IEEE P802.3cz D3.01 Multi-Gigabit Optical Automotive Ethernet Initial Sponsor ballot comments

Cl **45** *SC* **45.2.3.91.12** *P* **39** *L* **38** # I-11

Rannow, R K — Representing myself

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

Ambiguous and inconsistent termination used throughout the document. This is just one example:

When read as one, bit 3.2349.2 indicates both that the remote PHY has the EEE ability and that the EEE advertisement is enabled. When read as zero,

SuggestedRemedy

Check all instances and confirm consistency and remove ambiguity.

When read as a one, bit 3.2349.2 indicates that the remote PHY has the EEE ability and that the EEE advertisement is enabled. When read as a zero, ..

Multiple instances on inconsistency. Add "a" as necessary for consistency and correctness.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
Page 39 line 18: Substitute "read as one" with "read as a one". Substitute "read as zero" with "read as a zero".
Page 39 line 30: Substitute "read as one" with "read as a one". Remove "both".
Page 39 line 31: Substitute "read as zero" with "read as a zero".
Page 39 line 38: Substitute "read as one" with "read as a one". Remove "both".
Page 39 line 39: Substitute "read as zero" with "read as a zero".
Page 39 line 44: Substitute "read as one" with "read as a one".
Page 39 line 45: Substitute "read as zero" with "read as a zero".
Page 40 line 3: Substitute "read as one" with "read as a one".
Page 40 line 4: Substitute "read as zero" with "read as a zero".

Cl **66** *SC* **66.4.1** *P* **103** *L* **40** # I-179

Mcclellan, Brett — Marvell Semiconductor, Inc.

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

The current definition of PHD.CAP.LPI does not preclude dynamic changing between 1 and 0. I don't believe this could actually work with dynamic changes while the link is up.

SuggestedRemedy

on page 103 line 40 insert the following text "The value of PHD.CAP.LPI shall not change."

Response *Response Status* **U**

REJECT.

The issue raised by the author of the comment is already covered by the current draft version.

In page 69, line 10:

"PHD.CAP.LPI is used by the PHY to advertise that Energy-Efficient Ethernet (EEE) is supported and that it is enabled."

In subclause 45.2.3.90.4 it is stated:

"Setting bit 3.2348.0 to one shall enable the advertisement of local PHY EEE ability (see 166.4). Setting bit 3.2348.0 to zero shall prevent establishment of EEE operation with the link partner. If the BASE-U PHY does not have EEE ability (bit 3.2349.0 = 0, see 45.2.3.91.14) setting bit 3.2348.0 has no effect. Changes in EEE advertisement enable value shall only take effect after a PMA reset (see 166.3.4.1). Bit 3.2348.0 has no specified default value."

Cl **166** *SC* **166.2** *P* **66** *L* # I-177

Mcclellan, Brett Marvell Semiconductor, Inc.

Comment Type **TR** *Comment Status* **R** *Interfaces definition*

There is no definition for PMA interfaces to the PCS.
Without a definition of these interfaces, this specification is technically incomplete.

SuggestedRemedy

Insert a new subclause 166.2.1 Technology Dependent Interface with definitions for PMA interfaces.

Response *Response Status* **U**

REJECT.

This PHY specification makes use of service interfaces where needed for technical completeness and interoperability.

Inclusion of a PMA interface is not necessary for an implementer to build a compliant and interoperable PHY implementation.

Note that 802.3cz does not specify Autonegotiation, and therefore primitives specified in other clauses to support this feature (i.e, Clause 97 and 98) are not needed.

Cl **166** *SC* **166.2** *P* **66** *L* **1** # I-176

Mcclellan, Brett Marvell Semiconductor, Inc.

Comment Type **TR** *Comment Status* **R** *Interfaces definition*

There is no definition for Technology Dependent Interfaces link_control and link_status which are used throughout Clause 166 without indicating where link_control comes from, or where link_status goes to.
Without a definition of these interfaces, this specification is technically incomplete.

SuggestedRemedy

Insert a new subclause 166.2.1 Technology Dependent Interface with definitions for link_control and link_status

Response *Response Status* **U**

REJECT.

This PHY specification makes use of service interfaces where needed for technical completeness and interoperability.

Autonegotiation, and therefore primitives specified in other clauses to support this feature (i.e, Clause 97 and 98) are not needed.

link_control and link_status are mapped in subclause 166.13 (Table 166-22) to MDIO register bits.

Cl **166** *SC* **166.2** *P* **66** *L* **1** # I-175

Mcclellan, Brett Marvell Semiconductor, Inc.

Comment Type **TR** *Comment Status* **A** *Interfaces definition*

This PHY specification lacks a definition of service primitives and interfaces between sublayers.
Without a definition of these interfaces, this specification is technically incomplete.

SuggestedRemedy

Insert a new subclause 166.2 2.5GBASE-AU,
5GBASE-AU, 10GBASE-AU, 25GBASE-AU, and 50GBASE-AU service primitives and interfaces.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.

This PHY specification makes use of service interfaces where needed for technical completeness and interoperability.

However, the three first paragraphs of the subclause 166.2.1 can be changed to mirror other BASE-R clauses.

Page 66 lines 5 to 7,

Change "The 2.5GBASE-AU, 5GBASE-AU, or 10GBASE-AU PCS couples a 10 Gigabit Media Independent Interface (XGMII), see Clause 46, to the 2.5GBASE-AU, 5GBASE-AU, or 10GBASE-AU Physical Medium Attachment (PMA) sublayer."
to
"The PCS service interface of 2.5GBASE-AU, 5GBASE-AU, or 10GBASE-AU is the 10 Gigabit Media Independent Interface (XGMII), which is defined in Clause 46. The 2.5GBASE-AU, 5GBASE-AU, or 10GBASE-AU PCS provides all services required by the XGMII and couple it to the 2.5GBASE-AU, 5GBASE-AU, or 10GBASE-AU Physical Medium Attachment (PMA) sublayer."

Page 66 lines 9 to 10,

Change "The 25GBASE-AU PCS couples a Media Independent Interface for 25 Gb/s operation (25GMII), see Clause
106, to the 25GBASE-AU PMA sublayer."
to
"The 25GBASE-AU PCS service interface is the Media Independent Interface for 25 Gb/s operation (25GMII), which is defined in Clause 106. The 25GBASE-AU PCS provides all services required by the 25GMII and couple it to the 25GBASE-AU PMA sublayer."

Page 66 lines 12 to 13,

Change "The 50GBASE-AU PCS couples a Media Independent Interface for 50 Gb/s operation (50GMII), see Clause
132, to the 50GBASE-AU PMA sublayer."

to: "The 50GBASE-AU PCS service interface is the Media Independent Interface for 50 Gb/s operation (50GMII), which is defined in Clause 132. The 50GBASE-AU PCS provides all services required by the 50GMII and couple it to the 50GBASE-AU PMA sublayer."

Cl **166** *SC* **166.6.3.2** *P* **116** *L* **40** # I-107

Murty, Ramana Broadcom Inc.

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

Center wavelength (range) is defined over the narrow range of 970 - 990 nm. The justification for not accepting other source wavelengths, such as the one given in perezaranda_3cz_01b_080621_vcsel_reliability.pdf, are erroneous. The wavelength range should be expanded to allow a wide range of suppliers to participate.

SuggestedRemedy

Expand the center wavelength range to 840 - 990 nm.

Response *Response Status* **U**

REJECT.
There is no consensus to make a change.

The following is background on multiple hours of discussion on comments #i-107 and #i-108 within the P802.3cz Task Force (acting as the comment resolution group).

[begin proposed response to #i-107]

Proposal already discussed at Montreal plenary meeting (July 2022). Consensus to modify wavelength range was not reached (see https://www.ieee802.org/3/cz/public/jul_2022/Minutes_3cz_01_0722.pdf Motion #3 and comment #32 to P802.3cz/D2.1).

Range of +/- 10 nm is consistent with other projects that use different nominal center wavelength, i.e. C/138 138.7.1, Table 138-8. C/95 95.7.1, Table 95-6. C/52 52.5.1, Table 52-7.
The TX and RX characteristics have been derived with margin considering real 980nm device samples operating in a range of backside temperature between -40ºC and +125ºC and bias current of up to 8 mA. It was demonstrated during the project that required wear-out reliability cannot be achieved with 850nm VCSEL devices using similar current densities. It was also demonstrated that in order to marginally meet the wear-out reliability requirements, the bias current should be reduced < 5 mA in high temperature, therefore reducing the speed and optical power and increasing the RIN of the VCSEL devices, hence making much more difficult the PHY implementation. On top of that, it was also demonstrated that 980nm devices are much less dependent with temperature, so they present a much more uniform threshold current between -40 and 125ºC. 850nm devices could be optimized for high temperature, but degrading (or making impossible) operation at low temperature and viceversa.
Technology for manufacturing 980nm VCSEL devices is widely available. It was developed during last decade for sensor devices. Producing reliable, high speed, low noise, and efficient VCSELs at 980nm is much easier than at 850nm. This will allow to expand the availability of manufacturers that can supply photonics for BASE-AU PHYs in automotive industry.

[end proposed response to #i-107]

Two presentations on the VCSEL reliability were made during comment resolution discussion (see https://www.ieee802.org/3/cz/public/oct_2022/murty_3cz_01_1022.pdf and https://www.ieee802.org/3/cz/public/oct_2022/perezaranda_3cz_02_1022_vcsel_rel.pdf), in addition to an in-depth discussion of the impact on system technology and testing when the wavelength range is extended as proposed in #i-107 and #i-108.

Straw Poll (all individuals attending allowed to vote) to accept the above proposed response result: Yes 19 No 5 Abstain 8.
Motion (only 802.3 voting members allowed to vote) to accept the above proposed response failed: Yes 13 No 6 Abstain 5.

There was no other proposal for a response to the comment. Therefore it was concluded that there is no consensus to make the change proposed by the comment.

Cl **166** *SC* **166.6.3.3** *P* **117** *L* **40** # I-108

Murty, Ramana — Broadcom Inc.

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

Center wavelength (range) is defined over the narrow range of 970 - 990 nm. "Rainbow" photodetectors that can detect a wide range of wavelengths have been widely used in datacom.

SuggestedRemedy

Expand the center wavelength range to 840 - 990 nm.

Response *Response Status* **U**

REJECT.
There is no consensus to make a change.

The following is background on multiple hours of discussion on comments #i-107 and #i-108 within the P802.3cz Task Force (acting as the comment resolution group).

[begin proposed response to #i-108]

Proposal already discussed at Montreal plenary meeting (July 2022). Consensus to modify wavelength range was not reached (see https://www.ieee802.org/3/cz/public/jul_2022/Minutes_3cz_01_0722.pdf Motion #3 and comment #32 to P802.3cz/D2.1).

Expanding the center wavelength range to 840 - 990nm will imply that all the components between light emission and reception, including the photodetector, have to be validated and qualified to meet all the requirements for the full range of spectrum. This includes coupling optics in TX and RX as well as inline connections and fiber. Assuming butt-coupling and physical contact connectivity, which can be wavelength agnostic, as a feasible solution for automotive application just because it is used in data-centers may be an erroneous assumption.
Expanded beam optics, physical contact, and air gap connections are under consideration by connector makers to supply a robust, low cost, and fully automated terminated optical connectivity technology to automotive industry based on OM3 fiber. In the implementation of optical coupling, lenses and EBO connections, wavelength dependent refractive index and absorption of used materials needs to be considered. If same materials have to support reflow soldering, automotive environmental and mechanical conditions and perform well in a much wider range of wavelengths, then we are imposing constraints that will limit the solutions and will finally increase the cost without necessity.
Transceiver is not only affected by the materials used for optical coupling but also photodetector.

[end proposed response to #i-108]

Two presentations on the VCSEL reliability were made during comment resolution discussion (see https://www.ieee802.org/3/cz/public/oct_2022/murty_3cz_01_1022.pdf and https://www.ieee802.org/3/cz/public/oct_2022/perezaranda_3cz_02_1022_vcsel_rel.pdf), in

addition to an in-depth discussion of the impact on system technology and testing when the wavelength range is extended as proposed in #i-107 and #i-108.

Straw Poll (all individuals attending allowed to vote) to accept the above proposed response result: Yes 19 No 5 Abstain 8.
Motion (only 802.3 voting members allowed to vote) to accept the above proposed response failed: Yes 13 No 6 Abstain 5.

There was no other proposal for a response to the comment. Therefore it was concluded that there is no consensus to make the change proposed by the comment.

Cl **0** *SC* **0** *P* *L* # R1-64

Wienckowski, Natalie General Motors Company

Comment Type **GR** *Comment Status* **A** *Hyperlinks*

There are no hyperlinks in the document and there are no bookmarks.

SuggestedRemedy

Add missing hyperlinks and add bookmarks.

Response *Response Status* **U**

ACCEPT IN PRINCIPLE.
There was no changes in the content of the document. This is a PDF feature.