signal power within the signal's –20 dB spectral mask points".

Cl 156 SC 156.9.17 P 91 L 5
Dawe, Piers Nvidia
Comment Type E Comment Status D
maximum spectral excursion

SuggestedRemedy

unused / undefined

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

In 156.9.17 change the end of the second sentence from "plus and minus the maximum spectral excursion" to "plus and minus the maximum spectral excursion as defined in ITU-T G.698.2."

Cl 156 SC 156.9.18 P 91 L 15
Dawe, Piers Nvidia
Comment Type E Comment Status D
in-band OSNR

SuggestedRemedy

Define in-band

Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.

Approach of parameter Transmitter in-band OSNR being defined as OSNR consistent with IEEE Std 802.3-2022. Clause 156 adds new parameter Transmitter out-of-band OSNR. For CRG discussion.

Cl 156 SC 156.9.21 P 91 L 36
Dawe, Piers Nvidia
Comment Type E Comment Status D
No verb

SuggestedRemedy

Proposed Response Response Status W
PROPOSED REJECT.

No suggested remedy provided
The average receive power shall be within the limits given in Table 156-7.

Suggested Remedy
Average output power at TP3, Table 156-8? Sensitivity and overload? "shall" should not be here.

Proposed Response
PROPOSED ACCEPT IN PRINCIPLE.

Same language used for Average optical power in IEEE Std 802.3-2022 clause 154. Other inforce clauses include "if measured per IEC 61280-1-3 or 61280-1-3". For CRG discussion.

pre-FEC BER level lower than the CFEC threshold

Suggested Remedy
which is? and the SD-FEC?

Proposed Response
PROPOSED ACCEPT IN PRINCIPLE.

Change "while maintaining a pre-FEC BER level lower than the CFEC threshold" to "while maintaining a pre-FEC BER as defined in 156.1.1" Only applies to CFEC, see response to comment #525.

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

Suggested Remedy

Proposed Response
PROPOSED REJECT.

Statement "but it does not have to be met" applies to the line impairments which are listed and not the transmitter.

"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"

Suggested Remedy
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
PROPOSED ACCEPT IN PRINCIPLE.

For comment resolution group (CRG) consideration. Same informative or optional approach taken in IEEE Std 802.3-2022 154.9.16.
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.9.25 P 92 L 13 # 553
Dawe, Piers Nvidia
Comment Type E Comment Status D
insertion loss
SuggestedRemedy channel response?
Proposed Response Response Status W
PROPOSED REJECT.
Comment unclear and no suggested remedy provided

Cl 156 SC 156.9.26 P 92 L 18 # 554
Dawe, Piers Nvidia
Comment Type E Comment Status D
[Optical path OSNR penalty, defined in Recommendation ITU-T G.698.2, qv]
SuggestedRemedy
Proposed Response Response Status W
PROPOSED REJECT.
Comment unclear, no suggested remedy provided and reference to ITU-T is consistent with IEEE Std 802.3-2022.

Cl 156 SC 156.9.29 P 92 L 33 # 555
Dawe, Piers Nvidia
Comment Type E Comment Status D
[Adjacent channel isolation, defined in Recommendation ITU-T G.671, qv]
SuggestedRemedy
Proposed Response Response Status W
PROPOSED REJECT.
Comment unclear, no suggested remedy provided and reference to ITU-T is consistent with IEEE Std 802.3-2022.

Cl 156 SC 156.9.30 P 92 L 38 # 556
Dawe, Piers Nvidia
Comment Type E Comment Status D
[Interferometric crosstalk at TP3, defined in Recommendation ITU-T G.698.2, qv]
SuggestedRemedy
Proposed Response Response Status W
PROPOSED REJECT.
Comment unclear, no suggested remedy provided and reference to ITU-T is consistent with IEEE Std 802.3-2022.

Cl 156 SC 156.10.1 P 92 L 49 # 558
Dawe, Piers Nvidia
Comment Type E Comment Status D
Connect the 400 Gb/s DP-16QAM transmitter to
SuggestedRemedy
Proposed Response Response Status W
PROPOSED ACCEPT IN PRINCIPLE.
Review supporting presentation, for comment resolution group (CRG) consideration.

Cl 156 SC 156.10.1 P 93 L 8 # 562
Dawe, Piers Nvidia
Comment Type E Comment Status D
Digital Signal Processing
SuggestedRemedy
Proposed Response Response Status W
PROPOSED REJECT.
No suggested remedy provided
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<th>L 9</th>
<th># 561</th>
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<td>Need a bigger block size for at least one of these, to go with the jitter corner frequency</td>
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<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>
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<td>If there is interest I can bring a frequency dependent ENOB mask</td>
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<td>Calibrated coherent receiver and so on, also in other figures</td>
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IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl  156  SC  156.10.1.2.4  P  94  L  44  #  121
Ran, Adee  Cisco

Comment Type  T  Comment Status  D
"3rd-order super Gaussian filter with RRC = 0.2"

This is an uncommon way to specify a filter, and it is unclear.

RRC seems to stand for root raised cosine (0.2 may be the roll-off parameter beta), but this filter is not "super Gaussian" and it's unclear what "3rd-order" means for a raised cosine. Or is it a different filter?

Also, the cutoff frequency is not specified.

Suggested Remedy
Rewrite to clarify.

PROPOSED ACCEPT IN PRINCIPLE.
Change "3rd-order super Gaussian filter with RRC = 0.2" to "RRC filter with beta = 0.2"

Cl  156  SC  156.10.1.2.5  P  94  L  47  #  566
Dawe, Piers  Nvidia

Comment Type  E  Comment Status  D

Suggested Remedy
IQ offset (twice)

PROPOSED ACCEPT IN PRINCIPLE.
Change "IQ Offset" to "IQ offset" with editorial license

Cl  156  SC  156.10.1.2.6  P  94  L  3  #  569
Dawe, Piers  Nvidia

Comment Type  E  Comment Status  D

FIR filter with 15 real taps

Suggested Remedy
Where is the cursor?

PROPOSED REJECT.
No suggested remedy provided

Cl  156  SC  156.10.1.2.4  P  94  L  45  #  567
Dawe, Piers  Nvidia

Comment Type  E  Comment Status  A

Suggested Remedy

Response  Response Status  C

ACCEPT IN PRINCIPLE.

See response to comment 359
<table>
<thead>
<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
<th>Proposed Response</th>
<th>Response Status</th>
<th>Maniloff, Eric</th>
<th>Ciena</th>
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<tbody>
<tr>
<td>E</td>
<td>D</td>
<td>Remove Note</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
<td>W</td>
<td>Ran, Adee</td>
<td>Cisco</td>
</tr>
</tbody>
</table>

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<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
<th>Proposed Response</th>
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</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>D</td>
<td>Remove the editor's note.</td>
<td>PROPOSED ACCEPT.</td>
<td>W</td>
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<tr>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Suggested Remedy</th>
<th>Proposed Response</th>
<th>Response Status</th>
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</thead>
<tbody>
<tr>
<td>E</td>
<td>D</td>
<td>Use the standard equation style.</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
<td>W</td>
</tr>
</tbody>
</table>

---

**Comment 570**

Cl 156  SC 156.10.1.2.6  P 94  L 4  # 570  Daue, Piers  Nvidia

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

Suggested Remedy

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

Proposed Response

Response Status  W

PROPOSED REJECT.

No suggested remedy provided

---

**Comment 335**

Cl 156  SC 156.10.1.2.6  P 95  L 3  # 335  Ghiasi, Ali  Ghiasi Quantum/ Marvell

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

Suggested Remedy

Improve definition of the FIR

Proposed Response

Response Status  W

PROPOSED ACCEPT IN PRINCIPLE.

Change the first sentence of 156.10.1.2.6 to "The signal is equalized using an FIR filter with a 15 T spaced equalizer with real taps. The sum of all taps is equal to 1 and the main tap is allowed to vary from tap 1 to tap 8."

---

**Comment 220**

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

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

Suggested Remedy

Remove the editor's note.

Proposed Response

Response Status  W

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 122

---

**Comment 366**

Cl 156  SC 156.10.1.2.6  P 95  L 9  # 366  bucket

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

Editor's Note should be removed

Suggested Remedy

Remove Note

Proposed Response

Response Status  W

PROPOSED ACCEPT IN PRINCIPLE.

See response to comment 122

---

**Comment 122**

Cl 156  SC 156.10.1.2.6  P 95  L 9  # 122  bucket

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

I don't see any TBDs.

Suggested Remedy

Delete the editor's note.

Proposed Response

Response Status  W

PROPOSED ACCEPT.

---

**Comment 123**

Cl 156  SC 156.10.1.2.7  P 95  L 17  # 123  bucket

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

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.

Suggested Remedy

Use the standard equation style.

Proposed Response

Response Status  W

PROPOSED ACCEPT IN PRINCIPLE.

Update equation style to match style guide. With editorial license
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

Cl 156 SC 156.10.1.2.7 P 95 L 20 # 572
Dawe, Piers Nvidia
Comment Type E Comment Status D
   It would be better to count from 1 to K in the usual way
SuggestedRemedy

Proposed Response Response Status W
   PROPOSED REJECT.
   No suggest remedy provided

Cl 156 SC 156.10.1.2.7 P 95 L 20 # 571
Dawe, Piers Nvidia
Comment Type E Comment Status D
   Define k and K
SuggestedRemedy

Proposed Response Response Status W
   PROPOSED ACCEPT IN PRINCIPLE.
   For comment resolution group (CRG) consideration.

Cl 156 SC 156.10.1.2.7 P 95 L 25 # 573
Dawe, Piers Nvidia
Comment Type E Comment Status D
   l_delta and Q_delta not norm then norm
SuggestedRemedy

Proposed Response Response Status W
   PROPOSED REJECT.
   No suggest remedy provided

Cl 156 SC 156.10.1.2.7 P 95 L 31 # 574
Dawe, Piers Nvidia
Comment Type E Comment Status D
   Do what with alpha_peak? add equation
SuggestedRemedy

Proposed Response Response Status W
   PROPOSED REJECT.
   No suggest remedy provided

Cl 156 SC 156.10.1.2.7 P 95 L 45 # 575
Dawe, Piers Nvidia
Comment Type E Comment Status D
   n and eta are the same thing? Why not k?
SuggestedRemedy

Proposed Response Response Status W
   PROPOSED REJECT.
   No suggest remedy provided

Cl 156 SC 156.10.1.2.7 P 95 L 49 # 576
Dawe, Piers Nvidia
Comment Type E Comment Status D
   starting at 0
SuggestedRemedy

Proposed Response Response Status W
   PROPOSED REJECT.
   No suggest remedy provided

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: Clause, Subclause, page, line
IEEE P802.3cw D2.0 400 Gb/s over DWDM systems Initial Working Group ballot comments

<table>
<thead>
<tr>
<th>Cl</th>
<th>SC</th>
<th>Page</th>
<th>Line</th>
<th>Comment Type</th>
<th>Comment Status</th>
<th>Proposed Response</th>
<th>SuggestedRemedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>156</td>
<td>156.10.1.2.7</td>
<td>P 95</td>
<td>51</td>
<td>E</td>
<td>D</td>
<td>PROPOSED REJECT.</td>
<td>No suggest remedy provided</td>
</tr>
<tr>
<td>156</td>
<td>156.10.1.2.7</td>
<td>P 96</td>
<td>28</td>
<td>E</td>
<td>D</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
<td>Remove any blank lines with editorial license</td>
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<tr>
<td>156</td>
<td>156.11.1</td>
<td>P 96</td>
<td>35</td>
<td>E</td>
<td>D</td>
<td>PROPOSED ACCEPT.</td>
<td>Change the text in this subclause to &quot;Equipment subject to this clause shall conform to the general safety requirements in J.2.&quot;</td>
</tr>
<tr>
<td>156</td>
<td>156.12</td>
<td>P 97</td>
<td>41</td>
<td>E</td>
<td>A</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
<td>Review supporting presentation, for comment resolution group (CRG) consideration.</td>
</tr>
<tr>
<td>156</td>
<td>156.13.4.2</td>
<td>P 100</td>
<td>28</td>
<td>E</td>
<td>D</td>
<td>PROPOSED ACCEPT IN PRINCIPLE.</td>
<td>Add a table to 156.A.1 including Mux and Demux example specifications. For example see <a href="https://www.ieee802.org/3/cw/public/22_0523/maniloff_3cw_01_220523.pdf#page=5">https://www.ieee802.org/3/cw/public/22_0523/maniloff_3cw_01_220523.pdf#page=5</a></td>
</tr>
</tbody>
</table>