

IEEE P802.3dm D0.c Asymmetrical Electrical Automotive Ethernet 3rd Task Force review comments

Cl 201 SC 201.3.2 P 61 L 40 # 234

Razavi, Alireza Infineon  
 Comment Type T Comment Status D definitions

Undefined signal: 'recovered\_clock' appears in Figures 201-3 and 201-4 (PHY\_S and PHY\_D functional block diagrams) as a signal arc between PMA Receive and PMA Transmit, but is not defined as a primitive or variable anywhere in 201.2 or 201.5.

*SuggestedRemedy*

Add 'recovered\_clock' to the PMA service interface description in 201.5.2.9 (Clock Recovery), or add a NOTE in 201.5.2.2 (PMA Transmit) explaining its source and usage. The two existing NOTES in the figures reference it without a normative anchor.

Proposed Response Response Status W

PROPOSED REJECT.

This is in 802.3 in multiple places in figures, but there is not a definition anywhere.

Cl 201 SC 201.5.2.4.6 P 113 L 27 # 127

van Dyck, Peter Infineon  
 Comment Type T Comment Status D ACT Infofield

Since the time to send a complete set of infofields is speed dependent, see 201.5.2.4, the length of the countdown must also be speed dependent for HS\_PATH.

*SuggestedRemedy*

Replace:  
 "DataSwPFC24 shall be a minimum of 4081 and a maximum of 4785 from the current PFC24 value."  
 With:  
 "For 10Gb/s and 5Gb/s, DataSwPFC24 shall be a minimum of 4081 and a maximum of 4785 from the current PFC24 value. For 2.5Gb/s, DataSwPFC24 shall be a minimum of 2033 and a maximum of 2385 from the current PFC24 value."

Proposed Response Response Status W

PROPOSED ACCEPT.

Cl 201 SC 201.5.2.8.1 P 124 L 1 # 191

Jonsson, Ragnar Infineon  
 Comment Type T Comment Status D EZ - pull

Incorrect condition for TRUE state

*SuggestedRemedy*

Change "No SEND\_S pulses" to "Less than three SENBD\_S pulses".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD - Is this a change to the decision in Vancouver, or was this implemented incorrectly?

Correct spelling of suggested remedy:

Change "No SEND\_S pulses" to "Less than three SEND\_S pulses".

Cl 201 SC 201.5.2.8.1 P 124 L 4 # 192

Jonsson, Ragnar Infineon  
 Comment Type T Comment Status D EZ - pull

Incorrect condition for FALSE state

*SuggestedRemedy*

Change "At least one SEND\_S pulse" to "At least three SEND\_S pulses".

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD - Is this a change to the decision in Vancouver, or was this implemented incorrectly?

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CI 201 SC 201.5.2.10 P 127 L 8 # 219

Razavi, Alireza Infineon  
 Comment Type E Comment Status D ACT MDI

Text should be brought in from Clause 149, and subclauses 201.5.2.11 and 201.5.2.10 should be merged. It would be helpful to add a sentence describing the difference between MDI for T1 and V1.

SuggestedRemedy  
 see comment

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

Replace 201.5.2.10 with the following:

201.5.2.10 MDI, T1  
 Communication through the T1 MDI is summarized in 201.5.2.10.1 and 201.5.2.10.2.

201.5.2.10.1 MDI signals transmitted by the PHY

The symbols to be transmitted by the PMA are as described in the PMA Transmit function (201.5.2.2). The PMA Transmit function generates a pulse-amplitude modulated signal on the single shielded balanced pair of conductors in the following form:

Copy equation 149-12

where  $a_n$  is the modulation symbol transmitted at time  $nT$ , and  $h_T(t)$  denotes the system symbol response at the MDI. The symbol response shall comply with the electrical specifications given in 201.6.2 for the HS\_TX path and 201.7.2 for the LS\_TX path.

201.5.2.10.2 Signals received at the MDI

Signals received at the T1 MDI can be expressed as pulse-amplitude modulated signals that are corrupted by noise as follows:

Copy equation 149-13

where  $h_R(t)$  denotes the symbol response of the overall channel impulse response between the transmit symbol source and the receive MDI, and  $w(t)$  represents the contribution of various noise sources including uncanceled echo. The received signal is processed within the PMA Receive function to yield the received symbols  $rx\_symb$ . The channel shall meet the requirements of 201.9 for the -T1 link segment.

=====

Replace 201.5.2.11 with the following:

201.5.2.11 MDI, V1

The V1 MDI is as described in 201.5.2.10, with the following exceptions:

1. The signal is single-ended and is carried over a single coaxial cable.
2. The channel shall meet the requirements of 201.10 for the -V1 link segment.

CI 201 SC 201.6.2.5 P 135 L 37 # 11

Lo, William Axonne Inc.  
 Comment Type T Comment Status D ACT peak output

10GBASE-T1 PSD in 149.5.2.4 is -1dBm to 2 dBm.and 149.5.2.5 peak is less than 1.3V  
 201.6.2.4 for 10G also lists PSD of -1dBm to 2 dBm.but 201.6.2.5 list the max peak as 1.7V which is inconsistent.

SuggestedRemedy

Change 1.7 to 1.3  
 Change 0.85 to 0.65

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

TFTD. There was a lot of discussion on this topic in November 2025.

CI 201 SC 201.9.1.2 P 145 L 10 # 232

Razavi, Alireza Infineon  
 Comment Type T Comment Status D ACT RL

to be consistent with other setting, return loss for 2.5G may cover up to 2G not 4G

SuggestedRemedy

define Fmax similar to equation 201-14.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

TFTD

CI 201 SC 201.10.1.5 P 146 L 48 # 229

Razavi, Alireza Infineon  
 Comment Type T Comment Status D ACT SA

Screen attenuation lower-frequency limit is 30 MHz in Clause 149.

SuggestedRemedy

Use 30 MHz as the lower bound and update Figure 201-51 accordingly.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

TFTD

IEEE P802.3dm D0.c Asymmetrical Electrical Automotive Ethernet 3rd Task Force review comments

Cl 201A SC 201A P 149 L 26 # 125  
 Turner, Max Ethernovia  
 Comment Type T Comment Status D Autoneg  
 For interleaving, this definition is useless, as the X(n) may completely chnage order on the MDI  
 SuggestedRemedy  
 The only useful reference point is the beginng of the first superframe of an interleaving block, but it seems we lack good naming for this.  
 Commenter to provide a presentation, as this text field will not suffice.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 TFTD  
 See 2026-04\_Turner-Comment-Annex201A.pdf

Cl 201A SC 201A P 149 L 29 # 126  
 Turner, Max Ethernovia  
 Comment Type T Comment Status D Autoneg  
 For interleaving, this definition is useless, as the X(n) may completely chnage order on the MDI  
 SuggestedRemedy  
 The only useful reference point is the beginng of the first superframe of an interleaving block, but it seems we lack good naming for this.  
 Commenter to provide a presentation, as this text field will not suffice.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 TFTD  
 See 2026-04\_Turner-Comment-Annex201A.pdf

Cl 202 SC 202.1 P 157 L 8 # 150  
 Gorshe, Steve Microchip Technology  
 Comment Type E Comment Status D Editorial  
 Proposed editorial clean up in multiple places  
 SuggestedRemedy  
 See proposed editorial changes in attached file 8023d0pc-202-gorshe.docx  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Insert changes in file 8023d0pc-202-gorshe.docx  
 Grant Editorial license to implement in alignment with Style.

Cl 202 SC 202.1.3 P 159 L 19 # 242  
 Wang, Frank Realtek Semiconductor Corp.  
 Comment Type E Comment Status D State diagrams  
 It could be an accident when the editor tried to solve comment #213 for D0pb (remove the connection between "LINK MONITOR" and "Technology Dependent Interface (optional)"). An arrow going out from "Link Monitor" is now going nowhere.  
 SuggestedRemedy  
 The output of "LINK MONITOR" should be connected to "PCS TRANSMIT", "PCS OAM", and "PCS RECEIVE".  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 The output of "LINK MONITOR" should be connected to "PCS TRANSMIT", "PCS OAM", and "PCS RECEIVE".  
 Move the stray "connector dot" in the connection from PCS RECEIVE TO PCS TRANSMIT to the intersection of LINK MONITOR with PCS OAM as the LINK MONITOR is providing the link\_status signal.

IEEE P802.3dm D0.c Asymmetrical Electrical Automotive Ethernet 3rd Task Force review comments

CI 202 SC 202.1.4 P 161 L 39 # 18

Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D Terminology

The text says LS\_PATH PCS generates continuous code-group sequences that the PMA transmits. Is this correct? I thought the TDD bursts were separated by the PCS, with the PMA not transmitting in between.

*SuggestedRemedy*

change "generating continuous code-group sequences" to "generating bursts of code-group sequences"

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD. Consider with Comment #20.

(Editor's Note: The term code-group has been carried forward since clause 96 where the PMA received code-groups, however clause 96 actually defines code-group transfer to PMA as tx\_symb\_vector and a code-group is a "pair of ternary symbols". Now clause 202 transfers 1 symbol at a time from PCS to PMA, so suggest "generating continuous symbols" as the PCS will always generate a symbol tx\_symb every transmit clock cycle. Suggest review for other mis-use of the term "code-group" when "symbol(s)" would be more appropriate.)

change "generating continuous code-group sequences" to "generating continuous symbols"

CI 202 SC 202.1.4 P 162 L 9 # 149

Gorshe, Steve Microchip Technology  
 Comment Type T Comment Status D PHY operation

Proposed technical changes in multiple places for completeness and to address recent discussions

*SuggestedRemedy*

See proposed technical changes in attached file 8023d0pc-202-gorshe.docx

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD.

Insert changes in file 8023d0pc-202-gorshe.docx with the following possible exceptions:

1. Don't delete "simultaneous" on P17
2. Figure 202-15 don't implement comment below as gap\_time is not the same as QUIET time.
3. Table 202-10b should change TX/RX to LS/HS and change 00110, 00111, and 01000 to Reserved/Reserved.

Grant Editorial license to implement in alignment with Style.

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**Cl 202**    **SC 202.1.5**                      **P 162**        **L 8**                      # **20**

Zimmerman, George                      CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe

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

The text says HS\_PATH PCS generates continuous code-group sequences that the PMA transmits. Is this correct? I thought the TDD bursts were separated by the PCS, with the PMA not transmitting in between.

*SuggestedRemedy*  
change "generating continuous code-group sequences" to "generating bursts of code-group sequences"

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

TFTD. Consider with Comment #18.

(Editor's Note: The term code-group has been carried forward since clause 96 where the PMA received code-groups, however clause 96 actually defines code-group transfer to PMA as tx\_symb\_vector and a code-group is a "pair of ternary symbols". Now clause 202 transfers 1 symbol at a time from PCS to PMA, so suggest "generating continuous symbols" as the PCS will always generate a symbol tx\_symb every transmit clock cycle. Suggest review for other mis-use of the term "code-group" when "symbol(s)" would be more appropriate.)

change "generating continuous code-group sequences" to "generating continuous symbols"

**Cl 202**    **SC 202.1.5**                      **P 162**        **L 26**                      # **21**

Zimmerman, George                      CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe

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

The text says that the PCS generates a continuous stream of PAM2 or PAM4 symbols that are transmitted via the PMA. This is in conflict with the definition of the primitive PMA\_UNITDATA.request at 202.1.3.1.1 which says that the value is PAM2 or PAM4, or zeroes (e.g. during training or QUIET period)

*SuggestedRemedy*  
Change "continuous stream" to "bursts".

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

TFTD. Consider with Comment #19.

(Editor's Note: The PCS does generate a continuous stream of symbols (tx\_symb), so the sentence could be changed to remove PAM2 and mention of voltage levels.)

**Cl 202**    **SC 202.2.1.1.1**                      **P 165**        **L 8**                      # **22**

Zimmerman, George                      CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe

**Comment Type T**                      **Comment Status D**                      **PHY operation**

SEND\_N is defined as representing the XGMII data stream. According to the PHY control state diagram, it represents the TDD bursting of the XGMII data stream, including Z (0, or QUIET) symbols. Other parts of the text (see other comments) suggest that SEND\_Z is sent during TDD quiet periods.

*SuggestedRemedy*  
Change "representing an XGMII data stream in the data mode." to "representing the TDD bursting (including QUIET periods) of an XGMII data stream in the data mode."

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

TFTD.

(Editor's note: It doesn't hurt to say this, but it's unclear why it's needed. In other clauses, the similar description of SEND\_N is typically describing the useful information delivered as a service provided (IE the XGMII, GMII or MII). If it's important to mention everything symbols can represent, we should also include RS-FEC parity symbols, OAM bits, refresh header, etc.)

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CI 202 SC 202.3.2.2 P 171 L 33 # 30

Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe

Comment Type T Comment Status D PCS

Figure 202-4 is not the PCS transmit function block diagram - it is only a subset. Where are the interfaces (XGMII)? Where is the RS-FEC encoder? Where do Dn[0] and Dn[1] come from (they are combined and used in the scrambler as shown here, but where do they come from? - they are probably the c\_i out of the RS-FEC encoder, but this is neither said nor shown.)

More importantly, the diagram shows "TDD control" muxing the data bits from the scrambler and the silent (0, or "Z") symbols. This, as the most important functional feature needs explanation including an obvious change in bit rate through this diagram.

*SuggestedRemedy*

Redraw Figure 202-4 showing service interfaces to the PCS, XGMII and PMA service interface and all blocks in the data path. Moreover, show buffering or speed shifts for the PCS rate, which must be necessary for the TDD control to function. I am willing to help, but the specification is not sufficiently complete for me to offer a correct alternative at this time.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD.

(Editor's Note: Considering the updates to Figures 202-5 and 202-6, the TDD champion proposes working towards removing Figure 202-4 as it is a redundant, but incomplete, version of information already provided in the text and other figures. If consensus is that Figure 202-4 is useful to maintain, then the functional blocks could be added and the diagram improved, but the additional details of buffering and clock domain crossing seems best left to specific implementations.)

CI 202 SC 202.3.2.2 P 175 L 24 # 40

Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe

Comment Type T Comment Status D PCS

Since the TDD is a multirate PHY, show a demux at the place where the 2.5/5 Gb/s path diverges from the 10 Gb/s path with the control being the speed selection.

*SuggestedRemedy*

See comment.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Consider with Comment #185.

CI 202 SC 202.3.2.2.2 P 175 L 30 # 185

Muma, Scott Microchip

Comment Type T Comment Status D PCS

The intent of this figure has expanded beyond bit ordering to also show the payload transmitted in a burst. It may help to also show the refresh header and quiet symbols transmitted to illustrate the complete TDD cycle.

*SuggestedRemedy*

See attached PDF P8023dm\_D0pc\_bit\_order\_figure\_markup.pdf Figure 202-6

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Consider with Comment #40.

Insert changes in P8023dm\_D0pc\_bit\_order\_figure\_markup.pdf Figure 202-6

Grant Editorial license to implement in alignment with Style, including adding a call-out to the figure.

IEEE P802.3dm D0.c Asymmetrical Electrical Automotive Ethernet 3rd Task Force review comments

CI 202 SC 202.3.2.2.19 P 185 L 1 # 50  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type E Comment Status D precoder

Now that there is no precoder, you might as well do the gray-coding and encoding as one step. 202.3.2.2.19 is unnecessary.  
 Also, the output that goes to the TDD control is called Tn according to Figure 202-4. This makes Gn, and Mn both unnecessary notation.

*SuggestedRemedy*

Delete 202.3.2.2.19 (P185 L1 through 22)  
 Change references to G(n) on P184 L31 and L39 to T(n).  
 Change 0, 1, 2, 3 on P184 L32-37 and L41-45 to -1, -1/3, +1/3, and +1 respectively.  
 In Figure 202-4, Change "Gray mapping" to "Gray mapping PAM4 encoder", delete PAM4 mapper, and delete label of Gn.

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

(Editor's note: If the Gray mapping and PAM4 mapping are merged, this needs to be updated here and in all the diagrams. There isn't opposition to the idea as it will make the PAM2 and PAM4 datapaths more aligned, but there are a lot more changes to do than what is noted beyond P184/185 and Figure 202-4. Figure 202-6 and Figure 202-11 also need updating and the whole clause should be checked for alignment of Gray/PAM4 mapping occurrences to the terms.)

Delete 202.3.2.2.19 (P185 L1 through 22)

Change references to G(n) on P184 L31 and L39 to T(n).

Change 0, 1, 2, 3 on P184 L32-37 and L41-45 to -1, -1/3, +1/3, and +1 respectively.

In Figure 202-4, Change "Gray mapping" to "Gray mapping PAM4 encoder", delete PAM4 mapper, and delete label of Gn.

Grant Editorial license to work with the TDD champion to update Figure 202-6 and Figure 202-11, as well as align occurrences of Gray/PAM4 mapping to terms in clause 202.

CI 202 SC 202.3.2.3 P 185 L 53 # 55  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D PCS

The text describes adapting between PMA and XGMII rates, but they are NEVER synchronized, and, as I understand it, the PCS doesn't just adjust by inserting/deleting idles & sequence ordered sets, but also deletes the inter-burst gaps, nowhere does it describe recombining bursts. This seems an appropriate place.

*SuggestedRemedy*

Change at P184 L51 "Where the XGMII and PMA sublayer data rates are not synchronized, the receive process inserts idles..." to  
 "Because the received data stream is divided into TDD bursts, with silence interspersed, the PCS receive function recombines separated bursts before passing to the XGMII. Where the XGMII and the PMA sublayer transmit clocks are not frequency synchronized, the PCS receive process also inserts idles..."

Proposed Response Response Status W  
 PROPOSED REJECT.

(Editor's note: Recommend reject/withdraw given the removal of burst overhead will be covered by Comment #53. In the flow of the text, we are at the XGMII interface, so going back to talk about things that were removed at that point is confusing. The point of the sentence is just that if RX\_CLK is not rate-matched to the XGMII data already then it is necessary to insert/delete to achieve rate-matching of the XGMII data to the RX\_CLK. If RX\_CLK is already rate-matched to the XGMII data then nothing is required."

CI 202 SC 202.3.2.3 P 187 L 1 # 57  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type E Comment Status D PCS

In Figure 202-10 and 202-11 show where the TDD bursts are delineated, refresh headers are stripped and bursts are combined. These are necessary for completeness.

*SuggestedRemedy*

See comment

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

(Editor's note: Editors agree and note that Scott Muma provided suggested changes for Figures 202-5 and 202-6. Scott offered to revise Figure 202-10 and 202-11 according to the comment.

Grant Editor's license to work with TDD champion to revise Figure 202-10 and 202-11 according to the comment and conform to Style.

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CI 202 SC 202.3.2.3.1 P 189 L 3 # 58  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D PCS

The RECEIVE PCS doesn't form PAM2 streams. See prior comment where the values of rx\_symb, passed byt PMA\_UNITDATA.indication are not defined. Generally, the PMA would receive PAM2 and pass the values to the PCS, and generally these would be the same format as the PMA\_UNITDATA.request (tx\_symb)... It seems the purpose of this paragraph is to say that requests are concatenated. It also doesn't concatenate requests - it concatenates the rx\_symb values conveyed by the indications. Finally, the Figure referenced for 10Gb/s is incorrect (Fig 202-10 is the LS\_RX figure...)

SuggestedRemedy

Replace first paragraph of 202.3.2.3.1 with:  
 "When operating in 100 Mb/s, 2.5 Gb/s, or 5 Gb/s data mode, the receiving PCS shall concatenate rx\_symb values conveyed by the PMA\_UNITDATA.indication in order from rx\_PAM2\_0 to rx\_PAM2\_1023 (see Figure 202-10 for LS\_RX or Figure 202-11 for HS\_RX). When operating in 10 Gb/s data mode, the receiving PCS shall concatenate rx\_symb values conveyed by the PMA\_UNITDATA.indication in order from rx\_PAM4\_0 to rx\_PAM4\_511 (see Figure 202-11)."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD.

(Editor's note: Editors agree. However, a section before this on the whole burst is likely needed to align with Comment #57 changes. This step follows removal of refresh\_hdr and QUIET.)

CI 202 SC 202.3.3 P 189 L 45 # 61  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D RS-FEC

I don't think the output of the RS-FEC decoder should also be zero, because it representes SCRAMBLED zeros. It can't be zero and have the received descrambled values be zero unless the descrambler is off.

SuggestedRemedy

Change "The output of the RS-FEC decoder should also be zero." to "The output of the RS-FEC decoder should represent scrambled zeros."

Proposed Response Response Status W

PROPOSED REJECT.

The Editors disagree with the Commenter. The functional order is: RS-FEC encoder, scrambler, descrambler, RS-FEC decoder. Since the input to the RS-FEC encoder and scrambler is zeros, the output of the descrambler and RS-FEC decoder should also be zeros.

CI 202 SC 202.3.3 P 189 L 46 # 62  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type E Comment Status D EZ - pull

The sentence that "However, there is a possibility that the RS-FEC decoder corrected some errors." isn't relevant. It is unclear what this is supposed to mean.

SuggestedRemedy

Delete "However, there is a possibility that the RS-FEC decoder corrected some errors."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

(Editor's note: This is just differentiating between the behavior that bit errors cause the descrambler output to be not all zeros but the RS-FEC decoder output might still be all zeros even in the presence of bit errors. It's a helpful hint from CI149, but not changing anything whether it's there or not.)

Delete "However, there is a possibility that the RS-FEC decoder corrected some errors."

discussion with the editors on the purpose suggests an alternative wording:

"In the absence of errors in PMA Receive, the descrambler output should be zeros. The output of the RS-FEC decoder should also be zeros, and may correct errors in the descrambler output. Any nonzero values at the output of the RS-FEC decoder are due to uncorrectable RS-FEC frames."

CI 202 SC 202.3.5.3 P 193 L 33 # 74  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type E Comment Status D PCS

202.3.5.3 is unnecessary in its entirety (P193 L33 through P194 L14), as these requirements are all elsewhere - either in the PCS scrambler (202.3.4.1) or in 202.3.5.2, and in the mapper sections.

SuggestedRemedy

Delete 202.3.5.3 in its entirety, including the editor's note.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

(Editor's note: Agree that most of the section is redundant, however, equation (202-16) might need to be moved into next section if Figure 202-4 is retained.)

Grant Editor's license to implement in accordance with the resolution to maintaining or deleting Figure 202-4.

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CI 202 SC 202.3.6 P 195 L 9 # 254  
 Wang, Frank Realtek Semiconductor Corp.  
 Comment Type E Comment Status D PCS  
 wording  
 SuggestedRemedy  
 change "tdd\_cycle\_time" to "TDD\_cycle\_time"  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 TFTD. Consider with Comments #256 and #78.  
 (Editor's note: TDD\_cycle\_time should be should be defined in nominal terms similar to P194L35. It will be determined by  $(N_r+N_p+N_z)/\text{symbol\_rate}$ , two useful examples to add:  
 28800 symbols / 3 Gbd = 9.6 us  
 57600 symbols / 6 Gbd = 9.6 us)  
 change "tdd\_cycle\_time" to "TDD\_cycle\_time"

CI 202 SC 202.3.6 P 195 L 25 # 256  
 Wang, Frank Realtek Semiconductor Corp.  
 Comment Type E Comment Status D PCS  
 Add an additional column, "Tdd cycle\_time", to better understanding the timing in each TDD cycle.  
 SuggestedRemedy  
 Add 4th column "TDD\_cycle\_time (ns)" and a "9600" is assigned to SEND\_TS, SEND\_TA, and SEND\_N.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 TFTD. Consider with Comments #254 and #78.  
 (Editor's note: Intro text for TDD\_cycle\_time should be added somewhere. It should be clear it's nominal TDD cycle time, more important would be total symbols in the TDD cycle.)

CI 202 SC 202.3.6 P 195 L 25 # 78  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type E Comment Status D PCS  
 Adding the gap time to the table would make it far more useful. Checking these times revealed an error in Table 202-8.  
 SuggestedRemedy  
 Change title of Table 202-8 to "TDD cycle timing"  
 In Table 202-8:  
 Add column to table for gap\_time with appropriate values (I think 320ns for SEND\_TS, and 176 for SEND\_TA and SEND\_N)  
 Change LS\_TX\_time for SEND\_TA & SEND\_N to 554.67 ns , and HS\_TX\_time to 8693.33 ns  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 (Editor's note: The refresh header, payload, and QUIET times/symbol counts will be specified. The gap time is not a strictly controlled value since it depends on the alignment of the two ends (it will always have a range)).  
 Consider with Comments #254 and #78.

CI 202 SC 202.3.7.2.2 P 199 L 12 # 168  
 Chini, Ahmad Broadcom  
 Comment Type E Comment Status D PCS  
 tdd\_detect is not used.  
 SuggestedRemedy  
 remove tdd\_detect  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Accommodated by Comment #82.

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CI 202 SC 202.3.7.2.2 P 199 L 19 # 171  
 Chini, Ahmad Broadcom  
 Comment Type E Comment Status D PCS  
 tx\_data\_active specified but not used  
 SuggestedRemedy  
 remove tx\_data\_active  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Accommodated by Comment #82.

CI 202 SC 202.4.2.4.11 P 213 L 36 # 94  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D PMA  
 the exit from TRAINING0 is "negotiation\_done" which means the speed must be negotiated before exit. Therefore, "will be" should be "is", as it isn't a future action, it happens in the TRAINING0 state, which is what the paragraph is about. This might be clearer with some discussion of moving on after the negotiation as well.  
 SuggestedRemedy  
 change "will be" to "is"  
 Suggest that a final sentence, something like "Upon successful completion of the negotiation, training moves on to the COUNTDOWN."  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 (Editor's note: The state is COUNTDOWN0, and this is already stated in the final paragraph of this section. So, perhaps moving the final paragraph up to this location is helpful?)  
 change "will be" to "is" on P213, L36  
 Move, "The LEADER and FOLLOWER will move from TRAINING0 state to COUNTDOWN0 state, if local\_rcvr\_status and rem\_rcvr\_status are both asserted, and negotiation\_done bit is OK." from P213, L52 to the end of the paragraph on P213, L38.

CI 202 SC 202.4.2.4.11 P 213 L 43 # 178  
 Chini, Ahmad Broadcom  
 Comment Type T Comment Status D EZ - pull  
 The delay requirement is for both training and normal mode, but normal mode is not mentioned anywhere else.  
 SuggestedRemedy  
 Include normal mode as in below  
 When entering the TRAINING1 state or normal mode, the FOLLOWER shall use the LEADER transmitted delay\_count to align its transmit PMA frame to be 176 ns - delay\_count × 5.33 ns (+-5.3ns), after the last PMA training or normal mode payload symbol from the LEADER appears on the FOLLOWER input MDI.  
 Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.  
 Consider with Comment #95.  
 Change, P213, L43-46 to:  
 When entering the TRAINING1 state, the FOLLOWER shall use the LEADER transmitted delay\_count to align its transmit PMA frame to 176 ns - delay\_count × 5.333 ns (+/-5.333 ns) after the last PMA training or normal mode payload symbol from the LEADER appears on the FOLLOWER input MDI."  
 Add new sentence to the end of the paragraph on P213, L46, "The FOLLOWER shall maintain this alignment while tx\_mode is SEND\_TA or SEND\_N."

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CI 202 SC 202.4.2.4.11 P 213 L 47 # 96  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D PMA

The link\_fail\_inhibit timer is started within the TRAINING0 state. This may never happen. The conventions of 21.5 are adopted. These say that the actions in the state are executed instantaneously - and then the state waits for the exit conditions. Therefore, when training0 is entered, it checks once, and only once for training\_active and detect\_lp\_burst, and starts the link fail inhibit timer, setting training\_active to 1. training\_active should be 0 on the first pass through. so it becomes a matter of whether detect\_lp\_burst is true on entry - For the FOLLOWER, since loc\_rcvr\_status needs to be OK, this is probably fine, but the text is still not right since teh follower could get more than one burst before loc\_rcvr\_status = OK. For the LEADER, this is a problem, because it goes straight to TRAINING0 and detect\_lp\_burst will be FALSE (because the follower is SILENT, and the leader doesn't start transmitting until it enters TRAINING0). The statement to start the link\_fail\_inhibit timer never happens (and training\_active never gets set to 1). When the follower transitions, negotiation may complete, you come out of TRAINING0 without the link\_fail\_inhibit timer started and without the LEADER's training\_active being set to 1.

NOTE - the suggestion fixes the link\_fail\_inhibit\_timer & training\_active problem, and aligns the descriptive text, but might not be the desired behavior - this may require more work on the state diagram to get the desired behavior....

*SuggestedRemedy*

Suggest TRAINING0 be changed in Figure 202-26 to delete "IF (training\_active = 0 \* detect\_lp\_burst) THEN" and "END" (and adjust indent on currently nested statements) Delete first two sentences of the 5th paragraph (The LEADER link\_fail\_inhibit\_timer. training frame to the LEADER.)

Proposed Response Response Status W  
 PROPOSED ACCEPT IN PRINCIPLE.

TFTD. Consider with Comment #238.

CI 202 SC 202.4.2.4.11 P 213 L 54 # 97  
 Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type E Comment Status D PMA

The description of the startup sequence seems to stop halfway through. It's odd and not helpful. It would be nice to complete.

*SuggestedRemedy*

Suggest, adding new text after last paragraph of 202.4.2.4.11:  
 "The COUNTDOWN0 state synchronizes the link partners' transition from symmetric training TDD bursts (SEND\_TS) to asymmetric training TDD bursts (SEND\_TA) in the TRAINING1 state. The TRAINING1 state then waits until both local and remote receivers settle and signal that their status is OK, before transitioning to a subsequent countdown, COUNTDOWN1. Following the completion of COUNTDOWN1, the PCS is tested, and, if the link is reliable, as indicated by block lock and the RS-FEC error rate, PHY Control transitions to PCS\_DATA and begins transferring data."

Proposed Response Response Status W  
 PROPOSED ACCEPT.

(Editor's note: Other comments have already addressed some of the TRAINING0->COUNTDOWN0->TRAINING1, but laying it all out sequentially is useful and can be adjusted further if needed.)

Add new text after last paragraph of 202.4.2.4.11:  
 "The COUNTDOWN0 state synchronizes the link partners' transition from symmetric training TDD bursts (SEND\_TS) to asymmetric training TDD bursts (SEND\_TA) in the TRAINING1 state. The TRAINING1 state then waits until both local and remote receivers settle and signal that their status is OK, before transitioning to a subsequent countdown, COUNTDOWN1. Following the completion of COUNTDOWN1, the PCS is tested, and, if the link is reliable as indicated by block lock and the RS-FEC error rate, PHY Control transitions to PCS\_DATA and begins transferring data."

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CI 202 SC 202.4.3.1 P 214 L 28 # 112

Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D EZ - pull

There is no mention of what signals are transmitted during 2.5Gb/s or 5 Gb/s transmission.  
 "all other symbols" isn't really sufficient specification.

*SuggestedRemedy*

Insert the following new second sentence in the first paragraph of 202.4.3.1:  
 "For 100 Mb/s, 2.5 Gb/s or 5 Gb/s, all transmit symbols are PAM2."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Replace, "During RS-FEC frame transmission, 10 Gb/s transmit path uses PAM4 while all other symbols transmitted within a burst use PAM2."

with, "For 100 Mb/s, 2.5 Gb/s, or 5 Gb/s transmit rates, the refresh header and burst payload symbols are PAM2. For 10 Gb/s transmit rates, the burst payload is transmitted using PAM4 symbols, while the refresh header is transmitted using PAM4 symbols. When QUIET (i.e., not transmitting PAM2 or PAM4 symbols), Z symbols are transmitted."

Likely resolution is to refer to 202.5.2.4 contingent on EZ resolution of comment #260 which also defines Tx MDI behavior when tx\_symb=Z, or use similar wording in both places.

CI 202 SC 202.4.4.1 P 216 L 16 # 107

Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe  
 Comment Type T Comment Status D PMA

tdd\_watchdog\_status is not set anywhere. There is no defined function as a TDD monitor. This variable appears to be used only in the link monitor, and it might be eliminated if the link monitor were expanded to include the referenced TDD monitor (or might be deleted altogether) This functionality appears to involve a timeout counter of 96 usec, and some criterion for detection of reliable operation of TDD bursts...

*SuggestedRemedy*

Either: Delete tdd\_watchdog\_status and the definition (P216 L16-24, and it's use on exit from LINK\_UP in Figure 202-28 (Link Monitor SD))  
 OR: provide the referenced TDD monitor functionality, preferably by augmenting the link monitor state diagram.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD. Consider with Comment #237.

(Editor's note: The intent was for TDD\_watchdog\_status to be similar to the PMA\_watchdog\_status in 97.4.4.1. To add to the state machine would be possible by defining a 96usec timer that is started on entry to LINK\_UP and when done causes transition to LINK\_DOWN. The LINK\_UP state would transition to LINK\_UP upon detect\_lp\_burst to restart the timer. The tdd\_watchdog\_status could be deleted in favor of a tdd\_watchdog\_timer.)

CI 202 SC 202.4.4.1 P 216 L 18 # 237

Lee, Ching-Yen Realtek Semiconductor Corp.  
 Comment Type T Comment Status D PMA

The description of tdd\_watchdog\_status needs to be modified.

*SuggestedRemedy*

change "Variable indicating the status of the TDD monitor." to "Variable indicating whether a reliable TDD burst is detected."

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD. Consider with Comment #107.

(Editor's note: Perhaps this can be addressed by having a tdd\_watchdog\_timer?)

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CI 202 SC 202.4.5 P 217 L 3 # 238

Lee, Ching-Yen Realtek Semiconductor Corp.

Comment Type T Comment Status D PMA

The PHY Control state diagram needs to be updated.

**SuggestedRemedy**

An updated figure will be provided.

Add the following two variable to 202.4.4.1:

detect\_ip\_burst

A Boolean variable that is set TRUE when the TDD burst has been detected. Set to FALSE when the PMA detected the burst has ended (PMA could use timer timeout to terminate this detection signal).

training\_active

A Boolean variable that is set TRUE when the link\_fail\_inhibit\_timer is started. Set to FALSE after entering the DISABLE\_TRANSMITTER state and PCS\_DATA state.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

TFTD. Consider with Comment #96

(Editor's note: Looping can be just on !training\_active, we don't need to loop every time detect\_ip\_burst=FALSE. Try to avoid state machine stuff in the variables, and clarify the detect\_ip\_burst excludes Z.)

Implement changes in

[https://www.ieee802.org/3/dm/public/040726/Lee\\_3dm\\_01\\_070426.pdf](https://www.ieee802.org/3/dm/public/040726/Lee_3dm_01_070426.pdf)

Add the following two variables to 202.4.4.1:

detect\_ip\_burst

A Boolean variable indicating whether PAM2 or PAM4 symbols of a TDD burst have been detected.

Values:

TRUE: TDD PAM2 or PAM4 symbols are detected.

FALSE: PMA detects the Z symbols after the PAM2/PAM4 burst has ended (PMA could use timer timeout to terminate this detection signal).

training\_active

A Boolean variable indicating whether the link\_fail\_inhibit\_timer has started.

Values:

TRUE: The link\_fail\_inhibit\_timer is running and the link is in a training phase.

FALSE: The link is not currently in a training phase.

Change training\_active <= 0 in DISABLE\_TRANSMITTER and PCS\_DATA to training\_active <= FALSE

Change training\_active <= 1 in TRAINING0 to training\_active <= TRUE

CI 202 SC 202.4.5 P 218 L 17 # 98

Zimmerman, George CME Consulting/ADI,APL Gp, Cisco, Infineon, OnSe

Comment Type T Comment Status D PMA

TRAINING1 may simply fall through since loc\_rcvr\_status and rem\_rcvr\_status will likely be true on entry. Resetting them to NOT\_OK in the state will prevent this, and they will get executed once on entry, and become OK as the local receiver settles and the remote receiver sends OK status via infofield.

**SuggestedRemedy**

add "loc\_rcvr\_status <= NOT\_OK" and "rem\_rcvr\_status <= NOT\_OK" to state TRAINING1.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.

Consider with Comment #238.