Comment discussion: Clause 162

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TX Presets

Comment Summary

C#	Summary	Notes
103	Add control field bit to expand the # of presets to 7	
104	Define initial coefficient pre-set values	Presentation forthcoming
143	Specify values for transmit presets 2 & 3, and set tolerance to +/-0.025	Tolerance consistent with Table 162-9.
142	Allocate MDIO registers to hold coefficient values for OUT_OF_SYNC (instead of fixed values), with [0 0 0 1 0] default values (Preset 1)	Presentation forthcoming

These comments primarily pertain to Table 162-10

Full Comment Text

CommentID	CommenterName	Clause	Subclause	Page	Line	CommentType	Comment	SuggestedRemedy	Response
103	Healey, Adam	162	162.8.11	147	27	T	An expand set of predefined equalizer settings would be useful. The ability to select an initial condition closer to the target settings can be expected to improve robustness and decrease training time (due to a reduction in the number of iterative updates).	Add bit 11 of the control field (currently reserved) to "Initial condition request" to enable the definition of up to 7 presets with encoding 000 being "Individual coefficient control". The equalizer settings corresponding to each preset will be specified in 162.9.3.1.3 as already stated.	Accept
104	Healey, Adam	162	162.9.3.1.3	151	30	T	In Table 162-10, the coefficient initial conditions for presets 2 and onward are TBD.	Define the coefficient initial conditions (presentation with proposed values to be provided).	Accept in principle Pending review of the following presentation: http://www.ieee802.org/3/ck/public/20_07/healey_3ck_01_0720.pdf and resolution of C#143.
142	Ran, Adee	162	162.9.3.1.3	151	30	T	Cross-clause The OUT_OF_SYNC setting is the initial setting used when bringing up a link. It is likely not the optimal setting in many cases, and may not be a good starting point, which can cause long link-up times. In cases where the channel and link partner are known (typical in backplane or C2C), another initial setting may be preferable. To enable fast link up in such cases, it is proposed that the coefficients in OUT_OF_SYNC state be taken from MDIO registers instead of being fixed. The default values of the registers will create the current preset 1 settings [0 0 0 1 0], so that when the channel is unknown the behavior is unchanged from D1.2.	Two new sets of R/W registers should be allocated. Each set corresponds to the 5 coefficient values, one register each. "Initial coefficient vector" hold the values that will be set in OUT_OF_SYNC. "Current coefficient vector" holds the current coefficients. The encoding of these registers is implementation dependent, but is consistent between the sets. Presentation with more details is planned.	Accept in principle Pending presentation & Task force discussion. The referenced presentation is here. <presentation URL>
143	Ran, Adee	162	162.9.3.1.3	151	33	T	(cross-clause) Transmitter presets 2 and 3 are currently TBDs. It is proposed to use these presets as starting points for high-loss and low-loss channels. Preset 2 in the suggested remedy is based on COM simulations of 2 m cable + 2*110 mm host board, and 1.5 m cable + 2*55 host board, and several backplane channels (results are quite similar). Preset 3 for in the suggested remedy is aimed at short reach channels (more relevant for backplane/C2C), has minimum c(0) assumed in COM and no equalization, for channels that may need reduced swing. Even if equalization is required, this can be used as a convenient starting point of an optimization algorithm. Presets are based on the maximum allowed step size of 2.5% and should have a tolerance of one step. Clause 163 and Annex 120F do not have explicit settings but are going to be affected by this change.	Change the TBD values in the table as follows: Preset 2: -0.025, 0.075, -0.25, 0.65, 0 Preset 3: 0, 0, 0, 0.525, 0 Set tolerance of +/- 0.025 for all presets (including preset 1 and OUT_OF_SYNC).	Accept in principle For task force discussion.

C#103 Specifics

SuggestedRemedy
Add bit 11 of the control field (currently reserved) to "Initial condition request" to enable the definition of up to 7 presets with encoding 000 being "Individual coefficient control". The equalizer settings corresponding to each preset will be specified in 162.9.3.1.3 as already stated.

Bit			Select
13	12	11	
1	1	1	Reserved
1	1	0	Reserved
1	0	1	PRESET5
1	0	0	PRESET4
0	1	1	PRESET3
0	1	0	PRESET2
0	0	1	PRESET1
0	0	0	Individual coefficient control

Changes:

- New Exceptions added to 162.8.11
  - Table 136-9 amended as shown to the right
  - UPDATE_IC to apply new presets (slide 5 healey_3ck_01_0720.pdf)
- Modify an existing exception in 162.8.11
  - 136.8.11.2.1 Initial Condition request (add 3b select field to the exception)
- Expand Table 162-10 to cover additional presets.

C#104 and 143

- Update Table 162-10 to be

Coefficient update State	**ic_req**	**c(-3)**	**c(-2)**	**c(-1)**	**c(0)**	**c(1)**
OUT_OF_SYNC[a]	N/A	0	0	0	1	0
NEW_IC	PRESET1[a]	0	0	0	1	0
	PRESET2	0 ± 0.0125	0 ± 0.0125	0 ± 0.0125	0.50 ± 0.0125	0 ± 0.0125
	PRESET3	0 ± 0.0125	0 ± 0.0125	-0.075 ± 0.0125	0.75 ± 0.0125	0 ± 0.0125
	PRESET4	0 ± 0.0125	0.050 ± 0.0125	-0.200 ± 0.0125	0.75 ± 0.0125	0 ± 0.0125
	PRESET5	-0.025 ± 0.0125	0.075 ± 0.0125	-0.250 ± 0.0125	0.65 ± 0.0125	0 ± 0.0125

[a] PRESET1 is the reference for the calculation of the normalized coefficients of the transmit equalizer (see 162.9.3.1.1). As a result the normalized coefficients for PRESET1 and OUT_OF_SYNC do not include any tolerances.

- The setting of the Tx FIR in the OUT_OF_SYNC state in Figure 136-9 is scattered across the clause. However, the changes suggested in healey_3ck_01_0720.pdf would also require a modification to Figure 136-9 to maintain ic_sts = not_upd being sent while in this state.

C#142

- Suggests making the OUT_OF_SYNC TX FIR setting be programmable to assist in reducing link up time. Along with stating a presentation will be provided.

- No presentation has been provided
- Upon starting the PMD Control function process per 136.8.11.4.2 the TX FIR is set to PRESET1 (noEq full swing).
- PRESET1 allows for easy acquisition of training frame lock across a variety of channels. It's also a known starting point from which an adaptation algorithm can begin from.
- C#103 and 104 have added 2 new PRESET Tx FIR settings which adaptation algorithms can make use of to evaluate which one to begin micro-adjusting from. Note, there are currently 2 settings left as unused at this time.
- Depending upon the adaptation algorithm seeding the startup TX FIR with a known good setting may not reduce time to link up.