Cl **98** *SC* **98.5.2** *P* **36** *L* **49** # 1

Lusted, Kent — Synopsys

Comment Type **TR** *Comment Status* **A** *State Diagrams*

The timer for the 100BASE-T1L PHY is set to a very specific value of 85ms, without any allowance for variation in clock rates between partners. Also, an exact value of 85.00000000000000 ms would be difficult to meet in design. Allowing a narrow range would simplify the design and still follow the spirit of the timeout value.

SuggestedRemedy

Change "85 ms" to "85 ms to 86 ms" in the text as well as the PICS item SD21

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Accomodated by comment 253.

Cl **190** *SC* **190.5.4.2** *P* **112** *L* **44** # 18

Slavick, Jeff — Broadcom

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

Incomplete sentence, there is no "what to do"

SuggestedRemedy

Change:
With the transmitter in test mode 3 and, if 2.0 Vpp mode is supported, in test mode 4, and using the transmitter test fixture shown in Figure 190'23.
To:
The transmitter output droop is measured with the transmitter in test mode 3 and in test mode 4 (if 2.0 Vpp mode is supported) using the transmitter test fixture shown in Figure 190'23.

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.2.7** *P* **71** *L* **24** # 23

Slavick, Jeff — Broadcom

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

Which element is being identified?

SuggestedRemedy

Insert the following after the word element in italics with appropriate sub/superscripting "mi,5a^5 + mi,4a^4 + Ó + mi,1a + mi,0" with a using the alpha character.

Response *Response Status* **W**

ACCEPT.
(note, see 5th paragraph in 91.5.2.7)

Cl **190** *SC* **190.3.2.7** *P* **71** *L* **25** # 25

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **R** *RS-FEC*

The statement that mi,0 is the first bit transmitted is duplicative with the last sentence of this sub-section (pg71 lin 52).

SuggestedRemedy

Remove "mi,0 is the first bit transmitted"

Response *Response Status* **W**

REJECT.

CRG disagrees with commenter.
The two statements are similar but not identical. The first usage refers to message bits in the defined message symbol. Deleting it would remove the meaning of the notation. The second usage (at line 52) relates to the construction of the full codeword, not just the message symbols. Keeping both adds clarity and does no harm.

Cl **190** *SC* **190.3.2.7** *P* **71** *L* **26** # 26

Slavick, Jeff — Broadcom

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

tx_RSmessage<975:0> is defined after it's used.

SuggestedRemedy

Delete:
tx_RSmessage<975:0> prior to the RS-FEC(128,122) encoder is formed as follows:
tx_RSmessage<975:0> = tx_group<975:0>

Replace the two remaining instances of tx_RSmessage with tx_group.

Add the following before "where:"
from the Transmit process

Response *Response Status* **W**

ACCEPT.

Cl **1903** *SC* **1903.3.3** *P* **78** *L* **54** # 27

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **R** *RS-FEC*

There is no sub-clause describing the operation of the RS-FEC decoder and any status indicators it produces or statistics it provides.

SuggestedRemedy

Add a new sub-clause before 190.3.3.1 but at the same sub-level.

The Reed-Solomon decoder extracts the message symbols from the codeword, corrects them as necessary and discards the parity symbols. The RS-FEC decoder shall be capable of correcting any combination of up to t=3 symbol errors in a codeword. The probability that the decoder fails to indicate a codeword with t+1 errors as uncorrected is not expected to exceed 10^-6. This limit is also expected to apply for t+2 errors, t+3 errors, and so on.

The following counters shall be provided:
FEC_corrected_cw_counter
A 32-bit counter that increments by one for each RX_FRAME event (see 190.3.6.1.6) in which the FEC codeword contains errors and was corrected by the Reed Solomon decoder.

FEC_uncorrected_cw_counter
A 32-bit counter that increments by one for each RX_FRAME event (see 190.3.6.1.6) in which the FEC codeword contains errors that were detected but no corrected by the Reed Solomon decoder.

FEC_cw_counter
A 48-bit counter that increments by one for each RX_FRAME event (see 190.3.6.1.6).

FEC_codeword_error_bin_i
A set of three 32-bit counters were counter i increments by one for each RX_FRAME event (see 190.3.6.1.6) with exactly i correctable 8-bit symbols (I=1 to 3). For example if a codeword has exactly 2 error 8-bit symbols, then FEC_codeword_error_bin_2 is incremented.

In 190.3.7 add the following mappings
FEC_corrected_cw_counter to MDIO registers 3.802, 3.803
FEC_corrected_cw_counter to MDIO registers 3.804, 3.805
FEC_cw_counter to MDIO registers 3.300, 3.301, 3.302
FEC_corrected_error_bin_1 to MDIO registers 3.340, 3.341
FEC_corrected_error_bin_2 to MDIO registers 3.342, 3.343
FEC_corrected_error_bin_3 to MDIO registers 3.344, 3.345

Response *Response Status* **W**

REJECT.

CRG Disagrees with the commenter.

RS-FEC specifications integral to the PCS of BASE-T1 PHYs are different from those in high-speed PHYs where RS-FEC has been defined as a separate sublayer. Performance is integrated into the receiver. This has a long history with FEC in 1000BASE-T, MultiGBASE-T, and has continued with RS-FEC in 1000BASE-T1 and MultiGBASE-T1 PHYs. Separate specification from the receiver performance is not required in any of these PHYs because the sublayer cannot be separated from the PHY's PCS.

Cl **190** *SC* **190.3.2.7** *P* **71** *L* **43** # 28

Slavick, Jeff — Broadcom

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

The statement that pi,0 is the first bit transmitted is duplicative with the last sentence of this sub-section (pg71 lin 52).

SuggestedRemedy

Remove "pi,0 is the first bit transmitted"

Response *Response Status* **W**

REJECT.

CRG disagrees with commenter.
The two statements are similar but not identical. The first usage refers to parity bits in the defined parity symbol. Deleting it would remove the meaning of the notation. The second usage (at line 52) relates to the construction of the full codeword, not just the parity symbols. Keeping both adds clarity and does no harm.

Cl **190** *SC* **190.3.6.2** *P* **94** *L* **49** # 30

Slavick, Jeff — Broadcom

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

The transtion from TX_WAKE is going to where? I don't usually see a state name as the destination.

SuggestedRemedy

Make the arrow from TX_WAKE actually just connect directly to TX_MII and remove the TX_MII text from line 49

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.6.2** *P* **95** *L* **2** # 32

Slavick, Jeff — Broadcom

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

The transtion from SEND_WAKE is going to where? I don't usually see a state name as the destination.

SuggestedRemedy

Make the arrow from SEND_WAKE actually just connect directly to SEND_NORMAL and remove the SEND_NORMAL text from line 45

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.6.2** *P* **96** *L* **13** # 33

Slavick, Jeff — Broadcom

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

Convention is to use a circled letter and the same letter in a "house" to represent transitions that aren't drawn in (or would require overlapping lines).

SuggestedRemedy

In Figure 190-13 part a, replace RX_PKT on line 13 with an enclosed P, replace the path from RX_IDLE to RX_LPI with an enclosed L on line 22, replace the three RX_IDL arcs on lines 28, 34 and 44 with an enclosed I, add circled P going into state RX_PKT, add circled I going into state RX_IDL.
In Figure 190-13 partb, add a circled L going into state RX_LPI (within the dotted box) and replace the two instances of RX_IDLE on line 30 with an enclosed I

Response *Response Status* **W**

ACCEPT IN PRINCIPLE

Clause 190 follows convention in clause 145 which is more readable than single letter tags. In Figure 190-13, at P96 Lines 27, 34, & 44, and P97 L30 (twice) put RX_IDL in a flag, and add an entry 'house' into RX_IDL. Do similarly for RX_PKT and RX_LPI on pages 96 & 97. See e.g., Figure 145-13 for an example.

Cl **190** *SC* **190.3.6.1.2** *P* **90** *L* **38** # 34

Slavick, Jeff — Broadcom

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

The definition of rx_lpi_sleep doesn't quite make sense.

SuggestedRemedy

Change "when 32 consecutive rx_char values each represent /LI/" to "when the last 32 rx_char values recevied are /LI/ and EEE is supported and enabled"

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

(typo corrected)
Change "when 32 consecutive rx_char values each represent /LI/" to
"when the last 32 rx_char values received are /LI/ and EEE is supported and enabled"

Cl **190** *SC* **190.3.6.1.2** *P* **90** *L* **38** # 35

Slavick, Jeff — Broadcom

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

Isn't a character one thing or another, not a representation of something that looks like a character.

SuggestedRemedy

In the definitinon of rx_wk_idle change "each represent" to "are"

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Accomodated by comment 34

Cl **190** *SC* **190.3.6.2** *P* **97** *L* **32** # 36

Slavick, Jeff — Broadcom

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

This note stats this "figure" is only mandatory when EEE is enabled. But isn't this a figure that has to be spread over multiple pages, so part a and part b are really "one" figure. Which means this figure is always necessary just the dotted box is only applicable when EEE is enabled (as is stated on part a).

SuggestedRemedy

Replace the note in Figure 190-14, part b with the same note from part a

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.1** *P* **44** *L* **28** # 37

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **A** *RS-FEC*

Is the RS-FEC an optional to use or optional to implement?

SuggestedRemedy

If it's optional to implement, then add an RS-FEC Ability variable, mapping it to a MDIO register and in 190.3.2.7 and 190.3.3 qualify RS-FEC descriptions with that variable being TRUE for the encode and decode proceses.

If it's mandatory to implement but optional to use, then change this sentence in 190.1 to be "This clause specifies a Reed-Solomon forward error correction (RS-FEC) capability that may be enabled or disabled. The RS-FEC provides enhanced burst noise protection at the expense of increased latency."

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

There is an MDIO register variable at 3.2296.14, which is read only that indicates the capability - which is optional to implement. Use is negotiated in startup. Additional information seems to be needed in the overview to clarify this.

Add the following new second sentence to the 4th paragraph of 190.1 (P44 L28), "RS-FEC PHY capability is indicated using MDIO register bit 3.2296.14 or equivalent means if MDIO is not implemented. The request to use the RS-FEC capability is negotiated during startup. PHYs implementing RS-FEC request use of the capability by setting MDIO register bit 3.2297.14 to one.

Cl **190** *SC* **190.3.4.2.4** *P* **83** *L* **47** # 38

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **A** *RS-FEC*

eee_adv and rs_adv are only referred to here, I don't see a section for PCS resolution process.

SuggestedRemedy

Add the following to the last paragraph of 190.3.4.2.4
"When the transmitted eee_adv is set to one and the received Oct10<1> is also a one, then EEE enabled. When the transmitted rs_adv is to one and the recevied Oct10<0> is also a one, then RS-FEC mode is enabled."

Response *Response Status* **W**

ACCEPT IN PRINICIPLE.

(typo corrected, wording clarified)
Add the following to the last paragraph of 190.3.4.2.4

"EEE is enabled when transmitted eee_adv is set to one and the bit received in Oct10<1> is also a one. RS-FEC mode is enabled when the transmitted rs_adv is set to one and the bit received in Oct10<0> is also a one."

Cl **190** *SC* **190.3.4.2.4** *P* **83** *L* **45** # 39

Slavick, Jeff Broadcom

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

Figure 190-6 is the side-stream scrambler figure.

SuggestedRemedy

Change the reference to Figure 190-8.

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.4.2.4** *P* **83** *L* **41** # 40

Slavick, Jeff Broadcom

Comment Type **TR** *Comment Status* **A** *RS-FEC*

Only if you actually have the capability should you permit advertisement of EEE and RS-FEC

SuggestedRemedy

Change:
The PHY capability bits Oct10<0> and Oct10<1> reflect the values specified by the 100BASE-T1L training register bits 3.2297.14 and 3.2297.15, respectively.

To one of the two following options:

The PHY capability bits Oct10<0> and Oct10<1> indicate the PHYs request to enable RS-FEC and EEE modes of operation, respectively. rs_adv is set to one when the 100BASE-T1L PHY has the ability to operate in RS-FEC mode as indicated by status register 3.2296.14 and the 100BASE-T1L training register to request RS-FEC mode of operation is set to a one, 3.2297.14. eee_adv is set to one when the 100BASE-T1L PHY has the ability to operate in EEE mode as indicated by status register 3.2296.15 and the 100BASE-T1L training register to request EEE mode of operation is set to a one, 3.2297.15.

Or alternatively use following changes which utilizes sub-layer variables and maps those variables to the associated MDIO registers, since MDIO is not mandatory, just an option. DJ has moved in this direction of using variables within the sub-layer and then mapping them to MDIO container.

The PHY capability bits Oct10<0> and Oct10<1> indicate the PHYs request to enable RS-FEC and EEE modes of operation, respectively. rs_adv is set to one when the variables rs_fec_ability and rs_fec_request are both one. eee_adv is set to one when eee_ability and eee_request are both one.
In 190.3.7 add the following mappings
rs_fec_ability to MDIO register 3.2296.14
rs_fec_request to MDIO register 3.2297.14
eee_ability to MDIO register 3.2296.15
eee_request to MDIO register 3.2297.15

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change: "The PHY capability bits Oct10<0> and Oct10<1> reflect the values specified by the 100BASE-T1L training register bits 3.2297.14 and 3.2297.15, respectively. "

To
"PHY capability bits Oct10<0> and Oct10<1> indicate the PHY's request to enable RS-FEC and EEE modes of operation, respectively. Bit Oct10<0>, rs_adv, is set to one when the 100BASE-T1L PHY has the ability to operate in RS-FEC mode as indicated by status register bit 3.2296.14 and the 100BASE-T1L training register bit 3.2297.14 to request RS-FEC mode of operation is also set to a one. Bit Oct10<1>, eee_adv, is set to one when the 100BASE-T1L PHY has the ability to operate in EEE mode as indicated by status register bit 3.2296.15 and the 100BASE-T1L training register bit 3.2297.15 to request EEE mode of operation is also set to a one."

Cl **190** *SC* **190.3.2.6** *P* **70** *L* **31** # 41

Slavick, Jeff Broadcom

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

If the 190.3.2.6 is to describe all the steps taken from the MII to PMA service interface without all the details, then the flow should be a list of steps with references to the sub-clauses that contain the details.

SuggestedRemedy

Make lines 6 through 25 a new sub-clause titled ¶Transmit group encoding÷ that comes before the RS-FEC encoder sub-clause.

Insert this text after the first paragraph of 190.3.2.6:
MII transfers are encoded into 8N + 1 bit blocks to create a group of 15N + 2 octets per <the newly created sub-clause>

Add ¶(see 190.3.2.7)÷ after ¶6 parity octets÷ on line 30

Add ¶(see 190.3.2.8 through 190.3.2.10)÷ after Sdn[7:0] on line 33

Add ¶(see 190.3.2.11)÷ after 8B6T encoding on line 34

Make 190.3.2.7 through 190.3.2.11 plus the new sub-clause a sub-heading of 190.3.2.6. (Headings in suggested remedy based on D2.0 heading numbers)

Response *Response Status* **W**

ACCEPT.

Cl **30** *SC* **30.5.1.1.15** *P* **24** *L* **54** # 42

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **A** *RS-FEC*

aFECAbiilty and aFECmode I think should be used rather than aRSFECBypassAbility and aRSFCBypassEnable to indicate in management objects if RS-FEC mode is enabled.

SuggestedRemedy

Bring in 30.5.1.1.15 and add ¶(or mode of operation)÷ after optional FEC sublayer in the first paragraph of the behavior and add Clause 190 to the list. Insert MDIO register 45.2.3.75b in the list of capability registers.

Bring in 30.5.1.1.16 and add ¶(or mode of operation)÷ after optional FEC sublayer in the first paragraph of the behavior and add Clause 190 to list. Insert MDIO register 45.2.3.75c to list of FEC operating mode registers.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Accomodated by comments 246 & 247.

Cl **30** *SC* **30.5.1.1.17** *P* **24** *L* **54** # 43

Slavick, Jeff — Broadcom

Comment Type **TR** *Comment Status* **R** *RS-FEC*

aFECUncorrectableBlocks and aFECCorrectedBlocks needs mapping

SuggestedRemedy

Insert and increment rate of 120 000 for 100 Mb/s implementations into the SYNTAX descriptions and add 100BASE-T1L to the list of PHYs in both 30.5.1.1.17 and 30.5.1.1.18

Response *Response Status* **W**

REJECT.

CRG Disagrees with the commenter.
RS-FEC specifications integral to the PCS of BASE-T1 PHYs are different from those in high-speed PHYs where RS-FEC has been defined as a separate sublayer. Performance of FEC is integrated into the receiver with more simplified monitoring. This has a long history with 1000BASE-T, MultiGBASE-T, and has continued in 1000BASE-T1 and MultiGBASE-T1 PHYs. Separate specification from the receiver performance is not required because the sublayer cannot be separated from the PHY.

Cl **1** *SC* **1.5** *P* **22** *L* **34** # 44

Slavick, Jeff — Broadcom

Comment Type **ER** *Comment Status* **A** *EZ*

A new abbreviation "ABBR" is being added but I don't see it being used anywhere

SuggestedRemedy

Remove it

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.2** *P* **63** *L* **30** # 51

He, Xiang — Huawei Technologies

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

In Figure 190-4. The "Low-latency/RS-FEC select" is never mentioned anywhere in the document, and the mux/switch box is not an accurate illustration in the figure.
When RS-FEC is enabled, the RS-FEC encoder in the dashed box is used, and this mux has to be switched to the upper path. When RS-FEC is disabled, the RS-FEC in the dashed box is not used and the mux has to be switched to the lower path.

SuggestedRemedy

Suggest to rename "Low-latency/RS-FEC select" to "RS-FEC enable". Clearly mark 1 on the upper path, and 0 on the bottom path.

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.2** *P* **63** *L* **21** # 52

He, Xiang — Huawei Technologies

Comment Type **TR** *Comment Status* **A** *RS-FEC*

"Used when N=8, bypassed when N=2" on top of the dashed box seems odd. In 190.3.2.1, line 5 of page 62, it clearly says "When RS-FEC is disabled, N is 2Ó... When RS-FEC is enabled, N is 8 Ó". The actual thing determining which path is used is "RS-FEC enable". The number N is not an input, but a result.

SuggestedRemedy

Suggest to change the sentence on top of the dashed box as "Used when RS-FEC is enabled, bypassed when RS-FEC is disabled".

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.7** *P* **99** *L* **1** # 53

He, Xiang — Huawei Technologies

Comment Type **ER** *Comment Status* **A** *Editorial*

PCS management subclause is empty.

SuggestedRemedy

Add proper content to this subclause. Call it "PCS management variables" if this subclause is going to list all management variables with MDIO mapping.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Delete 190.3.7 header.

Management variables are spelled out where they apply and in registers. There is no need for a third summary table, which creates the possibility for errors.

Cl **190** *SC* **190.4** *P* **109** *L* **27** # 54

He, Xiang — Huawei Technologies

Comment Type **ER** *Comment Status* **R** *Editorial*

Is there a subclause for PMA management variables?

SuggestedRemedy

Suggest to add a subclause for PMA management variables.

Response *Response Status* **W**

REJECT.

Commenter provides insufficient remedy. Management variables are spelled out where they apply and in registers. There is no need for a third summary table, which creates the possibility for errors.

Cl **190** *SC* **190.3.6** *P* **88** *L* **33** # 55

He, Xiang — Huawei Technologies

Comment Type **ER** *Comment Status* **R** *Editorial*

Clause 190 has both PCS and PMA, so the subclause title is better to clearly states whether this is for PCS or PMA, if this is not a PCS specific thing like "Training" or "LPI signaling". This also aligns better with the subclause title for 190.3.1 through 190.3.3.

SuggestedRemedy

Change "Detailed functions and state diagrams" to "PCS detailed functions and state diagrams".

Response *Response Status* **W**

REJECT.

Numbering of subclauses makes the association clear - PCS is 190.3 (and subclauses), PMA is 190.4 (and subclauses). This is similar to numerous other clauses.

Cl **190** *SC* **190.4.9** *P* **103** *L* **19** # 56

He, Xiang — Huawei Technologies

Comment Type **ER** *Comment Status* **R** *Editorial*

Clause 190 has both PCS and PMA, so the subclause title is better to clearly states whether this is for PCS or PMA.
I also see the state diagrams for this subclause is for "PHY control", if these diagrams belong to the PMA subclause, and is part of PMA, please consider call them "PMA control state diagrams".

SuggestedRemedy

Change "Detailed functions and state diagrams" to "PMA detailed functions and state diagrams".
Subsquently, consider to rename "PHY control state diagram" to "PMA state diagram" for the state diagram figures.

Response *Response Status* **W**

REJECT.

Numbering makes the association clear. This is similar to numerous other clauses.

Cl **1** *SC* **1.4.341a** *P* **21** *L* **40** # 59

Ran, Adee Cisco Systems

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

The new definition FOLLOWER PHY incorrectly refers to 1.4.389 (which is "master") instead of 1.4.535 ("slave").
Also, the referenced definition says nothing about what "follower" is; the reader needs to read Annex K (which is informative) to find what this new term means.
Also, existing definitions in 1.4 do not refer to other definitions by number but rather by name. For example, "1.4.204 Base Page: See: Base link codeword."

In this case the new term is synonymous to "Slave Physical Layer Device". in similar cases, the abbreviation "Syn:" is used (see 1.4.359 in-band signaling, 1.4.468 Physical Layer entity, 1.4.544 switch).

Similarly for 1.4.371a "LEADER PHY" (where the reference isn't wrong, but the rest of the comment still applies).

SuggestedRemedy

Change the definition in 1.4.341a to
"syn: Slave Physical Layer Device. See also Annex K."
Change the definition in 1.4.371a to
"syn: Master Physical Layer Device. See also Annex K."

Response *Response Status* **W**

ACCEPT.

Cl **45** *SC* **45.2.1.236a.3** *P* **28** *L* **3** # 64

Ran, Adee Cisco Systems

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

"low-power ability" is not referenced anywhere in Clause 190 (although there is one instance of "low power mode", without a hyphen, in 190.4.1). Is it the same as "low-power idle" (part of EEE)?

SuggestedRemedy

If it is a separate function, it should be stated clearly to avoid confusion, and a specification of the behavior in this mode should be added in clause 190. If it is the LPI of EEE, please rename it or clarify in some other way.

Response *Response Status* **W**

REJECT.

This mode is described in nearly every PHY in 802.3 (over 100 instances in IEEE Std 802.3). It is a low-power non-operational state (e.g., software power down - Clause 45 bit 1.1.1). A change would make the reader question whether it was something different.

Cl **104** *SC* **104.6.2** *P* **40** *L* **8** # 70

Ran, Adee Cisco Systems

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

The last sentence in the amended paragraph mentions only PDs, but the existing text in 104.6.2 says "The PI for Type E PSEs and PDs". I assume PSEs for Type E are out of scope of this amendment, so they should still be included; I assume also for type G, but this may be intentional?

SuggestedRemedy

Correct the text as necessary to address PSEs.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

(this text was amended by 802.3dd - the editing instruction neglects that. PSE's were excluded by 802.3dd

insert "(as amended by IEEE Std 802.3dd-2022)" in editing instruction, to read:
Change the first paragraph of 104.6.2 (as amended by IEEE Std 802.3dd-2022) as shown:

Cl **190** *SC* **190.1.2** *P* **45** *L* **6** # 72

Ran, Adee Cisco Systems

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

Clause 4 specifies a CSMA-CD MAC (half duplex) but this PHY operates in full-duplex (as stated in 190.1.3).
Shouldn't it be Annex 4A instead?

SuggestedRemedy

Change to Annex 4A and the appropriate title.

Response *Response Status* **W**

REJECT.

CRG disagrees with the commenter.
The Clause 4 MAC supports full duplex operation. Annex 4A is the simplified full duplex MAC.

Cl **190** *SC* **190.1.3** *P* **45** *L* **51** # 75

Ran, Adee Cisco Systems

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

"RS-FEC is not compatible with all applications since it results in a significant increase in latency"
This is not a normative statement, and it goes without saying (this PHY as a whole, or any PHY, or anything, isn't compatible with _all_ applications).

Similarly for the statement "EEE is not compatible with all applications since it may result in a significant increase in latency and in latency variability" in the next paragraph.

SuggestedRemedy

Move these sentences into an informative NOTE, or delete them altogether.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change "RS-FEC is not compatible with all applications since it results in a significant increase in latency" to
"RS-FEC results in a significant increase in latency."

and change "EEE is not compatible with all applications since it may result in a significant increase in latency and in latency variability" to
"EEE can result in a significant increase in latency and latency variability." in the next paragraph.

Cl **190** *SC* **190.2.2.5.1** *P* **54** *L* **6** # 77

Ran, Adee Cisco Systems

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

For PMA_UNITDATA.indication, the possible values of rx_symb are not provided (unlike PMA_UNITDATA.request in 190.2.2.4.1). Are these the same set (ternary symbols)? Or is it a soft input for the PCS to decode?

SuggestedRemedy

Please clarify.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Insert :The rx_symb parameter takes on one of the following values:{-1, +1} when the PHY is in training mode{-1, 0, +1} when the PHY is in idle mode or in normal operation

Cl **190** *SC* **190.3.2.4** *P* **65** *L* **19** # 82

Ran, Adee Cisco Systems

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

The value "-" for "previous transfer" in the 4th and 5th rows is not one of the categories defined in Table 190¹1.

SuggestedRemedy

Clarify or correct if necessary.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Add at the bottom of the table, "NOTE - and em-dash indicates that any value quaifies."

Cl **190** *SC* **190.3.2.3** *P* **64** *L* **16** # 84

Ran, Adee Cisco Systems

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

"The bits of a transmitted or received block are labeled tx_coded<0:2N> and rx_coded<0:2N>"
The notations tx_coded<0:2N> and rx_coded<0:2N> do not appear anywhere other than in this subclause.
In 190.3.2.6 tx_coded has two indices, e.g., tx_coded<i><j>, where j is from 0 to 8N, so apparently tx_coded is an array of blocks; the size is different and the bit order is reversed, tx_coded<i><8N:0>.
In 190.3.6.1.2 it is tx_coded<0:8N> (same order here but different size).

I assume the size is 8N+1, and the order should be consistent; MSB on the left is more common.

Note that rx_coded doesn't appear anywhere else. Should it be rx_mii?

SuggestedRemedy

Change to tx_coded<8N:0> and rx_coded<8N:0>. Make the bit order consistent across the clause.

Change rx_coded to whatever it should be.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change tx_coded<0:2N> to tx_coded<0:8N> (the block has 8N+1 bits). delete "and rx_coded<0:2N>" and "and rx_coded<0>" and delete "or received" at P64 L16 (there is no reference to rx_coded).In 190.3.2.6.1, (P70 L18) change "tx_coded<i><8N:0> is the i-th (8N)B/(8N+1)B block" to "tx_coded<i><0:8N> is the i-th (8N)B/(8N+1)B block"

Cl **190** *SC* **190.2.2.13.1** *P* **57** *L* **44** # 87

Ran, Adee Cisco Systems

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

Is "control character" (here, also used in 190.3.2.2 and 190.3.2.3) identical to "control octet" (used in 190.3.2.4, 11 times)? Neither of these terms seems to be defined.

SuggestedRemedy

If the terms are identical, please use one term consistently. If not, please add text to clarify the difference.
Preferably, add a definition or a reference to an existing one.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Replace "control octet" with "control character" globally (and control octets with control characters)

Cl **190** *SC* **190.3.2.8** *P* **73** *L* **23** # 93

Ran, Adee Cisco Systems

Comment Type **ER** *Comment Status* **A** *PCS*

"as in Clause 40"
Reference is not specific enough. I assume the intent is 40.3.1.3.2, which contains the same equations for Sy_n and Sx_n, but it does not seem to be exactly the same for Sg_n. For Sy_n and Sx_n, either refer to an existing specification or note (informatively) that it is the same as an existing one.

SuggestedRemedy

Either change to "as specified in 40.3.1.3.2", or delete this phrase and add a paragraph "NOTE¨The specification for Sy_n and Sx_n is identical to the one in 40.3.1.3.2".

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change "as in Clause 40" to "as specified in 40.3.1.3.2".

Add at P73 L25 (after paragraph): "NOTE¨The specification for Sy_n and Sx_n is identical to 40.3.1.3.2".

Cl **190** *SC* **190.3.6.1.1** *P* **89** *L* **38** # 106

Ran, Adee Cisco Systems

Comment Type **TR** *Comment Status* **R** *RS-FEC*

The assigned values of RFER_CNT_LIMIT and RFRX_CNT_LIMIT result in hi_rfer being asserted when the RS-FEC block error ratio is about 16/88 or about 18% (assuming uncorrectable codewords occur randomly). This means 18% of the traffic can be lost (frame loss ratio higher than 1e-1!) without asserting hi_rfer, which makes it a very crude indication (the link will likley become useless at this performance or even lower BER) and does not match the stated BER/FLR requirements in 190.5.5.1.

Allowing a link to operate with such high error probability would raise MTTFPA concerns, because there is a non-negligible probability (with this codeword error probability and simple error model assumptions, estimated as ~0.2%) that a codeword with more than 3 errors is not detected as uncorrectable, but instead miscorrected to create 2t=6 symbol errors.

It practically becomes an indication of a dropped link, but this should already be detected by other means (pcs_status, implementation dependent) for the case where RS-FEC is not available.

Note that the PCS in clause 119 and similar ones asserts loss of alignment (and pcs_status=NOT_OK) upon reception of 3 consecutive uncorrectable RS-FEC codewords.

SuggestedRemedy

Increase RFRX_CNT_LIMIT to create a ratio based on the expected worst-case performance (e.g. frame loss ratio). For example, assuming the maximum allowed frame loss ratio is 1e-6 (very relaxed compared to about 1e-10 in BASE-R PHYs), RFRX_CNT_LIMIT should be RFER_CNT_LIMIT*1e6 or about 2^24.

If the current value is retained, add a NOTE stating that with random error assumptions, high_rfer will be asserted at a codeword error ratio of approximately 18% or above. (if the value is changed, add the note with the resulting probability).

Response *Response Status* **W**

REJECT.

The analysis uses a stationary error model - when in this channel it would more likely be burst errors, common to known causes in the application space. The analysis also neglects the fact that this high RFER count goes along with marking the blocks as Errors, guaranteeing that they will be discarded and counted at the MAC, indicating a bad link. Note that this is only a 100 Mbps link, so the MTTFPA calculation is much more generous than at 100 Gbps allowing monitoring of the MAC counters and reacting to a bad link.

Cl **190** *SC* **190.3.3.2** *P* **79** *L* **22** # 107

Ran, Adee
Cisco Systems

Comment Type **TR** *Comment Status* **R** *RS-FEC*

There is no specification of the RS-FEC decoder correction capability. I assume there is an expectation that the decoder actually corrects errors, but this is not written anywhere.

with the current specifications, the decoder could just ignore the parity symbols and extract the payload, and this would be compliant. Or it could just mark codewords as invalid if any error is detected (nonzero syndrome), never correcting anything. This would have very low latency but it's not what people would expect.

The code specified in 190.3.2.7 has 2t=128-122=6 so a decoder is expected to be able to correct up to t=3 symbol errors (with 8-bit symbols).

SuggestedRemedy

Add a requirement that the RS-FEC decoder shall be able to correct up to t=3 symbol errors (the text in 119.2.5.3 can be used as a reference).

Response *Response Status* **W**

REJECT.

CRG Disagrees with the commenter.

RS-FEC specifications integral to the PCS of BASE-T1 PHYs are different from those in high-speed PHYs where RS-FEC has been defined as a separate sublayer. Performance is integrated into the receiver. This has a long history with 1000BASE-T, MultiGBASE-T, and has continued in 1000BASE-T1 and MultiGBASE-T1 PHYs. Separate specification from the receiver performance is not required because the sublayer cannot be separated from the PHY.

Cl **190** *SC* **190.5.2** *P* **109** *L* **43** # 123

Ran, Adee
Cisco Systems

Comment Type **TR** *Comment Status* **R** *Test Modes*

I assumed that all test modes described are normatively required, but then realized that the even-numbered modes are optional, conditional of "increased transmit level" which is not defined anywhere. And it is not explicitly stated that the odd-numbered test modes are normatively required. The RS-FEC support adds another level of complexity.

It looks like there are actually 2 PMA-specific test modes (1 and 3) and 5 PMA+PCS test modes (5, 7, 9, 11, and 13; RS-FEC enable or disable is purely a PCS control), plus a bit that controls the transmit level. I assume there are reasons to define the test modes this way, and the suggested remedy is based on that (but a cleaner scheme separating the PCS test modes from the PMA test modes should be considered).

SuggestedRemedy

Change from
"The test modes described in this subclause are provided to allow testing of the transmitter"
to
"The test modes described in this subclause are provided to allow testing of the transmitter. Test modes 1, 3, 5, 7, and 11 shall be provided by all PHYs. Test modes 2, 4, 6, and 12 shall be provided if the PMA supports the optional increased transmit level (see <reference>). Test modes 9, 10, 13, and 14 shall be provided if the PCS supports RS-FEC (see <reference>)".

Use references to the subclause that specify the increased transmit level and RS-FEC as options (are there MDIO bits to indicate support?), or add new subclauses if there are no such specifications.

Response *Response Status* **W**

REJECT.

Test modes are required in all cases.
Even numbered test modes are not defined if increased transmit level is not supported (see P110 L15), but the setting still exists.If RS-FEC encoding is not supported, test modes 9 and 10 are undefined.

(P110 L32), but again, the setting still exists. Similarly for test modes 13 & 14 (P110 L39)

Cl **190** *SC* **190.5.4.4** *P* **113** *L* **26** # 125

Ran, Adee Cisco Systems

Comment Type **TR** *Comment Status* **R** *PMA Electrical*

"For the 1.0 Vpp operating mode, in test mode 7 <Ó> the transmit power shall be 1.0 ª 1.2 dBm"

1 V PtP (specified in 190.5.4.1) with PAM2 modulation on a 100 Ohm load delivers V^2/R=1^2/100 = 0.01 W = 10 mW; this is 10 dBm prior to pulse shaping. The PSD mask in figure 190-26 shows a mild low-pass response with about 4 dB attenuation at the Nyquist frequency (40 MHz) - not a lot more than square pulse shaping - how does that get anywhere near 1 dBm?

I may have got something completely wrong but it seems that the voltage and power specs don't match.

Similarly for the 2.0 Vpp mode (which should be just 6 dB higher - why is it 7 dB?)

SuggestedRemedy

If I'm not wrong - update whatever is necessary. (If I am wrong but it's not easy to explain why - consider adding a clarifying NOTE).

Response *Response Status* **W**

REJECT.

CRG DISAGREES WITH COMMENTER. Commenter makes an error in his calculation and uses 1 Vpeak, PAM2 not 1Vpp PAM3 (0.5Vp, with 1.76dB PAR). V^2/100ohm = 2.5mW (4dBm) minus 1.76dB PAR = 2.2 dBm, which fits the upper end fo the transmit power limit. The lower limit is for pulse shaping. Note that the difference between a 1st order nyquist filter and unfiltered pulse is > 1 dB…

Cl **190** *SC* **190.5.5.3** *P* **116** *L* **41** # 128

Ran, Adee Cisco Systems

Comment Type **TR** *Comment Status* **A** *PMA Electrical*

The NOTE includes an allowed ("may") modification the test conditions; this is not informative text.

SuggestedRemedy

Move this paragraph to normal subclause text. If desired, add a NOTE to explain the motivation for this allowance (e.g. "this allowance is provided to address limitations in noise generators").

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change "may be adapted" in the NOTE below figure 190-28 to "should be adapted". (the note should be a recommendation of what to do, not a permission)

Cl **190** *SC* **190.6.1** *P* **117** *L* **15** # 132

Ran, Adee Cisco Systems

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

[auto-negotiation is used] "To negotiate EEE capabilities as specified in 190.1.3.3."
But per 190.1.3.3 EEE capability are negotiated in InfoField as part of the training - which is after auto-negotiation.

SuggestedRemedy

Delete item d)

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.6.1** *P* **117** *L* **16** # 133

Ran, Adee Cisco Systems

Comment Type **TR** *Comment Status* **A** *Reduced TX level*

[auto-negotiation is used] "To negotiate the low <Ó> and high <Ó> operating modes ..."
How is that done?
(I reckon Table 98B¹1 has something to do with it but what are the rules for the negotiation? There should probably be a new subclause in clause 98)

SuggestedRemedy

Provide a reference to the subclause that contains the information (add a new one if necessary).

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Add to P117 L16 (item e) at the end, "(see 98B.3 and 98B.4)."

Cl **190** *SC* **190.6.2** *P* **117** *L* **22** # 136

Ran, Adee Cisco Systems

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

"One PHY should be configured as LEADER and one PHY should be configured as FOLLOWER"
This is not just a recommendation ("should"); it is an unavoidable situation if proper operation is assumed, as described in the next paragraph.

SuggestedRemedy

Change to "For successful operation of a link between two PHYs, one PHY must be configured as LEADER and the other as FOLLOWER". Move this sentence to the second paragraph before "In the case where <Ó>".

Response *Response Status* **W**

REJECT.

The configuration is not necessarily a forced configuration. It may be resolved as a preference in auto-negotiation, according to Table 98-4. This same language and technique has been used successfully for over 20 years (including 1000BASE-T) and resulting in successful BASE-T PHY links without misunderstanding.

Cl **190** *SC* **190.7.1.1** *P* **120** *L* **6** # 137

Ran, Adee Cisco Systems

Comment Type **TR** *Comment Status* **A** *Link Segment*

"Each 100BASE-T1L link segment" - within what set of segments?

I initially interpreted it as "each segment between connectors", but based on the text in 190.7.1.4.2 I suspect the intent is each differential pair within a bundle of differential pairs (as in a CAT6 cable). But I'm not sure this is relevant in general.

Similarly in 190.7.1.2, 190.7.1.4.1, 190.7.1.4.2

SuggestedRemedy

If there is no special meaning to "each", change "each link segment" to "a link segment". Otherwise, clarify what "each" refers to (within what set of segments?)
Apply in all instances of "each 100BASE-T1L link segment".

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Change "each 100BASE-T1L segment" to "the link segment" in 190.7.1.2, 190.7.1.4.1 and 190.7.1.4.2 (capitalize as appropriate).

Note - the language of "each" seems to have slipped over from multi-pair BASE-T to single-pair ethernet in clause 97, 149, and 165. Commenter may consider maintenance.

Cl **190** *SC* **190.7.** *P* **117** *L* **35** # 138

Ran, Adee Cisco Systems

Comment Type **TR** *Comment Status* **R** *Link Segment*

"The term "link segment" used in this clause refers to a single balanced pair of conductors operating in full duplex."
This reads like a length of cable, and connectors are not mentioned; but the next paragraph talks about "supports up to five in-line connectors". It is unclear whether a channel comprising several cables with connectors between them is considered one link segment or multiple link segments.

Also I think "operating in full duplex" is a property of the PHY (and the protocol used), not of the link segment.

SuggestedRemedy

Please specify more clearly what a link segment is. A figure showing the boundaries of the link segment in a connectorized channel would help.

Delete "operating in full duplex".

Response *Response Status* **W**

REJECT.

Link Segment is defined in 1.4 as "The point-to-point full-duplex medium connection between two and only two Medium Dependent Interfaces (MDIs)."

That would include any connectors, which are, of course, also conductors. The medium is capable of full-duplex conduction of signals. It doesn't have one-way amplifiers or directional couplers in it. This same language has been used successfully for over 20 years (including 1000BASE-T) and resulting in successful BASE-T PHY links without misunderstanding.

Cl **190** *SC* **190.11** *P* **129** *L* **1** # 167

Zimmerman, George CME Consulting/ADI,APLgp,CSCO,MRVL,Onsmi,Son

Comment Type **ER** *Comment Status* **A** *PICS*

PICS are needed for clause 190

SuggestedRemedy

Add PICS per contribution zimmerman_PICS_3dg_20250901.pdf with editorial license to align with other resolved comments.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Note, the file is zimmerman_PICS_3dg_20250901.xlsx. Editorial license to adjust PICS per comment resolution and changes in text.

Cl **190** *SC* **190.7.2.1** *P* **122** *L* **8** # 168

Zimmerman, George CME Consulting/ADI,APLgp,CSCO,MRVL,Onsmi,Son

Comment Type **TR** *Comment Status* **A** *Link Segment*

The requirement that the link segment meet the alien NEXT is missing.

SuggestedRemedy

Replace "PSANEXT loss is determined by summing the power of the individual pair-to-pair differential alien NEXT loss values over the frequency range 0.1 MHz to 60 MHz as follows in Equation (190¹4)." with
text below, adapted from 146.7.2.1
"PSANEXT loss is determined by summing the power of the individual pair-to-pair differential alien NEXT loss values over the frequency range 0.1 MHz to 60 MHz as follows in Equation (190¹XX)."
(insert new equation 190-XX, identical to Equation 146-13)
"where the function AN(f)j,N represents the magnitude (expressed in dB) of the alien NEXT loss at frequency
f of the disturbing 100BASE-T1L link segment j (1 to m) for the disturbed 10BASE-T1L link segment N.
The power sum ANEXT loss between a disturbed 100BASE-T1L link segment and other disturbing
100BASE-T1L link segments shall meet the values determined using Equation (190¹17) or 60 dB, whichever
is less."
(note to editor, Equation 190-17 above refers to the current numbering of the equation at P122 L13 - it will obviously be renumbered)

Add new PICS item to Link Segment, "Power sum ANEXT loss between a disturbed 100BASE-T1L link segment and the disturbing 100BASE-T1L link segment" | 190.7.2.1 | Meets equation 190-17 or 60 dB whichever is less | Yes[] No[]

Response *Response Status* **W**

ACCEPT IN PRINCIPLE. (Proposed Response below, changing start frequency to 1 MHz as per other comments)

Replace "PSANEXT loss is determined by summing the power of the individual pair-to-pair differential alien NEXT loss values over the frequency range 0.1 MHz to 60 MHz as follows in Equation (190-4)." with text below, adapted from 146.7.2.1"PSANEXT loss is determined by summing the power of the individual pair-to-pair differential alien NEXT loss values over the frequency range 1 MHz to 60 MHz as follows in Equation (190-XX)."(insert new equation 190-XX, identical to Equation 146-13)"where the function AN(f)j,N represents the magnitude (expressed in dB) of the alien NEXT loss at frequencyf of the disturbing 100BASE-T1L link segment j (1 to m) for the disturbed 10BASE-T1L link segment N.The power sum ANEXT loss between a disturbed 100BASE-T1L link segment and other disturbing100BASE-T1L link segments shall meet the values determined using Equation (190-17) or 60 dB, whichever is less."

(note to editor, Equation 190-17 above refers to the current numbering of the equation at P122 L13 - it will obviously be renumbered)

Add new PICS item to Link Segment, "Power sum ANEXT loss between a disturbed 100BASE-T1L link segment and the disturbing 100BASE-T1L link segment" | 190.7.2.1 | Meets equation 190-17 or 60 dB whichever is less | Yes[] No[]

Cl **190** *SC* **190.7.2.2** *P* **122** *L* **8** # 169

Zimmerman, George CME Consulting/ADI,APLgp,CSCO,MRVL,Onsmi,Son

Comment Type **TR** *Comment Status* **A** *Link Segment*

The requirement that the link segment meet the alien NEXT is missing.

SuggestedRemedy

Replace "as follows in Equation (190¹5)." at P123 L11 with
text below, adapted from 113.7.3.2.1
"as follows in Equation (190¹YY)."
(insert new equation 190-YY, identical to Equation 113-29, except the subscripted index "i" and the sum over index "i" is omitted)
"where AACRF(f)j, N is the magnitude in dB of the alien ACRF at frequency f of the disturbing link j (1 to m) into the 100BASE-T1L link segment N.
The PSAACRF between a disturbed duplex channel in a link segment and the disturbing duplex channels in other link segments shall meet the values determined using Equation (190¹18)."
(note to editor, Equation 190-18 above refers to the current numbering of the equation at P123 L14 - it will obviously be renumbered)

Add new PICS item to Link Segment, "Power sum PSAACRF loss between a disturbed 100BASE-T1L link segment and the disturbing 100BASE-T1L link segment" | 190.7.2.2 | Meets equation 190-18 or 60 dB whichever is less | Yes[] No[]

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Replace "as follows in Equation (190-5)." at P123 L11 with text below, adapted from 113.7.3.2.1

"as follows in Equation (190-YY)."
(insert new equation 190-YY, identical to Equation 113-29, except the subscripted index "i" and the sum over index "i" is omitted)
"where AACRF(f)j, N is the magnitude in dB of the alien ACRF at frequency f of the disturbing link j (1 to m) into the 100BASE-T1L link segment N.The PSAACRF between a disturbed duplex channel in a link segment and the disturbing duplex channels in other link segments shall meet the values determined using Equation (190-18)."

(note to editor, Equation 190-18 above refers to the current numbering of the equation at P123 L14 - it will obviously be renumbered)

Add new PICS item to Link Segment, "Power sum PSAACRF loss between a disturbed 100BASE-T1L link segment and the disturbing 100BASE-T1L link segment" | 190.7.2.2 | Meets equation 190-18 or 60 dB whichever is less | Yes[] No[]

Cl **190** *SC* **190.3.2.7** *P* **70** *L* **39** # 189

Zimmerman, George — CME Consulting/ADI,APLgp,CSCO,MRVL,Onsmi,Son

Comment Type **TR** *Comment Status* **A** *RS-FEC*

Somewhere along the way we seem to have missed stating the requirement for the RS-FEC encoder.

SuggestedRemedy

at P70 L39, change "When RS-FEC is enabled for the link, the group of 122 octets contained in the vector tx_group are encodedÓ" to "When RS-FEC is implemented and enabled for the link, the group of 122 octets contained in the vector tx_group shall be encoded..."
Add PICS item to PCS Transmit. Feature: RS-FEC encoder | Subclause 190.3.2.7 | Description: See 190.3.2.7 | Status: FEC:M | Support: Yes[] N/A []

Response *Response Status* **W**

ACCEPT.

Cl **98B** *SC* **98B.3** *P* **131** *L* **28** # 190

Zimmerman, George — CME Consulting/ADI,APLgp,CSCO,MRVL,Onsmi,Son

Comment Type **TR** *Comment Status* **A** *Reduced TX level*

There is missing information on how the transmit and receive level ability bit is resolved. This is accomplished by 98B.3.1 10BASE-T1L-specific bit assignments for 10BASE-T1L (which points to clause 146) I suggest we do the same here. [note - we may wish to have additional management & visibiltiy, but I've only covered minimal control here]

SuggestedRemedy

After Table 98B-1, add the following to the draft:
<Editing instruction> Insert 98B.3.2 following 98B.3.1 as follows: </end Ed Inst>
"98B.3.2 100BASE-T1L increased transmit/receive level ability
Bit A21 shall be set to one when the PHY has the ability to transmit and received at the increased transmit level, and set to zero when the PHY does not have the ability to transmit and receive the increased transmit level, or the ability is not advertised. When MDIO is implemented, the ability of the PHY can be determined by bit 1.2301.12 (see 45.2.1.236b). Note that setting bit A21 to zero is a way of explicitly requesting the lower transmit level. If bit A21 is one for both the PHY and the link partner, increased transmit level shall be selected. If bit A21 is zero for either the local PHY or the link partner, the lower transmit level is selected.÷

Insert to the end of item (e) in 190.6.1 (P117 L18), ¶(See 98B.3.2 for information on control and resolution)÷

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Accomodated by response to comment 244.

Cl **190** *SC* **190.5.4.1** *P* **112** *L* **32** # 191

Zimmerman, George — CME Consulting/ADI,APLgp,CSCO,MRVL,Onsmi,Son

Comment Type **TR** *Comment Status* **A** *Test Modes*

Unlike clause 146, we have made each test mode explicit to the transmit mode - hence the electrical specs are all written as though they only apply to the test modes. We need to link the auto-neg output to the transmitter level (we have descriptive text, but no requirement)

SuggestedRemedy

Insert new first sentence in 190.5.4.1 (P112 L32) ¶When not in test mode, the transmitter output voltage mode shall be as determined by the result of auto-negotiation as specified in 98B.3.2. See 190.6.1.÷
Add new PMA Electrical PICS Item PMAE 2 - Feature = "Transmitter level control" Subclause= 190.5.4.1 Value/Comment = "Determined by autonegotiation per 98B.3.2." Status M Support: Yes[] No[]

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.4.3** *P* **84** *L* **41** # 231

Murray, Brian — Analog Devices

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

In Table 190¹8 the 4B6B NND code-groups for PAM-2 training are listed. The entry [0010] = [-1 1 1 1 1 1] has a running disparity of +4. All other entries in the table have a running disparity of 0 or +2. The result of this is a difference between the running disparity bound during PAM-2 training (+/-7) and during data (+/-5).

There are 14 unused 6-tuples with running disparity of +2 (and their inverse) available to use as an alternative 6-tuples in the 4B6B table. Propose to use the 6-tuple [-1 1 -1 1 1 1] which has a running disparity of +2, is well behaved with no significant concern over data correlation.This keeps the range of running disparity the same in training and data.

SuggestedRemedy

Replace the 6-tuple [-1 1 1 1 1 1] for entry [0010] in Table 190-8 with the 6-tuple [-1 1 -1 1 1 1].

Response *Response Status* **W**

ACCEPT.

Cl **98B** *SC* **98B** *P* **131** *L* **1** # 255

Jones, Peter Cisco

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

Add Downshift/upshift to the draft as described in jones_3dg_august_2025_01.pdf

SuggestedRemedy

Make changes as per attached jones_3dg_august_2025_01.pdf pages 8 to 17.

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Make changes as per jones_3dg_september_2025_02.pdf pages 7 to 22 with editorial license.

Cl **190** *SC* **190.3.2.4** *P* **65** *L* **10** # 258

Jonsson, Ragnar Infineon

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

Table 190-2 does not have any case for "IDL DAT DAT"

SuggestedRemedy

Add code for "IDL DAT DAT" or add note if this is not a possible case.

Response *Response Status* **W**

REJECT.

!ERR can be DAT. Therefore, IDL DAT DAT is the same as IDL DAT !ERR - this is the first line in the table

Cl **190** *SC* **190.3.2.11** *P* **76** *L* **29** # 262

Jonsson, Ragnar Infineon

Comment Type **ER** *Comment Status* **A** *Editorial*

The meaning of "+" and ">" is not clear in the formulas in lines 29-34. The operands are sequences of -1, 0, and 1, and there is no obvious definition for "+" for this kind of operands.

SuggestedRemedy

Add explanation of what "+" and ">" mean in the context of this text

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Insert line between line 30 and 32: "where + indicates an integer addition."Replace line 32 with "-1 if ((DS_n > 0) AND (RD_{n-1} > 0 OR (RD_{n-1} = 0 AND Sg_n = 1)))

Meaning of ">" is clear in the context of a conditional.

Cl **190** *SC* **190.3.4.3** *P* **85** *L* **19** # 264

Jonsson, Ragnar Infineon

Comment Type **ER** *Comment Status* **A** *Editorial*

The meaning of "+", ">", and "x" is not clear in lines 19-34. See comments on page 76.

SuggestedRemedy

Add explanation of what "+", "x", and ">" mean in the context of this text

Response *Response Status* **W**

ACCEPT IN PRINCIPLE.

Insert line between line 19 and 21: "where + indicates an integer addition."Replace line 21 with "-1 if ((DS_n > 0) AND (RD_{n-1} > 0 OR (RD_{n-1} = 0 AND Sg_n = 1)))

Meaning of ">" is clear in the context of a conditional.

Cl **190** *SC* **190.3.6.1.2** *P* **89** *L* **49** # 274

Law, David HPE

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

The description of the rx_char variable in subclause 190.3.6.1.2 'Variables' says that it is a 'Structure representing one of the N characters that are output by the (8N)B/(8N + 1)B decoder' without defining which of the N characters. I believe that it is the reverse of the process described in subclause 190.3.2.4 'Block encoding' and involves unpacking the N values from an 8N + 1 bit block every 2N RX_CLK cycles.

I believe that this is covered in the penultimate paragraph of 190.3.3 'PCS Receive function' which says 'Every 2N RX_CLK cycles, an (8N+1)B block is received and is decoded to generate a list of N characters, each of which represents either a data octet or a control symbol. These characters are mapped one at a time into the rx_char structure, which is processed in accordance with Figure 190'13 to generate signals at the MII.'.

SuggestedRemedy

Suggest that since rx_coded, including the transmission order, is defined in subclause 190.3.2.3 'Notation conventions', the following is added to the description of the rx_char variable:

A (8N+1)B block represented by rx_coded<0:8N> (see 190.3.2.3) is received every 2N RX_CLK cycles. The 9-bit character represented by rx_char is extracted from rx_coded<0:8N> every 2 RX_CLK cycles. The Boolean value of rx_char is extracted from rx_coded<0>, the 8-bit numerical value of rx_char is extracted from rx_coded<8N + 1:8N + 9>.

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.6.1.2** *P* **90** *L* **30** # 277

Law, David HPE

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

The definition of rem_eee_low_snr says that it is a 'Variable set by the PMA Receive function ...'. Subclause 190.3.2.12 'EEE capability' says that 'The aux bit of every group of transmit bits, tx_group, is set to 1 when eee_low_snr is TRUE and is set to 0 otherwise.' and 'The variable rem_eee_low_snr indicates the value of the eee_low_snr variable communicated by the remote PHY.'. Since the PMA Receive function operates at a symbol level, generating rx_symb parameters communicated to the PCS through the PMA_UNITDATA.indication primitive, I don't believe the PMA Receive function can extract the aux bit. Instead, I believe that the rem_eee_low_snr variable is extracted by the PCS Receive function. In addition, it should be noted that rem_eee_low_snr is a Boolean variable.

SuggestedRemedy

Suggest that:

[1] The text 'Variable set by the PMA Receive function ...' should be changed to read 'Boolean variable set by the PCS Receive function ...'.
[2] The text 'See 190.3.2.12.' should be added to the end of the description of the rem_eee_low_snr variable.
[3] A line from the PCS RECEIVE block to the PCS TRANSMIT block labelled 'rem_eee_low_snr' should be added to Figure 190-3 'PCS reference diagram'.

Response *Response Status* **W**

ACCEPT.

Cl **190** *SC* **190.3.6.2** *P* **95** *L* **8** # 280

Law, David HPE

Comment Type **TR** *Comment Status* **A** *State Diagrams*

Figure 190'12 'EEE Transmit state diagram' uses the tx_lpi_alert_active variable, setting it TRUE in the SEND_ALERT state, then FALSE in the SEND_WAKE state. The viable tx_lpi_alert_active is not defined in 190.3.6.1.2 'Variables'. The variable tx_alert_active is defined in 190.3.6.1.2 'Variables' but is not used in any of the state diagrams.

Since the description of the tx_alert_active variable says it '... is set TRUE in the LPI transmit mode, when the PHY is transmitting alert signaling ...' and '... set FALSE otherwise.', this appears to be the same as the tx_lpi_alert_active variable used in Figure 190'12

SuggestedRemedy

Since the other LPI signalling related variables include _lpi_ (e.g., tx_lpi_active, tx_lpi_qr_active, rx_lpi_active, and rx_lpi_sleep), suggest that all instances of tx_alert_active be changed to read tx_lpi_alert_active.

Response *Response Status* **W**

ACCEPT.