Title	IEEE P802.3dm Draft 2.0 PICS, per G. Zimmerman comments
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Abstract

PICS for all clauses of IEEE P802.3dm are proposed based on "shall" statements in 802.3dm D2.0 and comments to reconcile issues found during collation of PICS. Where there are issues that relate to a comment filed, it is noted in the Notes column. Expectation is to grant editorial license to align PICS with changes in requirements that arise from comment resolution.

Feature Description	Section Number	Requirement Sentence	PDF Page	Suggested PICS action	Notes
Clause 45	**Clause 45**				
BER Counter Reset	45.2.3.87.6	These bits **shall** be reset to all zeros when the MultiGBASE-T1 PCS status 2 register is read by the management function or upon execution of the MultiGBASE-T1 PCS reset.	46	RM205 - no change	
BER Counter Overflow	45.2.3.87.6	These bits **shall** be held at all ones in the case of overflow.	46	RM206 - no change	
Clause 46	**Clause 46**				
XGMII Functional Behavior	46.1	...if not implemented, a conforming implementation **shall** behave functionally as if the RS and XGMII were implemented.	47	Requirement is in base standard, missing PICS. Add to 46.6.3.1 G6 /t Functional Behavior /t 46.1 /t Behaves as if the RS and XGMII were implemented (even when not physically instantiated) /t M /t Yes []	
TX_CLK Frequency	46.3.1.1	The TX_CLK frequency **shall** be 1/64 × fMAC ± 100 ppm, where fMAC is the frequency (in Hz) corresponding to the MAC's nominal transmit bit rate.	48	Modify FS2 to match new wording	
RX_CLK Frequency	46.3.2.1	When the received data rate at the PHY is within tolerance, the RX_CLK frequency **shall** be 1/64 × fMAC ± 100 ppm, where fMAC is the frequency (in Hz) corresponding to the MAC's nominal receive bit rate.	48	Modify FS9 to match new wording	
Clause 98					
Auto-Negotiation Functions	98.2	Auto-Negotiation **shall** provide the following functions: a) Transmit b) Receive c) Half duplex d) Arbitration.	51	G1, no modification needed	
Auto-Negotiation Compliance	98.2	These functions **shall** comply with the state diagrams from Figure 98–7 through Figure 98–10.	51	SD1, no modification needed	
Auto-Negotiation Interface	98.2	The Auto-Negotiation functions **shall** interact with the technology-dependent PHYs through the Technology Dependent Interface.	51	NO change - no PICS in the base standard, unchanged text. Consider maintenance to remove "shall"	
Transmitter Peak Output (Diff)	98.2.1.1.4	...transmit differential signal at MDI **shall** be within range of 1 V ± 30% peak-to-peak.	52	Already in draft (98.6.3, 98.6.5)	
Transmitter Peak Output (Unb)	98.2.1.1.4	...transmit signal at MDI **shall** be within range of 0.5 V ± 30% peak-to-peak.	53	Already in draft (98.6.3, 98.6.5)	
Clause 191				Replicate 149.11.3 Major capabilities, omitting row for *EEE, Replicate 149.11.4.1 General. Add options to major capabilities: PHY_S, PHY_D, 2.5Gb/s, 5 Gb/s, and 10 Gb/s HS rate to Major capabilities (as O.1)	
Annex 98B	**Annex 98B**				
Priority Resolution Rule	98B.4	Table 98B–2 **shall** indicate the relative priorities of the technologies supported by the IEEE 802.3 Selector Field value.	250	No PICS - there are no PICS in 98B.4. Also, this is a statement about the table, it shouldn't be a shall.	Note - commented to delete shall
	Clause 191				
PCT_HS	**PCT (PCS Transmit)**				
PCS Reset Execution	191.3.2.1	The PCS Reset function **shall** be executed whenever one of the following conditions occur: a) Power on. b) The receipt of a request for reset...	76	Replicate cl 149 PCT1	
PCS Reset Recovery Time	191.3.2.1	The control and management interface **shall** be restored to operation within 10 ms from the setting of bit 3.2322.15.	76	Replicate cl 149 PCT2	
PCS 64B/65B Transmit state diagram	191.3.2.2	The PCS Transmit function shall conform to the PCS 64B/65B Transmit state diagram in Figure 191-18.		Replicate cl 149 PCT3	Note - comment to add this shall, changing the following 2 shalls as well

PCS Transmit (10 Gb/s)	191.3.2.2	The PCS Transmit function **shall** conform to the PCS 64B/65B Transmit state diagram in Figure 191–9 and to the PCS Transmit bit ordering in Figure 191–11 for 10 Gb/s.	76	Change text - error here, Figs 191-1 and 191-10 are the block diagrams. Missing shall to Fig 191-18 which is the 64B/65B diagram. See comment to correct. Add PICS duplicating clause 149 PCT4, referencing Figure 191-11 in Value/Comment, with Status 10Gb/s * PHY_S: M	Note - comment to fix this shall to only refer to figure 191-11.
PCS Transmit (2.5/5 Gb/s)	191.3.2.2	The PCS Transmit function **shall** conform to the PCS 64B/65B Transmit state diagram in Figure 191–10 and to the PCS Transmit bit ordering in Figure 191–12 for 5 Gb/s and 2.5 Gb/s.	76	Note error - Fig 191-10 is block diagram, Add PICS duplicating clause 149 PCT4 referencing Figure 191-12 in Value/Comment, with Status (2.5 Gb/s + 5 Gb/s) * PHY_S: M	Note - comment to fix this shall to only refer to figure 191-11.
SEND_Z Passing	191.3.2.2	If a PMA_TXMODE.indication message has the value SEND_Z, PCS Transmit **shall** pass a Z symbol at each symbol period to the PMA...	76	Duplicat Cl 149 PCT5	
SEND_T Sequence	191.3.2.2	If a PMA_TXMODE.indication message has the value SEND_T, PCS Transmit **shall** generate a sequence (Tn) defined in 191.3.4.1 to the PMA...	76	Duplicat Cl 149 PCT6	
SEND_N Encoding	191.3.2.2	...the PCS Transmit function **shall** use a 65B coding technique to generate, at each symbol period, code-groups that represent data or control.	76	Duplicat Cl 149 PCT7	
XGMII control code encoding	191.3.2.2.5	All XGMII control code values that do not appear in the Table 149-2 shall not be transmitted and shall be treated as an error if received.	78	Insert PIC: (PCT_HSx) Value: Only XGMII control code values that appear in the Table 149-2 are transmitted and any value not in Table 149-2 is treated as an error if received. M	Note - THIS SHALL IS ADDED BY A COMMENT (reference to cl149 already exists), Editor should consider it within license to break this editorially into 2 PICS - one in PCST (transmit) and one in PCSR (receive)
Idle control characters	191.3.2.2.7	/I/ insertion and deletion shall occur in groups of 4.	79	Insert PIC copying PCT9 from Cl149	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
Adding Idle control characters	191.3.2.2.7	/I/s shall not be added while data is being received	79	Insert PIC copying PCT10 from Cl149	Note - THIS SHALL IS ADDED BY COMMENT should this be in PCR? It is listed PCT in most clauses but is actually a requirement on the PCS receive
Deleting Idle control characters	191.3.2.2.7	When deleting /I/s, the first four characters after a /T/ shall not be deleted.	79	Insert PIC copying PCT11 from Cl149	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
Ordered set	191.3.2.2.11	Sequence ordered set deletion shall only occur when two consecutive sequence ordered sets have been received and shall delete only one of the two	80	Insert PIC copying PCT14 from Cl149	Note - THIS SHALL IS ADDED BY A COMMENT (reference to cl149 already exists), Editor should consider it within license to break this editorially into 2 PICS - one in PCST (transmit) and one in PCSR (receive)
RS-FEC Encoding (HS)	191.3.2.2.13	The RS-FEC encoding... **shall** generate the 34 10-bit parity symbols (340 bits total).	83	Insert PIC (PCT_HSx, based on Cl 149 PCT15) as follows: Value: Generates 34 10-bit parity symbols (340 bits total). /t PHY_S: M /t Yes [ ]	
Interleave set to depth setting	191.3.2.2.14	Interleaver depth set to value requested by link partner during Infofield exchange.	83	Insert PIC PCT16 from cl 149 with status PHY_S: M	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
Round-robin interleaving scheme	191.3.2.2.14	Figure 149-9	83	Insert PIC PCT17 from cl 149 with status PHY_S: M	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
RS-FEC superframe aggregation	191.3.2.2.14	aggregate L RS-FEC input frames into an interleaved RS-FEC superframe	83	Insert PIC PCT18 from cl 149 with status PHY_S: M	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
PHY_S Scrambler Polynomial	191.3.2.2.19	The PHY_S PCS Transmit process **shall** employ Equation (191–2) as PHY_S transmitter side-stream scrambler generator polynomial.	84	Insert PIC: (PCT_HSx) Value: Equation 191-2 /t PHY_S: M	

PHY_S Scrambler Seed Value	191.3.2.2.19	In no case shall the scrambler state be initialized to all zeros.	84	Insert PIC: (PCT_HSx) Feature: Never initialized to all zeros. /t PHY_S: M	
PHY_S Scrambler Continuity	191.3.2.2.19	This scrambler, once started during PMA TRAINING STATE, **shall** continue to run uninterrupted during transition from SEND_T to SEND_N.	84	Insert PIC: (PCT_HSx) Value: Runs continuously once started during PMA TRAINING state. /t PHY_S: M	
Gray mapping for PAM4 encoding	191.3.2.2.20	For 10 Gb/s transmit rate, bit pairs shall be gray-mapped for PAM4 encoding as specified in 149.3.2.2.19.	84	Insert PICS PCT19 from cl 149 with status 10 Gb/s * PHY_S: M	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
	191.3.2.2.21	For 10 Gb/s transmit rate, gray-coded PAM4 symbols shall be precoded as specified in 149.3.2.2.20	84	Insert PICS PCT20 from cl 149 with status 10 Gb/s * PHY_S: M	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
	191.3.2.2.22	For 10 Gb/s transmit rate, precoded PAM4 symbols shall be encoded as specified in 149.3.2.2.21.	84	Insert PICS PCT21 from cl 149 with status 10 Gb/s * PHY_S: M	Note - THIS SHALL IS ADDED BY COMMENT. this is status "M" as in cl 149
PAM2 Level Encoding	191.3.2.2.23	The PCS Transmit process **shall** encode each output symbol to one of two PAM2 levels as specified in this subclause.	84	Insert PIC: (PCT_HSx) Value: Encoded as in 191.3.2.2.23 /t M	
PCR_HS					
PCS 64B/65B Receive state diagram (HS)	191.3.2.3	The PCS Receive function **shall** conform to the PCS 64B/65B Receive state diagram in Figure 191–19...	84	Insert PIC:PCR_HS1 (from Cl 149 PCR1) Value: Figure 191-19 /t PHY_D: M	
PCS receive bit ordering (HS)	191.3.2.3	The PCS Receive function **shall** conform to ...the PCS Receive bit ordering Figure 191-13 for 10 Gb/s		Insert PIC:PCR_HS2 (from Cl 149 PCR2) Value: Figure 191-13 /t 10 Gb/s * PHY_D: M	Note - editorially split up one sentence with 3 shalls
PCS receive bit ordering (HS)	191.3.2.3	The PCS Receive function **shall** conform to ...the PCS Receive bit ordering Figure 191-14 for 2.5Gb/s and 5 Gb/s		Insert PIC:PCR_HS3 (from Cl 149 PCR2) Value: Figure 191-14 /t (2.5 Gb/s * 5 Gb/s) * PHY_D: M	Note - editorially split up one sentence with 3 shalls
PAM4 Concatenation (10G)	191.3.2.3.1	...a 100M+10GBASE-T1/V1 PHY's HS_RX PCS **shall** form a PAM4 stream from the PMA_UNITDATA.indication primitive by concatenating requests...	85	Insert PIC:PCR_HS4 (from Cl149 PCR3) Value: forms PAM4 stream from PMA_UNITDATA.indication primitives. /t PHY_D * (10 Gb/s): M	
PAM2 Concatenation (2.5/5G)	191.3.2.3.1	...a 100M+2.5GBASE-T1/V1 PHY and a 100M+5GBASE-T1/V1 PHY's HS_RX PCS **shall** form a PAM2 stream from the PMA_UNITDATA.indication primitive...	85	Insert PIC:PCR_HS5 (from Cl 149 PCR3) Value: forms PAM2 stream from PMA_UNITDATA.indication primitives. /t PHY_D * (2.5 Gb/s + 5 Gb/s): M	
PHY_D Descrambler	191.3.2.3.2	PHY_D **shall** employ the receiver descrambler generator polynomial defined by Equation (191–2).	87	Insert PIC:PCR_HS6 (from Cl 149 PCR4,5) Value: Equation 191-2 /t PHY_D:M	
RS-FEC Integrity Check (HS)	191.3.2.3.3	The PCS Receive function **shall** check the integrity of the RS-FEC parity bits defined in 191.3.2.2.13.	86	Insert PIC:PCR_HS7 (from Cl 149 PCR6) Value: Checks RS-FEC parity per 191.3.2.2.13 PHY_D: M	
Decrambler Sync (HS)	191.3.4.2	The PHY **shall** acquire PCS descrambler state synchronization to the PAM2 training sequence and report success through scr_status.	87	Insert PIC: (PCR_HSx) Value: acquires descrambler synchronization and reports via scr_status PHY_D: M	
DECODE Function Rule	191.3.5.1.4	The DECODE function **shall** decode the block based on code specified in 149.3.2.2.2.	89	No PICS - Comment submitted to delete this duplicate shall.	
ENCODE Function Rule	191.3.5.1.4	The ENCODE function **shall** encode the block as specified in 191.3.2.2.2.	89	No PICS - Comment submitted to delete this duplicate shall.	
RFER Monitor	191.3.5.2	The PCS **shall** perform the functions of RFER monitor, Transmit, and Receive as specified in these state diagrams.	91	Insert PIC: (PCR_HSx) Feature: RFER Monitor Value: Conforms to Figure 191-17. Status: M Support: Yes[]	Note - comment changes this to just refer to the RFER monitor - others are in other PICS
TPG Test Pattern Generator (HS)					
Transmit PCS operating in test-pattern mode.	191.3.3	Transmit continuously according to the appropriate rate's transmit bit ordering diagram (Figure 191-11 or Figure 191-12), with the input to the RS-FEC encoder set to zero and the initial condition of the scrambler set to any non-zero value.	86	Insert PICS TPG1 from cl 149 as PICS TPG_HS1	Note - this PICS reflects another comment fixing the text

Receive PCS operating in test-pattern mode.	191.3.3	Receive continuously according to the appropriate rate's transmit bit ordering diagram (Figure 191-11 or Figure 191-12).	86	Replicate PICS TPG_HS2 from cl 149 as PICS TPG_HS2	Note - this PICS reflects another comment fixing the text
OAM					
OAM Behavior	191.3.7	When OAM is implemented, behavior shall be as defined in 149.3.9, including state diagrams in Figure 149-24 and Figure 149-25.	95	duplicate cl 149 PICS OAM1 Feature: OAM Behavior Subclause: 191.3.7, 149.3.4 Value/Comment: Conforms to Figure 149–24 and Figure 149–25 Status: OAM: M Support: Yes[] N/A[]	Note - comment brings in this shall
OAM Functions	191.3.7.2	"MultiG+100MBASE-T1/V1 OAM functions shall be as defined for a MultiGBASE-T1 PHY in 149.3.9.2 with the exception that the MultiG+100MBASE-T1/V1 OAM frame structure, PHY health, and PHY health indicator are defined in 191.3.7.2.1, 191.3.7.2.2, and 191.3.7.2.3, respectively."	96	Replicatee Cl 149 PICS OAM5, 6, 7, 9, and 11. (as OAM2,3,4,5,and 6) Insert new PICS: OAM7 Feature: OAM frame structure Subclause: 191.3.7.2 Value/Comment: As defined in 191.3.7.2.1 Status: OAM: M Support: Yes[] N/A[] Insert new PICS: OAM8 Feature: PHY health Subclause: 191.3.7.2 Value/Comment: As defined in 191.3.7.2.2 Status: OAM: M Support: Yes[] N/A[] Insert new PICS: OAM9 Feature: OAM frame structure Subclause: 191.3.7.2 Value/Comment: As defined in 191.3.7.2.3 Status: OAM: M Support: Yes[] N/A[]	Note - comment adds this missing shall
OAM Insertion (Interleaved)	191.3.7.2.1	...the first symbol (OAM<0>) **shall** be inserted in the first RS frame in the superframe...	96	No PICS - duplicative of the above	Note - comment changes requirement to be general on 191.3.7.2
OAM Disabled State	191.3.7.2.1	If OAM is not implemented then the 10-bit OAM field **shall** be set to all 0's.	96	No PICS - duplicative of the above	Note - comment changes requirement to be general on 191.3.7.2
PCT_LS					
PCS Reset (LS)	191.4.2.1	The low data rate PCS reset function **shall** be as specified in 191.3.2.1.	97	No PICS - there is only one PCS reset and there is already a PICS for it	Note - comments delete the shall and make this clear
PCS Transmit (LS)	191.4.2.2	The PCS Transmit function **shall** comply with the PCS 64B/65B Transmit state diagram in Figure 191–18 and to the PCS Transmit bit ordering in Figure 191–21.	97	PICS PCT_LS1 Feature PCS Transmit (LS) Subclause 191.4.2.2 Value/Comment Complies with Figure 191-18 and Figure 191-21. Status: PHY_D: M Support: Yes[] N/A[]	
SEND_Z Passing (LS)	191.4.2.2	If a PMA_TXMODE.indication message has the value SEND_Z, PCS Transmit **shall** pass a Z symbol at each symbol period to the PMA...	101	Replicate Cl 149 PCT5	
SEND_T Sequence (LS)	191.4.2.2	If a PMA_TXMODE.indication message has the value SEND_T, PCS Transmit **shall** generate a sequence (Sn) defined in 191.4.4 to the PMA...	101	Replicate Cl 149 PCT6	

SEND_N Encoding (LS)	191.4.2.2	...the PCS Transmit function **shall** use a 65B coding technique to generate, at each symbol period, code-groups that represent data or control.	101	Replicate Cl 149 PCT7	
Block Structure (LS)	191.4.2.2.4	The low data rate block structure **shall** be as specified in 149.3.2.2.4.	99	No PICS - no shalls in 149.3.2.2.4	Note - comment to delete shall here
XGMII control code encoding	191.4.2.2.5	All XGMII control code values that do not appear in the Table 149-2 shall not be transmitted and shall be treated as an error if received.	100	Insert PIC: (PCT_LSx) Value: Only XGMII control code values that appear in the Table 149-2 are transmitted and any value not in Table 149-2 is treated as an error if received. M	
Idle control characters	191.4.2.2.7	/I/ insertion and deletion shall occur in groups of 4.	100	Insert PIC copying PCT9 from Cl149	
Adding Idle control characters	191.4.2.2.7	/I/s shall not be added while data is being received	100	Insert PIC copying PCT10 from Cl149	
Deleting Idle control characters	191.4.2.2.7	When deleting /I/s, the first four characters after a /T/ shall not be deleted.	100	Insert PIC copying PCT11 from Cl149	
Start (/S/)	191.4.2.2.8	The low data rate ordered sets shall be as specified in 149.3.2.2.9.	100	delete 'shall', no PICS: there are no requirements in 149.3.2.2.9	Note - shall is removed by a comment.
Terminate (/S/)	191.4.2.2.9	The low data rate ordered sets shall be as specified in 149.3.2.2.10.	100	delete 'shall', no PICS: there are no requirements in 149.3.2.2.10	Note - shall is removed by a comment.
Ordered set	191.4.2.2.10	Sequence ordered set deletion shall only occur when two consecutive sequence ordered sets have been received and shall delete only one of the two	100	Insert PIC copying PCT14 from Cl149	
Error (/E/)	191.4.2.2.11	The low data rate ordered sets shall be as specified in 149.3.2.2.12.	101	delete 'shall', no PICS: there are no requirements in 149.3.2.2.12	Note - shall is removed by a comment.
RS-FEC Encoding (LS)	191.4.2.2.13	The RS-FEC encoding... **shall** generate the four 6-bit parity symbols (24 bits total).	102	Insert PIC (PCT_LSx, based on Cl 149 PCT15) as follows: Value: Generates 6 8-bit parity symbols (24 bits total). /t PHY_D: M /t Yes [ ]	
PHY_D Scrambler (LS)	191.4.2.2.16	The PHY_D PCS Transmit process **shall** employ Equation (191–8) as PHY_D transmitter side-stream scrambler generator polynomial.	104	Insert PIC: (PCT_LSx) Value: Equation 191-8 /t PHY_D: M	
PHY_D Scrambler Seed Value	191.4.2.2.16	In no case shall the scrambler state be initialized to all zeros.	104	Insert PIC: (PCT_LSx) Feature: Never initialized to all zeros. /t PHY_D: M	
PHY_D Scrambler Continuity	191.4.2.2.16	This scrambler, once started during PMA TRAINING STATE, **shall** continue to run uninterrupted during transition from SEND_T to SEND_N.	104	Insert PIC: (PCT_LSx) Value: Runs continuously once started during PMA TRAINING state. /t PHY_D: M	
PCR_LS					
PCS Receive (LS)	191.4.2.3	The PCS Receive function **shall** conform to the PCS 64B/65B Receive state diagram in Figure 191–19...	104	Insert PIC:PCR_LS1 (from Cl 149 PCR1) Value: Figure 191-19 /t PHY_S: M	
		The PCS Receive function **shall** conform to the... PCS Receive bit orderingin Figure 191–22...	104	Insert PIC:PCR_LS2 (from Cl 149 PCR2) Value: Figure 191-22 PHY_S: M	
Bit Stream Formation (LS)	191.4.2.3.1	...the receiving PCS **shall** form a bit stream from the PMA_UNITDATA.indication primitive by concatenating requests in order from Bit0 to Bit299.	105	Insert PIC:PCR_LS3 (from Cl149 PCR3) Value: forms bit stream from PMA_UNITDATA.indication primitives. /t PHY_S: M	
PHY_S Descrambler (LS)	191.4.2.3.2	PHY_S **shall** employ the receiver descrambler generator polynomial defined by Equation (191–8).	105	Insert PIC:PCR_LS4 (from Cl 149 PCR4,5) Value: Equation 191-8 /t PHY_S:M	
RS-FEC Integrity Check (LS)	191.4.2.3.3	The PCS Receive function **shall** check the integrity of the RS-FEC parity bits defined in 191.4.2.2.14.	105	Insert PIC:PCR_LS5 (from Cl 149 PCR6) Value: Checks RS-FEC parity per 191.4.2.2.14 PHY_S: M	
TPG_LS					
Test-Pattern Mode (TX)	191.4.3	...it **shall** transmit continuously by setting zero input and any non-zero initial condition to the PCS scrambler.	106	Insert PICS TPG1 from cl 149 as PICS TPG_LS1	
Test-Pattern Mode (RX)	191.4.3	...it **shall** receive continuously as illustrated in Figure 191–22.	106	Replicate PICS TPG_HS2 from cl 149 as PICS TPG_LS2	
PMA Training Frame_LS					

Infofield Reserved Bits	191.4.4	Reserved bits in the Infofield... **shall** be set to zero on transmit and ignored when received...	106	New PICS (TF_LS1) Value/Comment: set to zero Status: PHY_D: M Support: Yes[]	
OAM Field	191.4.4	Zeros **shall** be transmitted in the OAM field of the training frame.	106	New PICS (TF_LS2) Value/Comment: Zeros in the OAM field of the training frame Status: PHY_D: M Support: Yes[]	
Reserved bits (LS)	191.4.4	Reserved bits shall be transmitted as in 191.5.2.4.1	106	New PICS (TF_LS3) Value/Comment: As in 191.5.2.4.1 Status: PHY_D: M Support: Yes[]	
Scrambler Sync (LS)	191.4.4.1	The PHY **shall** acquire PCS descrambler state synchronization to the DME training sequence and report success through scr_status.	107	Insert PIC: (TF_LS4) Value: acquires descrambler synchronization and reports via scr_status PHY_S: M	
PMA					
PR					
PMA Reset Execution	191.5.2.1	The PMA Reset function **shall** be executed whenever one of the two following conditions occur...	108	Duplicate PICS PR1 from Cl149, referencing subclause 191.5.2.1	
PMAT					(note - in clause 149 these have just the text in them, no feature names)
PMA Transmit Operation	191.5.2.2	When the PHY Control state diagram (Figure 191–31) is not in the DISABLE_TRANSMITTER state, PMA Transmit **shall** continuously transmit pulses modulated by the symbols given by tx_symb onto the MDI.	109	Insert PICS PMAT1 Feature: PMA Transmit Operation Subclause: 191.5.2.2 Value/Comment: When not in DISABLE_TRANSMITTER state, continuously transmit pulses modulated by symbols given by tx_symb onto the MDI. Status: M Support: Yes[]	
Tx_symb during Link Synchronization	191.5.2.2	During Link Synchronization, when sync_link_control = DISABLE and Auto-Negotiation is either not enabled or is not implemented, the sync_tx_symb output by the PHY Link Synchronization function shall be used in place of tx_symb as the data source for PMA Transmit.	109	Insert PICS PMAT2 Feature: Tx_symb during Link Synchronization Subclause: 191.5.2.2 Value/Comment: When sync_link_control = DISABLE and Auto-Negotiation is either not implemented or not enabled, use sync_tx_symb in place of tx_symb Status: M Support: Yes[]	(note - status of this (AN:M) is in error in clause 149 - this feature is required when autoneg is not present, AND, when it is present (because autoneg can be disabled), hence status M)
PMA Signal Compliance	191.5.2.2	The signals generated by PMA Transmit **shall** comply with the electrical specifications given in 191.6.2 for HS_TX and in 191.7.2 for LS_TX.	109	Insert PICS PMAT3 Subclause 191.5.2.2 Value/Comment: HS_TX to comply with electrical specifications for 191.6.2 Status: PHY_S: M Support: Yes[] N/A[] Insert PICS PMAT4 Subclause 191.5.2.2 Value/Comment: LS_TX to comply with electrical specifications in 191.7.2 Status: PHY_D: M Support: Yes[] N/A[]	

LEADER Clock Source	191.5.2.2	When the PMA_CONFIG.indication parameter config is LEADER, the PMA Transmit function **shall** source TX_TCLK from a local clock source...	109	Insert PICS PMAT5 Feature: Leader clock source Subclause: 191.5.2.2 Value/Comment: Source TX_TCLK from a local clock source Status: M Support: Yes[]	
Leader-Follower Relationship	191.5.2.2	The LEADER-FOLLOWER relationship **shall** include loop timing.	109	Insert PICS PMAT6 Feature: Leader follower relationship Subclause: 191.5.2.2 Value/Comment: Include loop timing Status: M Support: Yes[]	
FOLLOWER Clock Source	191.5.2.2	If... config is FOLLOWER, the PMA Transmit function **shall** source TX_TCLK from the tx_symbol_clock of 191.5.2.9...	109	Insert PICS PMAT7 Feature: Follower clock source Subclause: 191.5.2.2 Value/Comment: Source TX_TCLK from the tx_symbol_clock of 191.5.2.9 Status: M Support: Yes[]	
PHY_D Role Support	191.5.2.2	Each PHY_D **shall** support operation as LEADER, and may support operation as FOLLOWER.	109	Insert PICS PMAT8 Feature: Support operation as Leader Subclause: 191.5.2.2 Value/Comment: PHY_D always supports Leader, PHY_S optionally supports Leader Status: PHY_D: M PHY_S:O Support: Yes[] N/A[]	note - editorially combined and rewrote these to be leader & follower support
PHY_S Role Support	191.5.2.2	Each PHY_S **shall** support operation as FOLLOWER, and may support operation as LEADER.	109	Insert PICS PMAT9 Feature: Support operation as Leader Subclause: 191.5.2.2 Value/Comment: PHY_S always supports Follower, PHY_D optionally supports Follower Status: PHY_D: O PHY_S:M Support: Yes[] N/A[]	note - editorially combined and rewrote these to be leader & follower support
PMA Transmit Fault	191.5.2.2	If the MDIO interface is implemented, then this function shall be mapped to the transmit fault bit as specified in 45.2.1.7.4.	109	Replicate PMAT8 from clause 149 as PMAT10 referencing 191.5.2.2 Feature: PMA transmit fault function Subclause: 191.5.2.2 Value/Comment: Mapped to the transmit fault bit as specified in 45.2.1.7.4 Status: MDIO:M Support: Yes[] N/A[]	
DME Encoding	191.5.2.2	When tx_mode is not SEND_Z, the PHY_D PMA Transmit function, and the PHY_S PMA Transmit function in link synchronization, shall encode binary values using Differential Manchester Encoding (DME) according to the rules in 191.5.2.2.1.	109	Insert PICS PMAT9 Feature: DME Encoding Subclause: 191.5.2.2 Value/Comment: Encoding per 191.5.2.2.1 when not in SEND_Z, used by PHY_D. Used by PHY_S in link synchronization Status: M Support: Yes[] N/A[]	note - this shall is changed substantially by a comment as it only applies normally to PHY_D and only applies to PHY_S in link sync. The PICS is rewritten to align with the comment text
DME Encoding Rules	191.5.2.2.1	**shall** be encoded using Differential Manchester Encoding (DME) as defined by the following rules.	109	Insert PICS PMAT9 Feature: DME encoding rules Subclause: 191.5.2.2.1 Value/Comment: See 191.5.2.2.1 Status: M Support: Yes[] N/A[]	note - this shall is pretty much as in the text, regardless of the comment.
PMAR					

PMA Receive Quality	191.5.2.3	The quality of these symbols **shall** allow RFER of less than 2 × 10-10 after RS-FEC decoding...	110	Insert PICS PMAR1 replicating cl 149 PICS PMAR1 Feature: Quality of received symbols Subclause 191.5.2.3 Value/Comment: RFER of less than 2 x 10^-10 after RS-FEC decoding, over a channel meeting the requirements of 191.9 for -T1 and of 191.10 for -V1. Status: M Support: Yes[]	
PMA Receive Fault	191.5.2.3	If the MDIO interface is implemented, then this function shall contribute to the receive fault bit specified in 45.2.1.7.5 and 45.2.1.250.7.	110	Insert PICS PMAR2 (note that PMAR2 in cl 149 has a very different form from the text & the transmit fault PICS) Feature: PMA receive fault function Subclause: 191.5.2.3 Value/Comment: Mapped to the receive fault bit as specified in 45.2.1.7.5 and 45.2.1.250.7 Status: MDIO:M Support: Yes[] N/A[]	
PCF_HS (PHY Control Function high speed					
PHY Control Compliance	191.5.2.4	PHY Control **shall** comply with the state diagram in Figure 191–31.	110	NO PICS - triplicate shall - see PICS for 191.5.2.6	Note - shall commented out.
Infofield Fields (HS)	191.5.2.4	The 12-octet Infofield **shall** include the fields in 191.5.2.4.2 through 191.5.2.4.7...	111	Insert PICS PCF_HS1 replicating cl 149 PICS PCF2 Feature: Infofield fields (HS) Subclause 191.5.2.4 Value/Comment: Include the fields of 191.5.2.4.2 through 191.5.2.4.7 Status: M Support: Yes[] Status: M Support: Yes[]	Note - this is applicable to both PHY_S and PHY_D because PHY_D must understand the infofields
Infofield Repetition (10/5G)	191.5.2.4	For 10 Gb/s and 5 Gb/s, Infofield **shall** be transmitted at least 256 times with each change to octets 7 to 10.	111	Insert PICS PCF_HS2 Feature: Infofield Repetition (10 G/5G) Subclause: 191.5.2.4 Value/Comment: Transmitted at least 256 times with each change to octets 7 to 10 Status: PHY_S * (10 Gb/s + 5 Gb/s): M Support: Yes[] N/A[]	Note this is only PHY_S:M because it relates JUST to transmission, others need to be interpreted by the receiver so they are both PHY_S and PHY_D
Infofield Repetition (2.5G)	191.5.2.4	For 2.5 Gb/s, Infofield **shall** be transmitted at least 128 times with each change to octets 7 to 10.	111	Insert PICS PCF_HS3 Feature: Infofield Repetition (2.5G) Subclause: 191.5.2.4 Value/Comment: Transmitted at least 128 times with each change to octets 7 to 10 Status: PHY_S * (2.5Gb/s): M Support: Yes[] N/A[]	Note this is only PHY_S:M because it relates JUST to transmission, others need to be interpreted by the receiver so they are both PHY_S and PHY_D
Reserved infofield bits	191.5.2.4.1	represent unused values and shall be set to zero on transmit and ignored when received	111	Insert PICS PCF_HS4 from Cl 149 PCF4 Feature: Infofield reserved bits Subclause 191.5.2.4.1 Value/Comment: set to zero on transmit and ignored when received by the link partner Status: M Support: Yes[]	
Infofield SFD (HS)	191.5.2.4.2	The start of Frame Delimiter... **shall** use the hexadecimal value 0xBBA700.	111	Insert PICS PCF_HS5 from Cl 149 PCF5 Feature: Start of Frame Delimiter hexadecimal value Subclause: 191.5.2.4.2 Value/Comment: 0xBBA700 Status: M Support: Yes[]	

PMA State Communication	191.5.2.4.4	The two state-indicator bits PMA_state<7:6> **shall** communicate the state of the transmitting transceiver to the link partner.	112	Insert PICS PCF_HS6 from Cl 149 PCF6 Feature: PMA_state<7:6> Subclause: 191.5.2.4.4 Value/Comment: Communicate the state of the transmitting transceiver to the link partner Status: M Support: Yes[] Status: M Support: Yes[]	
Valid Infofield Message Fields	191.5.2.4.4	As shown in Tables 191-5 and 191-6. Any other value shall not be transmitted and shall be ignored at the receiver.	112	Insert PICS PCF_HS7 from Cl 149 PCF7 Feature: Valid Infofield message fields Subclause: 191.5.2.4.4 Value/Comment: only values in Tables 191-5 and 191-6 are transmitted, and any other value is ignored by the receiver Status: M Support: Yes[]	
Initial Message Setting	191.5.2.4.4	The Message Field setting for the first transmitted PMA frame **shall** be the first row of Table 191–5 for the LEADER...	112	Insert PICS PCF_HS8 from Cl 149 PCF8 Feature: Initial message setting Subclause: 191.5.2.4.4 Value/Comment: first row of Table 191-5 for the Leader and first row of Table 191-6 for the follower Status: M Support: Yes[]	
Message Field Transition	191.5.2.4.4	...the next Message Field setting **shall** be the same Message Field setting or the Message Field setting corresponding to a row below the current setting.	112	Insert PICS PCF_HS9 from Cl 149 PCF9 Feature: Message field transition Subclause: 191.5.2.4.4 Value/Comment: Subsequent settings are either the same setting or the next row of Table 191-5 (leader) or 191-6 (follower). Status: M Support: Yes[]	
OAM Enablement (HS)	191.5.2.4.5	The optional MultiGBASE-T1 OAM capability **shall** be enabled only if both PHYs set the capability bit OAMen = 1.	112	Insert PICS PCF_HS10 from Cl 149 PCF12 Feature: OAM enablement (HS) Subclause: 191.5.2.4.5 Value/Comment: OAM enabled only if both PHYs set OAMen = 1 Status: M Support: Yes[]	
Capability Validity	191.5.2.4.5	The capability bit values **shall** be considered as valid only when the loc_rcvr_status bit is 1.	113	Insert PICS PCF_HS11 from Cl 149 PCF13 Feature: Capability validity Subclause: 191.5.2.4.5 Value/Comment: PHY capability bits are only valid when loc_rcvr_status = 1. Status: M Support: Yes[]	
Reserved portion of Infofield	191.5.2.4.5	Remaining bits shall be reserved and set to 0.	113	Insert PICS PCF_HS12 from Cl 149 PCF14 Feature: Reserved portion of infofield Subclause: 191.5.2.4.5 Value/Comment: Remaining bits are reserved and are set to zero per 191.5.2.4.1 Status: M Support: Yes[]	note - rewritten shall in comment to not be duplicative

Data Switch Alignment	191.5.2.4.6	DataSwPFC24 **shall** be set to an integer multiple of 16.	113	Insert PICS PCF_HS13 from Cl 149 PCF15 Feature: DataSwPFC24 Subclause: 191.5.2.4.6 Value/Comment: Set to an integer multiple of 16. Status: M Support: Yes[]	
Countdown Range (2.5G)	191.5.2.4.6	For 2.5 Gb/s, DataSwPFC24 **shall** be a minimum of 2033 and a maximum of 2385 from the current PFC24 value.	113	Insert PICS PCF_HS14 from Cl 149 PCF16 Feature: DataSwPFC24 for countdown value for 2.5 Gb/s Subclause: 191.5.2.4.6 Value/Comment: Minimum of 2033 and a maximum of 2385 from the current PFC24 value Status: (PHY_S * 2.5 Gb/s): M Support: Yes[]	
Countdown Range (10/5G)	191.5.2.4.6	minimum of 4071 and a maximum of 4785 from the current PFC24 value.	113	Insert PICS PCF_HS15 from Cl 149 PCF16 Feature: DataSwPFC24 for countdown value for 5 Gb/s and 10 Gb/s Subclause: 191.5.2.4.6 Value/Comment: Minimum of 2033 and a maximum of 2385 from the current PFC24 value Status: (PHY_S * (5 Gb/s + 10 Gb/s): M Support: Yes[]	
Infofield CRC16	191.5.2.4.7	CRC16 (2 octets) **shall** implement the CRC16 polynomial (x + 1)(x15 + x + 1)...	113	Insert PICS PCF_HS16 from Cl 149 PCF17 Feature: CRC16 polynomial Subclause: 191.5.2.4.7 Value/Comment: (x + 1) (x^15 + x + 1) of the previous 7 octets Status: M Support: Yes[]	
CRC	191.5.2.4.7	The CRC16 shall produce the same result as the implementation shown in Figure 191-29.	113	Insert PICS PCF_HS17 from Cl 149 PCF18 Feature: CRC16 Subclause: 191.5.2.4.7 Value/Comment: Figure 191-29 Status: M Support: Yes[]	
CRC Initialization	191.5.2.4.7	In Figure 191–29 the 16 delay elements S0,..., S15, **shall** be initialized to zero.	113	Insert PICS PCF_HS18 from Cl 149 PCF19 Feature: CRC16 delay elements Subclause: 191.5.2.4.7 Value/Comment: all initialized to zero. Status: M Support: Yes[]	
PCF_LS (PHY Control Function low speed)					
PHY Control Compliance (LS)	191.5.2.5	PHY Control shall comply with the state diagram in Figure 191–31.	114	No PICS - duplicate shall removed by comment.	Note - removed by comment
Infofield Fields (LS)	191.5.2.5	The 65-bit Infofield **shall** include the fields in 191.5.2.5.2 through 191.5.2.5.6...	114	Insert PICS PCF_LS1 replicating cl 149 PICS PCF2 Feature: Infofield fields (LS) Subclause 191.5.2.5 Value/Comment: Include the fields of 191.5.2.5.2 through 191.5.2.5.6 Status: M Support: Yes[] Status: M Support: Yes[]	

Infofield Repetition (LS)	191.5.2.5	Infofield **shall** be transmitted at least 128 times with each change to octets 5 to 8.	114	Insert PICS PCF_LS2 Feature: Infofield Repetition (LS) Subclause: 191.5.2.5 Value/Comment: Transmitted at least 128 times with each change to octets 5 to 8. Status: PHY_D: M Support: Yes[] N/A[]	
Reserved Infofield values	191.5.2.5	Reserved represents unused values which shall be set to zero on transmit and ignored when received	114	No PICS - duplicate	Note - comment references 191.5.2.4.1
Infofield Start of Frame	191.5.2.5.2	shall use the hexadecimal value 0x15A.	115	Insert PICS PCF_LS3 from Cl 149 PCF5 Feature: Start of Frame Delimiter hexadecimal value Subclause: 191.5.2.5.2 Value/Comment: 0x15A Status: M Support: Yes[]	
Infofield PMA state	191.5.2.5.3	PMA_state<7:6> shall communicate the state of the transmitting transceiver to the link	115	Insert PICS PCF_LS4 from Cl 149 PCF6 Feature: PMA_state<7:6> Subclause: 191.5.2.5.3 Value/Comment: Communicate the state of the transmitting transceiver to the link partner Status: M Support: Yes[] Status: M Support: Yes[]	
Valid Message Field	191.5.2.5.3	Table 191-5 for the Leader and Table 191-6 for the Follower, any other value shall not be transmitted and shall be ignored at the receiver.	115	Insert PICS PCF_LS5 from Cl 149 PCF7 Feature: Valid Infofield message fields Subclause: 191.5.2.5.3 Value/Comment: only values in Tables 191-5 and 191-6 are transmitted, and any other value is ignored by the receiver Status: M Support: Yes[]	Note - consider whether to combine this with HS
First Message Field value for the Leader	191.5.2.5.3	Message Field for the first transmitted PMA frame shall be the first row of Table 191-5 for the Leader	115	Insert PICS PCF_LS6 from Cl 149 PCF8 Feature: Initial message setting Subclause: 191.5.2.5.3 Value/Comment: first row of Table 191-5 for the Leader and first row of Table 191-6 for the follower Status: M Support: Yes[]	Note - consider whether to combine this with HS
First Message Field value for the Follower	191.5.2.5.3	Message Field for the first transmitted PMA frame shall be the second row of Table 191-6 for the Leader	115	Editorially combined with the PICS for the leader as in HS section	Note - consider whether to combine this with HS
Subsequent Message Field values	191.5.2.5.3	Subsequent Message Field settings shall be the same Message Field setting or a row below the previous setting.	115	Insert PICS PCF_LS7 from Cl 149 PCF9 Feature: Message field transition Subclause: 191.5.2.4.4 Value/Comment: Subsequent settings are either the same setting or the next row of Table 191-5 (leader) or 191-6 (follower). Status: M Support: Yes[]	Note - consider whether to combine this with HS
OAM Enablement (LS)	191.5.2.5.4	OAM capability shall be enabled only if both PHYs set the capability bit	115	Insert PICS PCF_LS8 from Cl 149 PCF12 Feature: OAM enablement (LS) Subclause: 191.5.2.5.4 Value/Comment: OAM enabled only if both PHYs set OAMen = 1 Status: M Support: Yes[]	Note - consider whether to combine this with HS

Capability Validity (LS)	191.5.2.5.4	capability bit values shall be considered as valid only when the loc_rcvr_status bit is 1.	115	Insert PICS PCF_LS9 from Cl 149 PCF13 Feature: Capability validity Subclause: 191.5.2.5.4 Value/Comment: PHY capability bits are only valid when loc_rcvr_status = 1. Status: M Support: Yes[]	Note - consider whether to combine this with HS
Reserved PHY capability bits	191.5.2.5.4	Remaining bits are reserved and set to 0.	116	Insert PICS PCF_LS10 from Cl 149 PCF14 Feature: Reserved portion of infofield Subclause: 191.5.2.5.4 Value/Comment: Remaining bits are reserved and are set to zero per 191.5.2.5.1 Status: M Support: Yes[]	Note - text rewritten in comment
PCF (PHY Control (both))					
Startup Compliance	191.5.2.6	The startup sequence **shall** comply with the state diagram description given in Figure 191–31.	116	Insert PICS PCF1 from Cl 149 PCF1 Feature: PHY Control State diagram Subclause: 191.5.2.6 Value/Comment: Figure 191-31 Status: M Support: Yes[]	
Startup Timing Compliance	191.5.2.6	The startup timing **shall** comply with Table 191–11 for PHY_S as LEADER and Table 191–12 for PHY_D as LEADER.	116	Insert PICS PCF2 Feature: Startup timing Subclause: 191.5.2.6 Value/Comment: Complies with Table 191-11 for PHY_S Leader and Table 191-12 for PHY_D as Leader Status: M Support: Yes[]	Note - this didn't seem separable for PHY_S and PHY_D requirements because timing is on both link partners. Consider whether this table is really required, or whether it is a consequence of the state diagram (I've submitted a comment on this) if it is a consequence, then delete the SHALL and this PICS.
minwait_timer duration	191.5.2.6.2	The timer **shall** expire 475 µs ± 50 µs after being started.	119	No PICS - duplicate shall (covered by state diagram shall)	Note - comment removes shall
LMK (Link Monitor)					
Link Monitor Compliance	191.5.2.7	The Link Monitor function shall comply with the state diagram of Figure 191-32	121	Insert PICS LMK1 from Cl 149 LMK1 Feature: Link Monitor function Subclause: 191.5.2.7 Value/Comment: Figure 191-32 Status: M Support: Yes[]	
PLS (PHY Link Synchronization)					
Link Sync Compliance	191.5.2.8	...then the Link Synchronization function **shall** conform to the state diagram in Figure 191–35.	122	Insert PICS PLS1 Feature: Link Synchronization function Subclause 191.5.2.8 Value/Comment: Figure 191-35 if autonegotiation is not implemented or not enabled. Status: M Support: Yes[]	
fail_inhibit_timer duration	191.5.2.8.2	This timer **shall** expire 50 ms after entering the LINK_GOOD_CHECK state.	124	No PICS - duplicate shall	Note comment removes shall
sigdect_wait_timer duration	191.5.2.8.2	The timer shall expire 5 µs ± 0.15 µs after being started.	124	No PICS - duplicate shall	Note comment removes shall
MDI					

MDI Symbols: T1 HS	191.5.2.10.1	The symbol response shall comply with the electrical specifications given in 191.6.2 for the HS_TX path and 191.7.2 for the LS_TX path.	127	Insert PICS MDIS1 Feature: MDIS1 Subclause 191.5.10.1 Value/Comment: Transmitted symbols comply with electrical specifications of 191.6.2. Status: T1 * PHY_S: M Support: Yes[]	
MDI Symbols: T1 LS	191.5.2.10.1	The symbol response shall comply with the electrical specifications given in 191.6.2 for the HS_TX path and 191.7.2 for the LS_TX path.	127	Insert PICS MDIS2 Feature: MDIS2 Subclause 191.5.10.1 Value/Comment: Transmitted symbols comply with electrical specifications of 191.7.2. Status: T1 * PHY_D: M Support: Yes[]	
MDI Symbols: V1 HS	191.5.2.10.2	The symbol response shall comply with the electrical specifications given in 191.6.2 for the HS_TX path and 191.7.2 for the LS_TX path.	127	Insert PICS MDIS3 Feature: MDIS3 Subclause 191.5.10.2 Value/Comment: Transmitted symbols comply with electrical specifications of 191.6.2. Status: V1 * PHY_S: M Support: Yes[]	Note - this isn't an explicit shall in the text, it is by reference, I have commented to make it clearer
MDI Symbols: V1 LS	191.5.2.10.2	The symbol response shall comply with the electrical specifications given in 191.6.2 for the HS_TX path and 191.7.2 for the LS_TX path.	127	Insert PICS MDIS4 Feature: MDIS4 Subclause 191.5.10.2 Value/Comment: Transmitted symbols comply with electrical specifications of 191.7.2. Status: V1 * PHY_D: M Support: Yes[]	Note - this isn't an explicit shall in the text, it is by reference, I have commented to make it clearer
PMA electrical specifications, High Speed					
Test modes					
Test Mode Provision	191.6.1	The test modes described as follows **shall** be provided to allow for testing...	128	Insert PICS TM_HS1 from Cl149 PICS TM1 Feature: Test Modes (HS) Subclause: 191.6.1 Value/Comment: Provided to allow testing of the transmitter jitter, transmitter distortion, transmitter PSD, transmitter droop, and BER. Status: PHY_S: M Support: Yes[] N/A[]	
Test Mode Enablement	191.6.1	If MDIO is implemented, these test modes **shall** be enabled by setting a control register 1.2313.15:13, or, if MDIO is not implemented, equivalent functionality shall be provided	128	Insert PICS TM_HS2 from Cl149 PICS TM2 Feature: Test mode enabling Subclause: 191.6.1 Value/Comment: Enabled by setting a control register, 1.2313.15:13 or equivalent functionality Status: (PHY_S * MDIO): M Support: Yes[] N/A[]	
Test Mode Restriction	191.6.1	The test modes **shall** only change the data symbols... and do not alter the electrical and jitter characteristics...	128	Insert PICS TM_HS3 from Cl149 PICS TM3 Feature: Test modes do not alter electrical or jitter characteristics Subclause: 191.6.1 Value/Comment: Only change the data symbols and do not alter the electrical and jitter characteristics of the trnasmitter and receiver from normal operation. Status: M Support: Yes[] N/A[]	

Test Mode 1, Clock access	191.6.1	When in this mode, the PHY **shall** provide access to a frequency reduced version of the transmit symbol clock...	128	Insert PICS TM_HS4 Feature: Test mode 1, clock access Subclause 191.6.1 Value/Comment: Provide access to frequency-reduced version of transmit clock, TX_CLK_175 Status: PHY_S: M Support: Yes[]	
Test Mode 2, PAM4	191.6.1	In Test Mode 2, while transmitting PAM4, the PHY shall transmit a continuous pattern of JP03A (as specified in 94.2.9.1 or JP03B as specified in 94.2.9.2	128	Insert PICS TM_HS5 Feature: Test mode 2, PAM4 Subclause 191.6.1 Value/Comment: Transmit JP03A (see 94.2.9.1) or JP03B (see 94.2.9.2) per Table 191-15. Status: PHY_S * 10 Gb/s: M Support: Yes[]	
Test Mode 2, PAM2	191.6.1	In Test Mode 2 while transmitting PAM2, the PHY shall transmit a continuous pattern of 0101.	128	Insert PICS TM_HS6 Feature: Test mode 2, PAM2 Subclause 191.6.1 Value/Comment: Transmit PAM2 0101 Status: PHY_S * (2.5 Gb/s + 5 Gb/s): M Support: Yes[]	
Test Mode 3 (HS)	191.6.1	enabled, the PCS shall generate a continuous pattern of {0, 3} symbols to	128	Insert PICS TM_HS7 Feature: Test Mode 3, Precoder operation (10G Only) Value/Comment: Continuous pattern of {0,3} Status: PHY_S * 10 Gb/s: M Support: Yes[] N/A[]	Note - comment to adjust text to reflect 10G only
Test Mode 4, 10G	191.6.1	the PHY shall transmit a continuous pattern of PRBS13Q (as specified in	128	Insert PICS TM_HS8 Feature: Test Mode 4, Transmit linearity 10G Subclause: 191.6.1 Value/Comment: Generate PRBS13Q Status: PHY_S * 10 Gb/s: M Support: Yes[] N/A[]	
Test Mode 4, 2.5G or 5G	191.6.1	the PHY shall each transmit a continuous pattern of PRBS13 (as specified	129	Insert PICS TM_HS9 Feature: Test Mode 4, Transmit linearity, 2.5G/5G Subclause: 191.6.1 Value/Comment: Generate PRBS13 Status: PHY_S * (2.5 Gb/s + 5 Gb/s): M Support: Yes[] N/A[]	
Test Mode 5	191.6.1	the PHY shall transmit as in non-test operation and in the LEADER with data set to normal interframe idle symbols.	129	Insert PICS TM_HS10 Feature: Test Mode 5, PSD mask Subclause: 191.6.1 Value/Comment: Transmit as in normal operation with normal interframe idle as the input Status: PHY_S: M Support: Yes[] N/A[]	
Test Mode 6	191.6.1	the PHY shall transmit a continuous pattern of 128xS {+1} followed by 128xS {-1} symbols.	129	Insert PICS TM_HS11 Feature: Test Mode 6, Droop (HS) Subclause: 191.6.1 Value/Comment: Transmit 128xS {+1} followed by 128xS{-1} symbols locally timed Status: PHY_S: M Support: Yes[] N/A[]	
TES_HS (Transmitter electrical specifications (HS))					

AC Coupling	191.6.2	The electrical input shall be AC-coupled, i.e., it shall present a high, i.e., it shall present a high dc common-mode impedance at the MDI.	131	Insert PICS TES_HS1 from Cl 149 TES1 Feature: AC coupling Subclause: 191.6.2 Value/Comment: Present a high dc common-mode impedance at the MDI Status: PHY_S: M Support: Yes[] N/A[]	
Load for electrical tests (T1)	191.6.2	where a load is not specified, the transmitter shall meet the requirements of this clause with a 100 \OHM resistive differential load for a -T1 link and a 50 ohm resistive load for a -V1 link.	131	Insert PICS TES_HS2 from Cl 149 TES2 Feature: Load for T1 tests Subclause: 191.6.2 Value/Comment: meet electrical requirements with a 100 ohm differential load Status: PHY_S * T1: M Support: Yes[] N/A[]	
Load for electrical tests (V1)	191.6.2	where a load is not specified, the transmitter shall meet the requirements of this clause with a 100 \OHM resistive differential load for a -T1 link and a 50 ohm resistive load for a -V1 link.	131	Insert PICS TES_HS3 from Cl 149 TES2 Feature: Load for V1 tests Subclause: 191.6.2 Value/Comment: meet electrical requirements with a 50 ohm load Status: PHY_S * V1: M Support: Yes[] N/A[]	
LEADER RMS Jitter Limit	191.6.2.1	less than J ps (see Table 191-14) at LEADER TX_TCLK_175 relative to an unjittered reference.	132	Insert PICS TES_HS4 from Cl 149 TES8 Feature: Leader RMS timing jitter at TX_TCLK Subclause: 191.6.2.1 Value/Comment: Less than J ps (see Table 191-14) Status: PHY_S : M Support: Yes[] N/A[]	
LEADER peak-to-peak Jitter Limit	191.6.2.1	less than 10 x J ps (see Table 191-14) at LEADER TX_CLK_175 relative to an unjittered reference.	132	Insert PICS TES_HS5 from Cl 149 TES9 Feature: Leader peak-to-peak timing jitter at TX_TCLK Subclause: 191.6.2.1 Value/Comment: Less than 10*J ps (see Table 191-14) Status: PHY_S : M Support: Yes[] N/A[]	
FOLLOWER RMS Jitter Limit	191.6.2.1	less than 6 ps and less than 3 ps over jitter frequencies greater than 100 kHz at FOLLOWER TX_CLK_175 relative to an unjittered reference.	132	Insert PICS TES_HS6 from Cl 149 TES10 Feature: Follower RMS timing jitter at TX_TCLK Subclause: 191.6.2.1 Value/Comment: Less than 6 ps and less than 3 ps over 100 kHz. Status: PHY_S : M Support: Yes[] N/A[]	
FOLLOWER peak-to-peak Jitter Limit	191.6.2.1	less than 60 ps at FOLLOWER TX_CLK_175 relative to an unjittered reference.	132	Insert PICS TES_HS7 from Cl 149 TES11 Feature: Follower peak-to-peak timing jitter at TX_TCLK Subclause: 191.6.2.1 Value/Comment: Less than 60 ps Status: PHY_S : M Support: Yes[] N/A[]	
Jitter Interval	191.6.2.1	TX_TCLK_175 jitter **shall** be measured over an interval of 1 ms ± 10%.	132	Shall on user - needs to change, no PICS	Comment removes shall
Jitter Measurement Bandwidth	191.6.2.1	The band-pass bandwidth of the capturing device shall be at least 200 MHz	132	Shall on user - needs to change, no PICS	Comment removes shall
Leader Transmit MDI random Jitter (RMS)	191.6.2.2	The RMS value of the MDI output jitter relative to an unjittered reference shall be less than J ps.	132	Insert PICS TES_HS8 from Cl 149 TES14 Feature: Leader RMS timing jitter at MDI Subclause: 191.6.2.2 Value/Comment: Less than J ps (see Table 191-14), using test mode 2 and test fixture 3 Status: PHY_S : M Support: Yes[] N/A[]	

Leader Transmit MDI random Jitter (p-p)	191.6.2.2	The peak-to-peak value of the MDI output jitter relative to an unjittered reference shall be less than 10×J ps.	132	Insert PICS TES_HS9 from Cl 149 TES15 Feature: Leader peak-to-peak timing jitter at MDI Subclause: 191.6.2.2 Value/Comment: Less than 10*J ps (see Table 191-14) using test mode 2 and test fixture 3. Status: PHY_S : M Support: Yes[] N/A[]	
Random jitter measurement interval	191.6.2.2	Jitter shall be measured over an interval of 1 ms	132	Shall on user - needs to change, no PICS	Comment removes shall
Random jitter measurement bandwidth	191.6.2.2	The band-pass bandwidth of the capturing device shall be at least 200 MHz	132	Shall on user - needs to change, no PICS	Comment removes shall
Leader transmitter deterministic Jitter at MDI	191.6.2.3	Using this method, DJpk-pk **shall** be less than 9×J ps.	133	Insert PICS TES_HS10 from Cl 149 TES18 Feature: Leader DJ at MDI Subclause: 191.6.2.3 Value/Comment: Less than 9xJ ps (see Table 191-14), using test mode 2 and test fixture 3 Status: PHY_S : M Support: Yes[] N/A[]	
Leader transmit Even-Odd Jitter at MDI	191.6.2.3	Using this method, EOJpk-pk **shall** be less than 4×J ps.	133	Insert PICS TES_HS11 from Cl 149 TES19 Feature: Leader EOJ at MDI Subclause: 191.6.2.3 Value/Comment: Less than 4*J ps (see Table 191-14) using test mode 2 and test fixture 3. Status: PHY_S : M Support: Yes[] N/A[]	
LEADER Symbol Rate	191.6.2.4	...the symbol transmission rate of the LEADER PHY **shall** be within the range 5625 × S MHz ± 100 ppm.	133	Insert PICS TES_HS12 from Cl 149 TES23 Feature: Leader transmitter clock freqeuncy Subclause: 191.6.2.4 Value/Comment: within the range 5625 x S MHz +/- 100 ppm Status: PHY_S : M Support: Yes[] N/A[]	Note - comment filed may change the name of the feature to PHY_S transmitter clock frequency
FOLLOWER Free-run Rate	191.6.2.4	...the symbol transmission rate of the FOLLOWER PHY, when running off of a free-running clock, **shall** be within the range 5625/48 MHz +1/–20%...	133	Insert PICS TES_HS13 from Cl 149 TES23 Feature: Follower transmitter clock freqeuncy Subclause: 191.6.2.4 Value/Comment: within the range 5625xS MHz +/- 100 ppm Status: PHY_S : M Support: Yes[] N/A[]	Note - comment filed may change the name of the feature to PHY_D transmitter clock frequency
Clock Variation Rate	191.6.2.4	...and the short-term rate of frequency variation **shall** be less than 1% / second.	133	Insert PICS TES_HS14 from Cl 149 TES24 Feature: Short term frequency variation Subclause: 191.6.2.4 Value/Comment: Less than 1% / second Status: PHY_S: M Support: Yes[] N/A[]	Note - comment filed to make this requirement apply to both, as it seems it should, requirement for PHY_D moved to 191.7.2.4 per comment.
Test mode 4 MultiG	191.6.2.5	With the transmitter in test mode 4, transmitting in MultiG mode, and using the transmitter test fixture 1 shown in Figure 191–36 for -T1 and Figure 191–37 for -V1, the test defined in 120D.3.1.2 shall be performed.	133	No PICS - requirement on user	Note - comment filed to remove shall
Transmitter SNDR (HS)	191.6.2.5	The transmitter SNDR distortion, as specified in 120D.3.1.6, **shall** exceed 36 dB in 10G+100MBASE-T1/V1, 33 dB in 5G+100MBASE-T1/V1, and 30 dB in 2.5G+100MBASE-T1/V1 modes.	133	Insert PICS TES_HS15 from Cl 149 TES4 Feature: Transmitter linearity Subclause: 191.6.2.5 Value/Comment: See 191.6.2.5. Status: PHY_S: M Support: Yes[] N/A[]	

HS Transmit Power	191.6.2.6	...the transmit power for the MultiG+100MBASE-T1/V1 PHYs **shall** be as specified in Table 191–16...	133	Insert PICS TES_HS16 from Cl 149 TES20 Feature: Transmit power level Subclause: 191.6.2.6 Value/Comment: Table 191-16 Status: PHY_S: M Support: Yes[] N/A[]	
HS Transmit PSD	191.6.2.6	...and the power spectral density of the transmitter **shall** be between the upper and lower masks specified in Equation (191–12) and Equation (191–13).	133	Insert PICS TES_HS16 from Cl 149 TES21 Feature: PSD of the transmitter Subclause: 191.6.2.6 Value/Comment:PSD between bounds of Equation 191-12 and 191-13 Status: PHY_S: M Support: Yes[] N/A[]	
HS Quiet Signal Level	191.6.2.6	...when tx_symb is “Z”... the transmit signal **shall** be less than -36dBm.	133	Insert PICS TES_HS17 from Cl149 PMAT9 Feature:HS Quiet signal level Subclause: 191.6.2.6 Value/Comment: less than -36 dBm Status: PHY_S: M Support: Yes[] N/A[]	
HS Transmitter Peak Output	191.6.2.7	...the transmit signal of a MultiG+100MBASE-T1 transmitter... **shall** be less than the peak-to-peak limits specified in Table 191–17 at the MDI.	135	Insert PICS TES_HS18 from Cl 149 TES22 Feature: HS Transmitter peak-to-peak voltage Subclause: 191.6.2.7 Value/Comment: Table 191-17 Status: PHY_S: M Support: Yes[] N/A[]	
HS Maximum Output Droop	191.6.2.8	...the magnitude of both the positive and negative droop **shall** be less than 30%...	136	Insert PICS TES_HS19 from Cl 149 TES3 Feature: HS Transmitter droop Subclause: 191.6.2.8 Value/Comment: positive and negative droop less than 30% Status: PHY_S: M Support: Yes[] N/A[]	
RES_HS (Receiver electrical specifications)					
HS Received BER	191.6.3.1	...the signal received at the MDI... **shall** be received with a BER less than 10-12 after RS-FEC decoding, and sent to the XGMII after link reset completion.	136	Insert PICS RES_HS1 from Cl 149 RES1 Feature: Receiver differential input signals Subclause: 191.6.3.1 Value/Comment: BER less than 10–12 after RS-FEC decoding Status: PHY_D: M Support: Yes[] N/A[]	
Broadband noise rejection	191.6.3.2	The BER (is expected to/shall) be less than 10^-12.	136	Insert PICS RES_HS2 Feature: Broadband noise rejection Subclause: 191.6.3.2 Value/Comment: BER less than 10^-12 with noise from Table 191-18 Status: PHY_D: M Support: Yes[] N/A[]	Note - this shall is added by a comment, if the comment is rejected, do not add this PICS
PMA Electrical specs, low speed path					
TM_LS					
Provision of LS Test Modes	191.7.1	The test modes described as follows **shall** be provided to allow for testing...	137	Insert PICS TM_LS1 from Cl149 PICS TM1 Feature: Test Modes (HS) Subclause: 191.7.1 Value/Comment: Provided to allow testing of the transmitter jitter, transmitter distortion, transmitter PSD, transmitter droop, and BER. Status: PHY_D: M Support: Yes[] N/A[]	

LS Test Mode Enablement	191.7.1	If MDIO is implemented, these test modes **shall** be enabled by setting a control register, 1.2313.15:13...	137	Insert PICS TM_LS2 from Cl149 PICS TM2 Feature: Test mode enabling Subclause: 191.7.1 Value/Comment: Enabled by setting a control register, 1.2313.15:13 or equivalent functionality Status: (PHY_D * MDIO): M Support: Yes[] N/A[]
LS Test Mode Limitation	191.7.1	The test modes **shall** only change the data symbols... and do not alter the electrical and jitter characteristics...	137	Insert PICS TM_LS3 from Cl149 PICS TM3 Feature: Test modes do not alter electrical or jitter characteristics Subclause: 191.7.1 Value/Comment: Only change the data symbols and do not alter the electrical and jitter characteristics of the trnasmitter and receiver from normal operation. Status: M Support: Yes[] N/A[]
LS Clock Access (TM1)	191.7.1	When in this mode, the PHY **shall** provide access to a frequency reduced version of the transmit symbol clock...	137	Insert PICS TM_LS4 Feature: Test mode 1, clock access Subclause 191.7.1 Value/Comment: Provide access to frequency-reduced version of transmit clock, TX_CLK_175 Status: PHY_D: M Support: Yes[]
DME Test Pattern (TM2)	191.7.1	When test mode 2 is enabled, the PHY **shall** repeatedly transmit DME encoded ones.	137	Insert PICS TM_LS5 Feature: Test mode 2, DME Subclause 191.7.1 Value/Comment: DME encoded ones Status: PHY_D: M Support: Yes[]
Linearity Test Pattern (TM4)	191.7.1	When test mode 4 is enabled the PHY **shall** transmit a continuous pattern of PRBS13...	137	Insert PICS TM_LS6 Feature: Test Mode 4, Transmit linearity, DME Subclause: 191.7.1 Value/Comment: Generate PRBS13 Status: PHY_D: M Support: Yes[] N/A[]
PSD Test Mode (TM5)	191.7.1	When test mode 5 is enabled, the PHY **shall** transmit as in non-test operation and in the LEADER data mode...	137	Insert PICS TM_LS7 Feature: Test Mode 5, PSD mask Subclause: 191.7.1 Value/Comment: Transmit as in normal operation with normal interframe idle as the input Status: PHY_D: M Support: Yes[] N/A[]
LS Droop Test Pattern (TM6)	191.7.1	When test mode 6 is enabled, the PHY **shall** transmit a continuous pattern of 3 {+1} baseband symbols followed by 3 {–1} symbols.	137	Insert PICS TM_LS8 Feature: Test Mode 6, Droop (LS) Subclause: 191.7.1 Value/Comment: Transmit a continuous pattern of 3 {+1} followed by 3 {-1} symbols Status: PHY_D: M Support: Yes[] N/A[]
TES_LS (Transmitter electrical specifications (LS))				
LS AC-coupling Requirement	191.7.2	The electrical input **shall** be AC-coupled, i.e., it **shall** present a high dc common-mode impedance at the MDI.	139	Insert PICS TES_LS1 from Cl 149 TES1 Feature: AC coupling Subclause: 191.7.2 Value/Comment: Present a high dc common-mode impedance at the MDI Status: PHY_D: M Support: Yes[] N/A[]

Load for electrical tests (T1)	191.7.2	...the transmitter **shall** meet the requirements of this clause with a 100 Ω resistive differential load... [or 50 Ω for -V1].	139	Insert PICS TES_LS2 from Cl 149 TES2 Feature: Load for T1 tests Subclause: 191.7.2 Value/Comment: meet electrical requirements with a 100 ohm differential load Status: PHY_D * T1: M Support: Yes[] N/A[]	
Load for electrical tests (V1)	191.7.2	...the transmitter **shall** meet the requirements of this clause with a 100 Ω resistive differential load... [or 50 Ω for -V1].	139	Insert PICS TES_LS3 from Cl 149 TES2 Feature: Load for V1 tests Subclause: 191.7.2 Value/Comment: meet electrical requirements with a 50 ohm load Status: PHY_D * V1: M Support: Yes[] N/A[]	
LEADER Jitter (RMS-LS)	191.7.2.1	...the RMS value of the LEADER TX_TCLK_175 jitter relative to an unjittered reference **shall** be less than J ps.	139	Insert PICS TES_LS4 from Cl 149 TES8 Feature: Leader RMS timing jitter at TX_TCLK Subclause: 191.7.2.1 Value/Comment: Less than J ps (see Table 191-14) Status: PHY_D : M Support: Yes[] N/A[]	note there is a comment on this since Table 191-14 doesn't actually have J for PHY_D
LEADER Jitter (P-P-LS)	191.7.2.1	The peak-to-peak value of the LEADER TX_TCLK_175 jitter relative to an unjittered reference **shall** be less than 10×J ps.	139	Insert PICS TES_LS5 from Cl 149 TES9 Feature: Leader peak-to-peak timing jitter at TX_TCLK Subclause: 191.7.2.1 Value/Comment: Less than 10*J ps (see Table 191-14) Status: PHY_D : M Support: Yes[] N/A[]	note there is a comment on this since Table 191-14 doesn't actually have J for PHY_D
FOLLOWER Jitter (RMS-LS)	191.7.2.1	...the RMS value of the FOLLOWER TX_TCLK_175 jitter relative to an unjittered reference **shall** be less than 50 ps.	139	Insert PICS TES_LS6 from Cl 149 TES10 Feature: Follower RMS timing jitter at TX_TCLK Subclause: 191.7.2.1 Value/Comment: Less than 50 ps. Status: PHY_D : M Support: Yes[] N/A[]	
FOLLOWER Jitter (P-P-LS)	191.7.2.1	The peak-to-peak value of the FOLLOWER TX_TCLK_175 jitter relative to an unjittered reference **shall** be less than 500 ps.	139	Insert PICS TES_LS7 from Cl 149 TES11 Feature: Follower peak-to-peak timing jitter at TX_TCLK Subclause: 191.7.2.1 Value/Comment: Less than 500 ps Status: PHY_D : M Support: Yes[] N/A[]	
LS Jitter Interval	191.7.2.1	TX_TCLK_175 jitter **shall** be measured over an interval of 1 ms ± 10%.	139	Shall on user - needs to change, no PICS	Comment removes shall
LS jitter measurement bandwidth	191.7.2.1	The band-pass bandwidth of the capturing device shall be at least 200 MHz	139	Shall on user - needs to change, no PICS	Comment removes shall
LS MDI Jitter (RMS)	191.7.2.2	The RMS value of the MDI output jitter relative to an unjittered reference **shall** be less than J ps.	139	Insert PICS TES_LS8 from Cl 149 TES14 Feature: Leader RMS timing jitter at the MDI Subclause: 191.7.2.2 Value/Comment: Less than J ps (see Table 191-14) Status: PHY_D : M Support: Yes[] N/A[]	note there is a comment on this since Table 191-14 doesn't actually have J for PHY_D
LS MDI Jitter (P-P)	191.7.2.2	The peak-to-peak value of the MDI output jitter relative to an unjittered reference **shall** be less than 10×J ps.	139	Insert PICS TES_LS9 from Cl 149 TES15 Feature: Leader peak-to-peak timing jitter at the MDI Subclause: 191.7.2.2 Value/Comment: Less than 10*J ps (see Table 191-14) Status: PHY_D : M Support: Yes[] N/A[]	note there is a comment on this since Table 191-14 doesn't actually have J for PHY_D
MDI Jitter Interval LS	191.7.2.2	Jitter shall be measured over an interval of 1 ms ± 10%.	139	Shall on user - needs to change, no PICS	Comment removes shall
MDI Jitter measurement bandwidth LS	191.7.2.2	The band-pass bandwidth of the measurement device shall be larger than 200 MHz.	139	Shall on user - needs to change, no PICS	Comment removes shall

LS LEADER Symbol Rate	191.7.2.4	The baseband symbol transmission rate of the LEADER PHY... **shall** be within the range 5625/48 MHz ± 100 ppm.	140	Insert PICS TES_LS10 from Cl 149 TES23 Feature: Leader transmitter clock freqeuncy Subclause: 191.7.2.4 Value/Comment: within the range 5625 / 48 MHz +/- 100 ppm Status: PHY_D : M Support: Yes[] N/A[]	
FOLLOWER Free-run Rate	191.7.2.4	...the symbol transmission rate of the FOLLOWER PHY, when running off of a free-running clock, **shall** be within the range 5625/48 MHz +1/–20%...	133	Insert PICS TES_LS11 from Cl 149 TES23 Feature: Follower transmitter clock freqeuncy Subclause: 191.7.2.4 Value/Comment: within the range 5625/48 MHz +1/- 20% Status: PHY_D : M Support: Yes[] N/A[]	Note - this requirment appeared in the high speed section, in 191.6.2.4. it has been added here where it appears more appropriate given the frequency
Clock Variation Rate	191.7.2.4	...and the short-term rate of frequency variation **shall** be less than 1% / second.	133	Insert PICS TES_LS12 from Cl 149 TES24 Feature: Short term frequency variation Subclause: 191.7.2.4 Value/Comment: Less than 1% / second Status: PHY_D: M Support: Yes[] N/A[]	Note - this requirment appeared in the high speed section, in 191.6.2.4. it has been added here where it appears more appropriate given the frequency
LS Transmitter Rise/Fall Time	191.7.2.5	The rise/fall transition time... **shall** be less than 1.5 ns.	140	Insert PICS TES_LS13 Feature: LS transmitter Rise/Fall time Subclause: 191.7.2.5 Value/Comment: less than 1.5 ns Status: PHY_D: M Support: Yes[] N/A[]	
LS SNDR Distortion	191.7.2.6	The transmitter SNDR distortion **shall** exceed 30 dB.	140	Insert PICS TES_LS14 from Cl 149 TES4 Feature: Transmitter linearity Subclause: 191.7.2.6 Value/Comment: shall not exced 30 dB as defined in 191.7.2.6. Status: PHY_D: M Support: Yes[] N/A[]	
LS Transmit Power	191.7.2.7	...the transmit power for the 100M+MultiGBASE-T1/V1 PHYs **shall** be as specified in Table 191–21...	141	Insert PICS TES_LS15 from Cl 149 TES20 Feature: Transmit power level Subclause: 191.7.2.7 Value/Comment: Table 191-21 Status: PHY_D: M Support: Yes[] N/A[]	
LS Transmit PSD	191.7.2.7	...and the power spectral density of the transmitter **shall** be between the upper and lower masks...	141	Insert PICS TES_LS16 from Cl 149 TES21 Feature: PSD of the transmitter Subclause: 191.7.2.7 Value/Comment:PSD between bounds of Equation 191-14 and 191-15 Status: PHY_D: M Support: Yes[] N/A[]	
LS Quiet Signal Level	191.7.2.7	...when tx_symb is “Z”... the transmit signal **shall** be less than -36dBm.	141	Insert PICS TES_LS17 from Cl149 PMAT9 Feature:LS Quiet signal level Subclause: 191.7.2.7 Value/Comment: less than -36 dBm Status: PHY_D: M Support: Yes[] N/A[]	
LS Peak Output (-T1)	191.7.2.8	...the differential transmit signal of a 100M+MultiGBASE-T1 transmitter **shall** be less than 1.0 V peak-to-peak at the MDI.	142	Insert PICS TES_LS18 from Cl 149 TES22 Feature: LS Transmitter peak-to-peak voltage Subclause: 191.7.2.8 Value/Comment:less than 1.0 V Peak-to-peak at the MDI Status: PHY_D * T1: M Support: Yes[] N/A[]	

LS Peak Output (-V1)	191.7.2.8	...the transmit signal **shall** be less than 0.5 V peak-to-peak at the MDI.	142	Insert PICS TES_LS19 from Cl 149 TES22 Feature: LS Transmitter peak-to-peak voltage Subclause: 191.7.2.8 Value/Comment:less than 0.5 V Peak-to-peak at the MDI Status: PHY_D * V1: M Support: Yes[] N/A[]
LS Maximum Output Droop	191.7.2.9	...the magnitude of both the positive and negative droop **shall** be less than 30%...	143	Insert PICS TES_LS20 from Cl 149 TES3 Feature: LS Transmitter droop Subclause: 191.7.2.9 Value/Comment: positive and negative droop less than 30% Status: PHY_D: M Support: Yes[] N/A[]
RES_LS (Receiver electrical specifications)				
LS Received BER	191.7.3.1	...the signal received at the MDI... **shall** be received with a BER less than 10-10 after RS-FEC decoding...	143	Insert PICS RES_LS1 from Cl 149 RES1 Feature: Receiver differential input signals Subclause: 191.7.3.1 Value/Comment: BER less than 10–10 after RS-FEC decoding Status: PHY_S: M Support: Yes[] N/A[]
Management interface				
Auto-Neg Requirements	191.8.1	If Auto-Negotiation is implemented, it **shall** meet the requirements of Clause 98.	144	Insert PICS MGM1 Feature: Auto-Negotiation compliance Subclause: 191.8.1 Value/Comment: Meets requirements of Clause 98 Status: AN: M Support: Yes[] N/A[]
Link Segment -T1				
Insertion Loss (-T1)	191.9.1.1	The insertion loss of each -T1 link segment **shall** meet the values determined using Equation (191–16).	144	Insert PICS Item: LST1 Feature: -T1 insertion loss Subclause: 191.9.1.1 Value/Comment: Meets equation 191-16 Status: INS * T1:M Support: Yes [ ], N/A [ ]
Return Loss (-T1)	191.9.1.3	The return loss of each -T1 link segment **shall** meet the values determined using Equation (191–18).	145	Insert PICS Item: LST2 Feature: -T1 return loss Subclause: 191.9.1.3 Value/Comment: Meets equation 191-18. Status: INS * T1:M Support: Yes [ ], N/A [ ]
Coupling Attenuation (-T1)	191.9.1.4	The coupling attenuation of each -T1 link **shall** be as specified in 149.7.1.4.	146	Insert PICS Item: LST3 Feature: -T1 coupling attenuation Subclause: 191.9.1.4 Value/Comment: Meets requirements of 149.7.1.4 Status: INS * T1:M Support: Yes [ ], N/A [ ]
Screening Attenuation (-T1)	191.9.1.5	The screening attenuation of each -T1 link **shall** be as specified in 149.7.1.5.	146	Insert PICS Item: LST4 Feature: -T1 screening attenuation Subclause: 191.9.1.5 Value/Comment: Meets requirements of 149.7.1.5. Status: INS * T1:M Support: Yes [ ], N/A [ ]

Max Link Segment Delay (-T1)	191.9.1.6	The propagation delay of a -T1 link segment **shall** not exceed 160 ns...	146	Insert PICS Item: LST5 Feature: -T1 segment delay Subclause: 191.9.1.6 Value/Comment: less than or equal to 160 ns Status: INS * T1:M Support: Yes [ ], N/A [ ]
PSANEXT Loss (-T1)	191.9.2.1	The PSANEXT **shall** be as specified in 149.7.2.1.	146	Insert PICS Item: LST6 Feature: -T1 PSANEXT loss Subclause: 191.9.2.1 Value/Comment: Meets requirements of 149.7.2.1 Status: INS * T1:M Support: Yes [ ], N/A [ ]
PSAACRF (-T1)	191.9.2.2	The PSAACRF **shall** be as specified in 149.7.2.2.	146	Insert PICS Item: LST7 Feature: -T1 PSAACRF loss Subclause: 191.9.2.2 Value/Comment: Meets requirements of 149.7.2.2 Status: INS * T1:M Support: Yes [ ], N/A [ ]
Link Segment -V1				
Insertion Loss (-V1)	191.10.1.1	The insertion loss of each -V1 link segment **shall** meet the values determined using Equation (191–16).	147	Insert PICS Item: LSV1 Feature: -V1 insertion loss Subclause: 191.10.1.1 Value/Comment: Meets equation 191-16 Status: INS * V1:M Support: Yes [ ], N/A [ ]
Return Loss (-V1)	191.10.1.3	The return loss of each -V1 link segment **shall** meet the values determined using Equation (191–18).	147	Insert PICS Item: LSV2 Feature: -V1 return loss Subclause: 191.10.1.3 Value/Comment: Meets equation 191-18. Status: INS * V1:M Support: Yes [ ], N/A [ ]
Screening Attenuation (-V1)	191.10.1.5	The screening attenuation for each -V1 link segment **shall** meet the values determined using Equation (191–19).	147	Insert PICS Item: LSV3 Feature: -V1 screening attenuation Subclause: 191.10.1.5 Value/Comment: Meets equation 191-19. Status: INS * V1:M Support: Yes [ ], N/A [ ]
Max Link Segment Delay (-V1)	191.10.1.6	The propagation delay of a -V1 link segment **shall** not exceed 160 ns...	148	Insert PICS Item: LSV4 Feature: -V1 segment delay Subclause: 191.10.1.6 Value/Comment: less than or equal to 160 ns Status: INS * V1:M Support: Yes [ ], N/A [ ]
PSANEXT Loss (-V1)	191.10.2.1	The power sum ANEXT loss... **shall** meet the values determined using Equation (191–20).	148	Insert PICS Item: LSV5 Feature: -V1 PSANEXT loss Subclause: 191.10.2.1 Value/Comment: Meets equation 191-20 Status: INS * V1:M Support: Yes [ ], N/A [ ]
PSAACRF (-V1)	191.10.2.2	The power sum AACRF loss... **shall** meet the values determined using Equation (191–21).	149	Insert PICS Item: LSV6 Feature: -V1 PSAACRF loss Subclause: 191.10.2.2 Value/Comment: Meets equation 191-21 Status: INS * V1:M Support: Yes [ ], N/A [ ]

MDI					
MDI Return Loss (-T1)	191.11.2.1	The differential impedance at the -T1 MDI... **shall** be such that any reflection... are per the relationship shown in Equation (191–22).	150	Insert PICS item: MDI1 Feature: Return Loss -T1 Subclause: 191.11.2.1 Value/Comment: Meets Equation 191-22 Status: T1: M Support: Yes[] N/A[]	
MDI Fault Tolerance (-T1)	191.11.3	The -T1 MDI fault tolerance **shall** comply with 96.8.3.	151	Insert PICS item: MDI2 Feature: Fault tolerance -T1 Subclause: 191.11.3 Value/Comment: Meets requirements of 96.8.3 Status: T1: M Support: Yes[] N/A[]	
MDI Return Loss (-V1)	191.12.2.1	The differential impedance at the -V1 MDI... **shall** be such that any reflection... are per the relationship shown in Equation (191–23).	151	Insert PICS item: MDI3 Feature: Return Loss -V1 Subclause: 191.12.2.1 Value/Comment: Meets Equation 191-23 Status: V1: M Support: Yes[] N/A[]	
MDI Fault Tolerance	191.12.3	The coaxial cable interface of the MDI **shall**... withstand without damage the application of short circuits...	152	Insert PICS item: MDI4 Feature: Fault Tolerance -V1 Subclause: 191.12.3 Value/Comment: withstand short circuits without damage to potentials in Table 191-23 Status: V1: M Support: Yes[] N/A[]	
MDI Short Circuit Resilience	191.12.3	Normal operation shall resume after the short circuit(s) is (are) removed.	152	Insert PICS item: MDI4 Feature: Short circuit Resistance -V1 Subclause: 191.12.3 Value/Comment: withstand short circuits without damage to potentials in Table 191-23 Status: V1: M Support: Yes[] N/A[]	
MDI Transient Resilience	191.12.3	The single conductor of the MDI **shall** also withstand without damage high-voltage transient noises and ESD...	152	Insert PICS item: MDI2 Feature: Noise Resilience -V1 Subclause: 191.12.3 Value/Comment: Withstand high voltage transient noise and ESD per application requirements Status: V1: M Support: Yes[] N/A[]	Note - there is a comment to remove this shall, I expect it to be controversial
Path Delay (DEL)					
Path Delay Constraints	191.14	These delays **shall** not exceed the limits shown in Table 191–24.	153	Insert PICS item: DEL1 Feature: Path delays Subclause: 191.14 Value/Comment: Less than limits in Table 191-24. Status: M Support: Yes[] N/A[]	
Clause 192					
PCS Reset Execution (Cl. 192)	192.3.2.1	The PCS Reset function **shall** be executed whenever one of following conditions occur: a) Power on. b) The receipt of a request for reset...	172	192.13.4.1 PCS Transmit Item: PCST1 Feature: PCS Reset Subclause: 192.3.2.1 Value/Comment: Meets requirements of 19.3.2.1 Status: M Support: Yes [ ]	

Management Restoration	192.3.2.1	The control and management interface **shall** be restored to operation within 10 ms from the setting of bit 3.2322.15.	172	192.13.4.1 PCS Transmit Item: PCST2 Feature: Control and management interface restoration Subclause: 192.3.2.1 Value/Comment: Restored to operation within 10 ms from the setting of bit 3.2322.15 Status: M Support: Yes [ ]	
PCS Transmit Compliance	192.3.2.2	The PCS Transmit function **shall** conform to the PCS 64B/65B Transmit state diagram in Figure 192–20 and to the PCS Transmit bit ordering.	172	192.13.4.1 PCS Transmit Item: PCST3 Feature: PCS Transmit compliance Subclause: 192.3.2.2 Value/Comment: Conforms to the PCS 64B/65B Transmit state diagram in Figure 192–20 and to the PCS Transmit bit orderering in Figure 192–5 and Figure 192–6 Status: M Support: Yes [ ]	
SEND_Z Support	192.3.2.2	If a PMA_TXMODE.indication message has the value SEND_Z, PCS Transmit **shall** pass Z symbols at each symbol period to the PMA...	173	192.13.4.1 PCS Transmit Item: PCST4 Feature: PMA_TXMODE.indication message SEND_Z value Subclause: 192.3.2.2 Value/Comment: PCS Transmit passes Z symbols at each symbol period to the PMA via the PMA_UNITDATA.request primitive Status: M Support: Yes [ ]	
SEND_TS/TA Symbols	192.3.2.2	If a PMA_TXMODE.indication message has the value SEND_TS or SEND_TA, PCS Transmit **shall** generate a sequence (On) defined in 192.3.4 to the PMA...	173	192.13.4.1 PCS Transmit Item: PCST5 Feature: PMA_TXMODE.indication message SEND_TS or SEND_TA value Subclause: 192.3.2.2 Value/Comment: PCS Transmit generates the O_n sequence defined in 192.3.4 to the PMA via the PMA_UNITDATA.request primitive Status: M Support: Yes [ ]	
SEND_N Encoding (192)	192.3.2.2	...the PCS Transmit function **shall** use a 65B coding technique to generate code-groups that represent data or control.	173	192.13.4.1 PCS Transmit Item: PCST6 Feature: PMA_TXMODE.indication message SEND_N value Subclause: 192.3.2.2 Value/Comment: The PCS is in the data mode of operation and the PCS Transmit function uses a 65B coding technique to generate code-groups that represent data or control Status: M Support: Yes [ ]	
Idle Grouping Rule	192.3.2.2.7	/I/ insertion and deletion **shall** occur in groups of 4.	180	192.13.4.1 PCS Transmit Item: PCST7 Feature: Idle /I/ insertion and deletion Subclause: 192.3.2.7 Value/Comment: Occurs in groups of four. /I/s may not be added while data is being received. The first four characters after a /T/ are not be deleted when deleting /I/s. Status: M Support: Yes [ ]	Note - editors to make decision and align clause 192 and 191 treatment. See 191.3.2.2.7 & 191.4.2.2.7 (about rows 33-35 and 80-82) in clause 191.

Idles not added while data is being received	192.3.2.2.7	They **shall** not be added while data is being received.	180	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS -above for 192.3.2.2.7	Note - editors to make decision and align clause 192 and 191 treatment. See rows 33-35 and 80-82 in clause 191.
Idles not deleted following Termination	192.3.2.2.7	When deleting /I/s, the first four characters after a /T/ shall not be deleted.	180	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - above for 192.3.2.2.7	Note - editors to make decision and align clause 192 and 191 treatment. See rows 33-35 and 80-82 in clause 191.
RS-FEC Parity (LS) 192	192.3.2.2.13	The RS-FEC encoding... **shall** generate the six 8-bit parity symbols (48 bits total).	181	192.13.4.1 PCS Transmit Item: PCST8 Feature: RS-FEC (LS) encoding Subclause: 192.3.2.13 Value/Comment: Takes the 992-bit vector, consisting of tx_group15x65B, and the 17-bit OAM_field, and generates the six 8-bit parity symbols (48 bits total) Status: M Support: Yes [ ]	
RS-FEC Parity (HS)	192.3.2.2.13	The RS-FEC encoding... **shall** generate the six 8-bit parity symbols (48 bits total).	181	192.13.4.1 PCS Transmit Item: PCST9 Feature: RS-FEC (HS) encoding Subclause: 192.3.2.13 Value/Comment: Takes the 976-bit vector, consisting of tx_group15x65B, and the 1-bit OAM_field, and generates the six 8-bit parity symbols (48 bits total) Status: M Support: Yes [ ]	
Interleaving Depth	192.3.2.2.14	The interleaving depth, L, of the transmitter **shall** be predefined for each data rate and comply with Table 192–4.	181	192.13.4.1 PCS Transmit Item: PCST10 Feature: Transmitter interleaving depth, L Subclause: 192.3.2.14 Value/Comment: Round-robin interleaving scheme shown in Figure 192–8 is applied Status: M Support: Yes [ ]	
Interleaving Application	192.3.2.2.14	When L > 1, the round-robin interleaving scheme shown in Figure 192–8 **shall** be applied.	181	192.13.4.1 PCS Transmit Item: PCST11 Feature: Transmitter interleaving depth, L > 1 Subclause: 192.3.2.14 Value/Comment: Predefined for each data rate and complies with Table 192–4. Status: M Support: Yes [ ]	
Superframe Aggregation	192.3.2.2.14	The HS_TX PCS Transmit **shall** aggregate L RS-FEC input frames into an interleaved RS-FEC input superframe.	181	192.13.4.1 PCS Transmit Item: PCST12 Feature: Superframe aggregation Subclause: 192.3.2.14 Value/Comment: HS_TX PCS Transmit aggregates L RS-FEC input frames into an interleaved RS-FEC input superframe Status: M Support: Yes [ ]	

Refresh Scrambling	192.3.2.2.17	The scrambled refresh header data bit, Cn, **shall** be as in Equation (192–4).	185	192.13.4.1 PCS Transmit Item: PCST13 Feature: Scrambled refresh header data bit Subclause: 192.3.2.17 Value/Comment: See Equation (192–4) superframe Status: M Support: Yes [ ]
PRBS11 Implementation	192.3.2.2.18	The PRBS11 pattern generator **shall** produce the same result as the implementation shown in Figure 192–10.	185	192.13.4.1 PCS Transmit Item: PCST14 Feature: PRBS11 scrambler polynomial Subclause: 192.3.2.18 Value/Comment: The PRBS11 pattern generator produces the same result as the implementation shown in Figure 192–10 superframe Status: M Support: Yes [ ]
LEADER Scrambler	192.3.2.2.19	...PCS Transmit **shall** employ Equation (192–9) as the transmitter scrambler generator polynomial.	186	192.13.4.1 PCS Transmit Item: PCST15 Feature: PRBS33 scrambler polynomial, Leader Subclause: 192.3.2.19 Value/Comment: PCS Transmit uses Equation (192–9) as the transmitter scrambler generator polynomial superframe Status: M Support: Yes [ ]
FOLLOWER Scrambler	192.3.2.2.19	...PCS Transmit **shall** employ Equation (192–10) as the transmitter scrambler generator polynomial.	186	192.13.4.1 PCS Transmit Item: PCST16 Feature: PRBS33 scrambler polynomial, Follower Subclause: 192.3.2.19 Value/Comment: PCS Transmit uses Equation (192–10) as the transmitter scrambler generator polynomial superframe Status: M Support: Yes [ ]
Scrambler State Rule	192.3.2.2.19	In no case, **shall** the scrambler state be initialized to all zeros.	186	192.13.4.1 PCS Transmit Item: PCST17 Feature: Scrambler state rule Subclause: 192.3.2.19 Value/Comment: The scrambler state is never initialized to all zeros Status: M Support: Yes [ ]
Scrambler Continuity	192.3.2.2.19	This scrambler, once started during PMA training, **shall** continue to run uninterrupted during the payload of PMA training frames and data mode frames...	186	192.13.4.1 PCS Transmit Item: PCST18 Feature: Scrambler continuity Subclause: 192.3.2.19 Value/Comment: Once started, during PMA training, the scrambler continues to run uninterrupted during the payload of PMA training frames and data mode frames Status: M Support: Yes [ ]

Scrambler Stop Rule	192.3.2.2.19	...and **shall** stop during QUIET and refresh headers.	186	192.13.4.1 PCS Transmit Item: PCST19 Feature: Scrambler stop rule Subclause: 192.3.2.19 Value/Comment: Once started, during PMA training, the scrambler stops during QUIET and refresh headers Status: M Support: Yes [ ]
PAM4 Gray Mapping (TX)	192.3.2.2.20	...the PCS Transmit process **shall** map consecutive pairs of bits... to Gray-coded symbols, G(n)...	187	192.13.4.1 PCS Transmit Item: PCST20 Feature: Gray mapping (TX) for PAM4 encoding Subclause: 192.3.2.20 Value/Comment: See 192.3.2.20 Status: M Support: Yes [ ]
PAM4 Gray Mapping (RX)	192.3.2.2.20	...the PCS Receive process **shall** map Gray-coded symbols... to pairs of bits, {An, Bn}...	187	192.13.4.1 PCS Transmit Item: PCST21 Feature: Gray mapping (RX) for PAM4 encoding Subclause: 192.3.2.20 Value/Comment: See 192.3.2.20 Status: M Support: Yes [ ]
PAM4 Symbol Encoding	192.3.2.2.21	...the PCS Transmit process **shall** encode each Gray-coded symbol, G(n), to one of four PAM4 levels...	188	192.13.4.1 PCS Transmit Item: PCST22 Feature: PAM4 encoding Subclause: 192.3.2.21 Value/Comment: See 192.3.2.21 Status: M Support: Yes [ ]
PCS Receive Compliance	192.3.2.3	The PCS Receive function **shall** conform to the PCS 64B/65B Receive state diagram in Figure 192–21 and the PCS Receive bit ordering...	188	192.13.4.2 PCS Receive Item: PCSR1 Feature: PCS Receive compliance Subclause: 192.3.2.3 Value/Comment: Conforms to the PCS 64B/65B Receive state diagram in Figure 192–21 and the PCS Receive bit ordering in Figure 192–12 for the LS_RX and Figure 192–13 for the HS_RX, including compliance with the associated state variable as specified in 192.3.5.1.2 Status: M Support: Yes [ ]
LS Stream Formation	192.3.2.3.1	...the receiving PCS **shall** concatenate rx_symb values conveyed by the PMA_UNITDATA.indication during the burst payload in order from PAM2Nr to PAM2Nr + Np–1.	192	192.13.4.2 PCS Receive Item: PCSR2 Feature: Frame and block synchronization Subclause: 192.3.2.3.1 Value/Comment: The receiving PCS concatenates rx_symb values conveyed by the PMA_UNITDATA.indication during the burst payload according to its data mode (see 192.3.2.3.1) Status: M Support: Yes [ ]
HS Stream Formation	192.3.2.3.1	...the receiving PCS **shall** concatenate rx_symb values... during the burst payload in order from PAM40 to PAM4Np–1.	192	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - Row 234

LEADER Descrambler	192.3.2.3.2	For descrambling, the LEADER PHY **shall** employ the receiver descrambler generator polynomial per Equation (192–10)...	192	192.13.4.2 PCS Receive Item: PCSR3 Feature: Descrambler, Leader Subclause: 192.3.2.3.2 Value/Comment: The Leader PHY uses the receiver descrambler generator polynomial in Equation (192–10) Status: M Support: Yes [ ]
FOLLOWER Descrambler	192.3.2.3.2	...and the FOLLOWER PHY **shall** employ the receiver descrambler generator polynomial per Equation (192–9).	192	192.13.4.2 PCS Receive Item: PCSR4 Feature: Descrambler, Follower Subclause: 192.3.2.3.2 Value/Comment: The Follower PHY shall uses the receiver descrambler generator polynomial in Equation Equation (192–9) Status: M Support: Yes [ ]
RS-FEC Integrity Check	192.3.2.3.3	The PCS Receive function **shall** check the integrity of the RS-FEC parity bits defined in 192.3.2.2.13.	192	192.13.4.2 PCS Receive Item: PCSR5 Feature: RS-FEC parity bit intergity check Subclause: 192.3.2.3.3 Value/Comment: The PCS Receive function checks the integrity of the RS-FEC parity bits defined in 192.3.2.2.13 Status: M Support: Yes [ ]
Test-Pattern Transmit	192.3.3	...it **shall** transmit continuously by setting zero input and any non-zero initial condition to the PCS scrambler.	192	This text does not exist in clause 192 - Val submitted a commit to check.
Test-Pattern Receive	192.3.3	...it **shall** receive continuously as illustrated in Figure 192–12 or Figure 192–13.	192	This text does not exist in clause 192 - Val submitted a commit to check.
SEND_TS Frequency	192.3.4	SEND_TS uses a symmetric frame format and **shall** transmit at 3 GBd.	193	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS1 Feature: SEND_TS frequency Subclause: 192.3.4 Value/Comment: Uses a symmetric frame format and transmits at 3 GBd Status: M Support: Yes [ ]
Scrambler Run Persistence	192.3.4	...this scrambler **shall** continue to run uninterrupted for each symbol during all subsequent payloads...	193	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS2 Feature: 33-bit scrambler operation Subclause: 192.3.4 Value/Comment: Once started at the beginning of the training payload of the first training burst, continues to run uninterrupted for each symbol during all subsequent payloads and maintains its last state during the QUIET period and refresh headers Status: M Support: Yes [ ]
Scrambler Stop Persistence	192.3.4	...and **shall** maintain its last state during the QUIET period and refresh headers.	196	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - Row 243

Refresh Header Content	192.3.4.2	The refresh header **shall** be composed of a leading sequence of zeros followed by four bytes of 0x01, followed by four bytes of 0xF0.	197	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS3 Feature: Refresh header content Subclause: 192.3.4.2 Value/Comment: Composed of a leading sequence of zeros followed by four bytes of 0x01, followed by four bytes of 0xF0 Status: M Support: Yes [ ]
Scrambler Sync Acquisition	192.3.4.4	The PCS **shall** acquire descrambler state synchronization to the PAM2 training sequence and report success through scr_status...	199	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS4 Feature: Scrambler synchronization acquisition and reporting Subclause: 192.3.4.4 Value/Comment: The PCS acquires descrambler state synchronization to the PAM2 training sequence and reports success through scr_status, and continues to use the synchronized state in all subsequent bursts in both data and training modes Status: M Support: Yes [ ]
DECODE Function Rule	192.3.5.1.3	The DECODE function **shall** decode the block based on code specified in 192.3.2.2.4.	200	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS5 Feature: DECODE function rule Subclause: 192.3.5.1.3 Value/Comment: Decodes the block as specified in 192.3.2.2.4. Status: M Support: Yes [ ]
ENCODE Function Rule	192.3.5.1.3	The ENCODE function **shall** encode the block as specified in 192.3.2.2.4.	200	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS6 Feature: ENCODE function rule Subclause: 192.3.5.1.3 Value/Comment: Encodes the block as specified in 192.3.2.2.4. Status: M Support: Yes [ ]
PCS Logic Adherence	192.3.5.2	The PCS **shall** perform the functions of RFER monitor, Transmit, and Receive as specified in these state diagrams.	202	192.13.4.3 Physical Coding Sublayer (PCS) Item: PCS7 Feature: PCS functions Subclause: 192.3.5.2 Value/Comment: Performs the functions of RFER monitor, Transmit, and Receive as shown in Figure 192–19 , Figure 192–20, and Figure 192–21 Status: M Support: Yes [ ]
PMA Reset Execution	192.4.2.1	The PMA Reset function **shall** be executed whenever one of the two following conditions occur...	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.1 PMA Reset Item: PMAR1 Feature: PMA Reset function Subclause: 192.4.2.1 Value/Comment: See 192.4.2.1 Status: M Support: Yes [ ]

PMA Transmit Operation	192.4.2.2	...PMA Transmit **shall** continuously transmit pulses modulated by the symbols given by tx_symb onto the MDI...	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT1 Feature: PMA Transmit operation Subclause: 192.4.2.2 Value/Comment: Continuously transmits pulses modulated by the symbols given by tx_symb onto the MDI, followed by a QUIET period to complete a TDD cycle, when the PHY Control state diagram (see Figure 192–26) is not in the DISABLE_TRANSMITTER state Status: M Support: Yes [ ]
PMA Signal Compliance	192.4.2.2	The signals generated by PMA Transmit **shall** comply with the electrical specifications given in 192.5.2.	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT2 Feature: PMA Transmit signal compliance Subclause: 192.4.2.2 Value/Comment: Complies with the electrical specifications given in 192.5.2 Status: M Support: Yes [ ]
LEADER Clock Source	192.4.2.2	...the PMA Transmit function **shall** source the transmit symbol clock TX_TCLK from a local clock source...	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT3 Feature: Clock source, LEADER Subclause: 192.4.2.2 Value/Comment: The transmit symbol clock TX_TCLK is sourced from a local clock source, while meeting the transmit jitter requirements of 192.5.2.3, when the PMA_CONFIG.indication parameter config is LEADER Status: M Support: Yes [ ]
Loop Timing Requirement	192.4.2.2	The LEADER-FOLLOWER relationship **shall** include loop timing.	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT4 Feature: Loop timing Subclause: 192.4.2.2 Value/Comment: The LEADER-FOLLOWER relationship include loops timing Status: M Support: Yes [ ]
FOLLOWER Clock Source	192.4.2.2	...the PMA Transmit function **shall** source TX_TCLK from the recovered clock of 192.4.2.6...	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT5 Feature: Clock source, FOLLOWER Subclause: 192.4.2.2 Value/Comment: The transmit symbol clock TX_TCLK is sourced from the recovered clock of 192.4.2.6, while meeting the jitter requirements of 192.5.2.3, when the PMA_CONFIG.indication parameter config is FOLLOWER Status: M Support: Yes [ ]

Transmit Fault Mapping	192.4.2.2	...this function **shall** be mapped to the transmit fault bit as specified in 45.2.1.7.4.	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT6 Feature: Transmit fault function mapping Subclause: 192.4.2.2 Value/Comment: Mapped to the transmit fault bit, as specified in 45.2.1.7.4, f the MDIO interface is implemented Status: O Support: Yes [ ]
Launch Power (Disable)	192.4.2.2.1	...this function **shall** cause the average launch power of the transmitter to be as specified in 192.5.2.4 when the value of tx_symb is Z.	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.2 PMA Transmit Item: PMAT7 Feature: Launch power disable Subclause: 192.4.2.2.1 Value/Comment: The average launch power of the transmitter is as specified in 192.5.2.4 when the PMA_transmit_disable variable is set to TRUE and the value of tx_symb is Z Status: M Support: Yes [ ]
PMA Receive Quality	192.4.2.3	The quality of these symbols **shall** allow RFER of less than 2 × 10–10 after RS-FEC decoding...	208	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.3 PMA Receive Item: PMAR1 Feature: Receive quality Subclause: 192.4.2.3 Value/Comment: See 192.4.2.3 Status: M Support: Yes [ ]
Status Constraint	192.4.2.3	The reception of Z symbols during the TDD QUIET period alone **shall** not trigger setting loc_rcvr_status to NOT_OK.	209	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.3 PMA Receive Item: PMAR2 Feature: Status constraint Subclause: 192.4.2.3 Value/Comment: The reception of Z symbols during the TDD QUIET period alone does not trigger setting loc_rcvr_status to NOT_OK Status: M Support: Yes [ ]
Receive Fault Mapping	192.4.2.3	...this function **shall** contribute to the receive fault bit specified in 45.2.1.7.5.	209	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.3 PMA Receive Item: PMAR3 Feature: Receive fault function mapping Subclause: 192.4.2.3 Value/Comment: Contributed to the receive fault bit specified in 45.2.1.7.5, f the MDIO interface is implemented Status: O Support: Yes [ ]
PHY Control Compliance	192.4.2.4	PHY Control **shall** comply with the state diagram in Figure 192–26.	209	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.3 PHY Control Item: CNTRL1 Feature: PHY control compliance Subclause: 192.4.2.4 Value/Comment: Complies with the state diagram in Figure 192–26 Status: M Support: Yes [ ]

Infofield Fields	192.4.2.4	The 12-octet Infofield **shall** include the fields in 192.4.2.4.2 through 192.4.2.4.8...	209	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.4 Infofield Item: IF1 Feature: 12-octet Infofield fields Subclause: 192.4.2.4 Value/Comment: Include the fields in 192.4.2.4.2 through 192.4.2.4.8 as shown in Figure 192–23 and Figure 192–24 Status: M Support: Yes [ ]
Infofield transmission	192.4.2.4	When PMA_state = 00, Infofield shall be transmitted at least 16 times with each change to octets 7 to 10.	209	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.4 Infofield Item: IF2 Feature: Infofield transmission Subclause: 192.4.2.4 Value/Comment: Transmit Infofield at least 16 times with each change to octets 7 to 10 when PMA_state = 00 Status: M Support: Yes [ ]
Infofield Reserved Bits	192.4.2.4.1	...Reserved <bit location>... **shall** be set to zero on transmit and ignored when received...	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.4 Infofield Item: IF3 Feature: Infofield reserved bits Subclause: 192.4.2.4.1 Value/Comment: Unused values are set to zero on transmit and ignored when received by the link partner Status: M Support: Yes [ ]
Infofield SFD	192.4.2.4.2	The start of Frame Delimiter... **shall** use the hexadecimal value 0xBBA700.	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.4 Infofield Item: IF4 Feature: Infofield start of frame delimiter Subclause: 192.4.2.4.2 Value/Comment: Uses the hexadecimal value 0xBBA700 Status: M Support: Yes [ ]
PMA State Communication	192.4.2.4.4	The two state-indicator bits PMA_state<7:6> **shall** communicate the state of the transmitting transceiver to the link partner.	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 Message Field Item: MF1 Feature: PMA state communication Subclause: 192.4.2.4.4 Value/Comment: Bits PMA_state<7:6> communicate the state of the transmitting transceiver to the link partner Status: M Support: Yes [ ]
Training Phase Signal	192.4.2.4.4	The two training_phase-indicator bits training_phase<4:3> **shall** communicate the training phase...	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 Message Field Item: MF2 Feature: Training phase signal Subclause: 192.4.2.4.4 Value/Comment: Bits training_phase<4:3> communicate the training phase of the transmitting transceiver to the link partner Status: M Support: Yes [ ]

Invalid Value Transmission	192.4.2.4.4	All possible Message Field settings are listed in Table 192–10 for the LEADER or FOLLOWER. Any other values **shall** not be transmitted…	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 Message Field Item: MF3 Feature: Invalid value transmission Subclause: 192.4.2.4.4 Value/Comment: Values not listed in Table 192–10 for the LEADER or FOLLOWER are not transmitted and ignored at the receiver Status: M Support: Yes [ ]
Invalid Value Reception	192.4.2.4.4	All possible Message Field settings are listed in Table 192–10 for the LEADER or FOLLOWER. Any other values … **shall** be ignored at the receiver.	210	Seems like an unecessary shall. Grouped with the PICS on row 267 for now. Val submitted the following comment: Replace, "Any other values shall not be transmitted and shall be ignored at the receiver." with, "Any other values shall not be transmitted."
Initial Message Field (Leader)	192.4.2.4.4	The Message Field setting for the first transmitted PMA burst **shall** be the first row of Table 192–10 for the LEADER…	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 Message Field Item: MF4 Feature: Initial Message Field setting Subclause: 192.4.2.4.4 Value/Comment: The Message Field setting for the first transmitted PMA burst is the first row of Table 192–10 for the LEADER, and the first or second row of Table 192–10 for the FOLLOWER Status: M Support: Yes [ ]
Initial Message Field (Follower)	192.4.2.4.4	The Message Field setting for the first transmitted PMA burst … the first or second row of Table 192–10 for the FOLLOWER.	210	Grouped with PICS on row 269.
Next Message Field	192.4.2.4.4	…the next Message Field setting **shall** be the same Message Field setting or the Message Field setting corresponding to a row below…	210	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 Message Field Item: MF5 Feature: Next Message Field Subclause: 192.4.2.4.4 Value/Comment: Is the same Message Field setting or the Message Field setting corresponding to a row below the current setting in Table 192-10 Status: M Support: Yes [ ]
OAM Enablement	192.4.2.4.5	The optional OAM capability **shall** be enabled only if both PHYs set the capability bit OAMen=1.	212	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 PHY capability Item: CAP1 Feature: OAM capability Subclause: 192.4.2.4.5 Value/Comment: Enabled only if both PHYs set the capability bit OAMen=1 Status: O Support: Yes [ ]

Capability Validity	192.4.2.4.5	The capability bit values **shall** be considered as valid only when loc_rcvr_status<5> bit is 1.	212	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.5 PHY capability Item: CAP2 Feature: OAM capability validity Subclause: 192.4.2.4.5 Value/Comment: Valid only when loc_rcvr_status<5> bit is 1 Status: O Support: Yes [ ]
Delay Count Acceptance	192.4.2.4.6	The FOLLOWER **shall** accept the received remote delay_count only when received remote delay_count_valid bit is set to 1.	214	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 TDD delay counter Item: DLY1 Feature: Delay count acceptance Subclause: 192.4.2.4.6 Value/Comment: The FOLLOWER accept the received remote delay_count only when received remote delay_count_valid bit is set to 1 Status: M Support: Yes [ ]
Delay Count Storage	192.4.2.4.6	The FOLLOWER **shall** store this delay_count number.	213	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 TDD delay counter Item: DLY2 Feature: Delay count storage Subclause: 192.4.2.4.6 Value/Comment: The FOLLOWER stores delay_count number Status: M Support: Yes [ ]
Delay Acknowledgment	192.4.2.4.6	...the FOLLOWER **shall** send back its received delay count in its own delay_count field...	213	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 TDD delay counter Item: DLY3 Feature: Delay acknowledgment Subclause: 192.4.2.4.6 Value/Comment: The FOLLOWER sends back its own delay_count field as acknowledgment of delay_count reception, and set its delay_count_valid to 1 Status: M Support: Yes [ ]
Negotiation Success Rule	192.4.2.4.6	...it **shall** set negotiation_done to OK.	213	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 TDD delay counter Item: DLY4 Feature: Negotiation success rule Subclause: 192.4.2.4.6 Value/Comment: The LEADER or the FOLLOWER sets negotiation_done to OK when it finishes the exchange of delay count and the negotiated data rates Status: M Support: Yes [ ]
FOLLOWER Burst Adjust	192.4.2.4.6	...the FOLLOWER **shall** adjust its transmit burst position according to the stored delay_count.	213	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 TDD delay counter Item: DLY5 Feature: FOLLOWER burst adjustment Subclause: 192.4.2.4.6 Value/Comment: The FOLLOWER adjusts its transmit burst position according to the stored delay_count, starting from Asymmetric training and continuing through to the data mode Status: M Support: Yes [ ]

Phase Switch Limit	192.4.2.4.7	PhaseSwBC24 **shall** be a minimum of 16 and a maximum of 256 from the BC24 value...	214	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 Phase switch Item: PS1 Feature: PhaseSwBC24 burst count Subclause: 192.4.2.4.7 Value/Comment: A minimum of 16 and a maximum of 256 from the BC24 value sent in the first burst after entering a COUNTDOWN state Status: M Support: Yes [ ]
Infofield CRC16	192.4.2.4.9	CRC16 (2 octets) **shall** implement the CRC16 polynomial (x + 1)(x15 + x + 1)...	215	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 CRC16 Item: CRC1 Feature: CRC16 Infofield Subclause: 192.4.2.4.9 Value/Comment: Implements the CRC16 polynomial (x + 1)(x15 + x + 1) of the previous 7 octets, Oct4<7:0>, Oct5<7:0>, Oct6<7:0>, Oct7<7:0>, Oct8<7:0>, Oct9<7:0>, and Oct10<7:0> Status: M Support: Yes [ ]
CRC16 Verification	192.4.2.4.9	The CRC16 **shall** produce the same result as the implementation shown in Figure 192–25.	215	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 CRC16 Item: CRC2 Feature: CRC16 verification Subclause: 192.4.2.4.9 Value/Comment: Produces the same result as the implementation shown in Figure 192–25 Status: M Support: Yes [ ]
CRC Initialization	192.4.2.4.9	In Figure 192–25 the 16 delay elements S0,..., S15, **shall** be initialized to zero.	215	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.6 CRC16 Item: CRC3 Feature: CRC16 initialization Subclause: 192.4.2.4.9 Value/Comment: The 16 delay elements S0,..., S15 are initialized to zero as shown in Figure 192–25 Status: M Support: Yes [ ]
Startup Compliance	192.4.2.4.11	The startup sequence **shall** comply with the state diagram description given in Figure 192–26.	215	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.7 Startup Item: ST1 Feature: Startup sequence compliance Subclause: 192.4.2.4.11 Value/Comment: Complies with the state diagram description given in Figure 192–26 Status: M Support: Yes [ ]

TRAINING0 Alignment	192.4.2.4.11	...first symbol of the FOLLOWER's transmit PMA training frame at the transmit MDI **shall** be aligned so that it is 400 ± 1 transmit symbols after...	215	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.7 Startup Item: ST2 Feature: TRAINING0 alignment Subclause: 192.4.2.4.11 Value/Comment: The first symbol of the FOLLOWER's transmit PMA training frame at the transmit MDI is aligned at 400 ± 1 transmit symbols after the last PMA training payload symbol from the LEADER arrived at the FOLLOWER input MDI Status: M Support: Yes [ ]
Alignment Maintenance	192.4.2.4.11	The FOLLOWER **shall** maintain this alignment while in the TRAINING0 and COUNTDOWN0... states.	215	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.7 Startup Item: ST3 Feature: Alignment maintenance Subclause: 192.4.2.4.11 Value/Comment: The FOLLOWER maintains alignment while in the TRAINING0 and COUNTDOWN0 (i.e., while tx_mode = SEND_TS) states Status: M Support: Yes [ ]
TRAINING1 Alignment	192.4.2.4.11	...the FOLLOWER **shall** use the LEADER transmitted delay_count to align its transmit PMA training frame to be 176 ns - delay_count × 5.333 ns...	216	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.7 Startup Item: ST4 Feature: TRAINING1 alignment Subclause: 192.4.2.4.11 Value/Comment: The FOLLOWER uses the LEADER transmitted delay_count to align its transmit PMA training frame to be 176 ns - delay_count × 5.333 ns (± 5.333 ns) after the last PMA training payload symbol from the LEADER appears on the FOLLOWER input MDI Status: M Support: Yes [ ]
Alignment Maintenance (A)	192.4.2.4.11	The FOLLOWER **shall** maintain this alignment while tx_mode is SEND_TA or SEND_N.	216	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.7 Startup Item: ST5 Feature: Alignment maintenance Subclause: 192.4.2.4.11 Value/Comment: The FOLLOWER maintains ita alignment while tx_mode is SEND_TA or SEND_N Status: M Support: Yes [ ]
Link Monitor Compliance	192.4.2.5	The Link Monitor function **shall** comply with the state diagram of Figure 192–28.	216	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.8 Link Monitor Item: LM1 Feature: Link Monitor function compliance Subclause: 192.4.2.5 Value/Comment: Complies with the state diagram of Figure 192–28 Status: M Support: Yes [ ]

Clock Recovery Purpose	192.4.2.6	The Clock Recovery function **shall** provide a clock suitable for signal sampling...	216	192.13.4.4 Physical Medium Attachment (PMA) 192.13.4.4.9 Clock Recovery Item: CR1 Feature: Clock Recovery function Subclause: 192.4.2.6 Value/Comment: Provides a clock suitable for signal sampling so that the RFER indicated in 192.4.2.3 is achieved Status: M Support: Yes [ ]
MDI Signal Response	192.4.3.1	This symbol response **shall** comply with the electrical specifications given in 192.5.2.	217	192.13.4.5 MDI signals Item: MDI1 Feature: MDI symbol response compliance Subclause: 192.4.3.1 Value/Comment: Complies with the electrical specifications given in 192.5.2 Status: M Support: Yes [ ]
link_fail_timer expire	192.4.4.2	The timer **shall** expire 97.5 ms □ □□5 ms after being started.	219	192.13.4.6 Timers Item: TIM1 Feature: link_fail_timer expiration Subclause: 192.4.4.2 Value/Comment: Expires 97.5 ms ± 5 ms after being started Status: M Support: Yes [ ]
minwait_timer expire	192.4.4.2	The timer **shall** expire 975 □s □ 50 □s after being started.	219	192.13.4.6 Timers Item: TIM2 Feature: minwait_timer expiration Subclause: 192.4.4.2 Value/Comment: Expires 975 μs ± 50 μs after being started Status: M Support: Yes [ ]
tdd_watchdog_timer expire	192.4.4.2	The timer **shall** expire 96 □s □ 5 □s after being started.	219	192.13.4.6 Timers Item: TIM3 Feature: tdd_watchdog_timer expiration Subclause: 192.4.4.2 Value/Comment: Expires 96 μs ± 5 μs after being started Status: M Support: Yes [ ]
Test Mode Provision	192.5.1	The test modes described as follows **shall** be provided to allow for testing...	222	(Source reference P802.3da 188.6.1 PMDE3) 192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM1 Feature: Test modes Subclause: 192.5.1 Value/Comment: Implemented in PHY to allow testing transmitter electrical requirements Status: M Support: Yes [ ]

Test Mode Enablement	192.5.1	If MDIO is implemented, these test modes **shall** be enabled by setting a control register...	222	(Source reference P802.3da 188.6.1 PMDE4) 192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM2 Feature: Enable test modes Subclause: 192.5.1 Value/Comment: Enable by setting control register, 1.2313.15:13 as described in192.5.1 when MDIO implemented; enabling of test modes is provided otherwise when MDIO is not implemented Status: M Support: Yes [ ]
Test Mode Restriction	192.5.1	The test modes **shall** only change the data symbols... and do not alter the electrical and jitter characteristics...	222	(Source reference P802.3da 188.6.1 PMDE5) 192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM3 Feature: Test mode operation Subclause: 192.5.1 Value/Comment: Test modes only change data symbols provided to the transmitter circuitry Status: M Support: Yes [ ]
Clock Access (TM1)	192.5.1	When in this mode, the PHY **shall** provide access to a frequency reduced version of the transmit symbol clock...	222	192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM4 Feature: Test mode 1 Subclause: 192.5.1 Value/Comment: When enabled, PHY provides access to a frequency reduced version of the transmit symbol clock or TX_TCLK_187.5. TX_TCLK_187.5 is equal to 187.5 MHz and is a divided version of TX_TCLK that times the transmitted symbols Status: M Support: Yes [ ]
Repeating Pattern (TM2)	192.5.1	...the PHY **shall** transmit a continuous repeating pattern of {+1, –1} symbols...	223	192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM5 Feature: Test mode 2 Subclause: 192.5.1 Value/Comment: When enabled, PHY transmits a continuous repeating pattern of {+1, –1} symbols with the transmitted symbols timed by TX_TCLK derived from its local clock reference Status: M Support: Yes [ ]
Distortion Pattern (PAM2)	192.5.1	...the PHY **shall** transmit the sequence of symbols generated by the PCS scrambler generator polynomial per Equation (192–16)...	223	192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM6 Feature: Test mode 4, PAM2 mode Subclause: 192.5.1 Value/Comment: When enabled, PHY transmits the sequence of symbols generated by the PCS scrambler generator polynomial per Equation (192–16). All PHYs support transmission of this signal at 3 GBd. PHYs that support 5 Gb/s and 10 Gb/s transmit rates support transmission of this signal at 6 GBd. Status: M Support: Yes [ ]

3 GBd Support (Dist)	192.5.1	All PHYs **shall** support transmission of this signal at 3 GBd.	223	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - Row 299	
6 GBd Support (Dist)	192.5.1	PHYs that support 5 Gb/s and 10 Gb/s transmit rates **shall** support transmission of this signal at 6 GBd.	223	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - Row 299	
Distortion Pattern (PAM4)	192.5.1	...the PHY **shall** transmit the PCS scrambler generator polynomial per Equation (192–16)...	223	192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM7 Feature: Test mode 4, PAM4 mode Subclause: 192.5.1 Value/Comment: When enabled, PHY transmits the PCS scrambler generator polynomial per Equation (192–16). PHYs that support 10 Gb/s transmit rates support transmission of this signal at 6 GBd. Status: M Support: Yes [ ]	
6 GBd Support (10G)	192.5.1	PHYs that support 10 Gb/s transmit rates **shall** support transmission of this signal at 6 GBd.	223	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - Row 302	
PRBS11 Implementation	192.5.1	The PRBS11 pattern generator **shall** produce the same result as the implementation shown in Figure 192–10.	223	XXX	This is a duplicate entry from a copy error (this text is found in 192.3.22.18). Was another 'shall' statement supposed to be here instead? I can't find one.
TM5 Transmit Mode	192.5.1	...the PHY **shall** transmit continuously with no QUIET period or refresh header and with transmit signal level corresponding to the data mode...	223	192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM8 Feature: Test mode 5 Subclause: 192.5.1 Value/Comment: When enabled, PHY transmits continuously with no QUIET period or refresh header and with transmit signal level corresponding to the data mode of operation Status: M Support: Yes [ ]	
TM6 Transmit Pattern	192.5.1	...the PHY **shall** transmit a continuous pattern of 30 {+1} symbols followed by 30 {–1} symbols...	224	192.13.4.7 PMA electrical specifications 192.13.4.7.1 Test modes Item: TM9 Feature: Test mode 6 Subclause: 192.5.1 Value/Comment: When enabled, PHY transmits a continuous pattern of 30 {+1} symbols followed by 30 {–1} symbols with the transmitted symbols timed from its local 3 GHz clock source Status: M Support: Yes [ ]	
Input AC-coupling	192.5.2	The electrical input **shall** be ac-coupled (i.e., it presents a high dc common-mode impedance at the MDI).	225	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT1 Feature: Coupling Subclause: 192.5.2 Value/Comment: Electrical input is ac-coupled Status: M Support: Yes [ ]	

Resistive Load Support	192.5.2	...the transmitter **shall** meet the requirements of this clause with a 100 □ resistive differential load...	225	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT2 Feature: Transmitter electrical specifications Subclause: 192.5.2 Value/Comment: Meets requirements of 192.5.2 Status: M Support: Yes [ ]
Output Droop Limit	192.5.2.1	...the magnitude of both the positive and negative droop **shall** be less than 24%...	225	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT2 Feature: Transmitter output droop Subclause: 192.5.2.1 Value/Comment: Less than 24%, measured with respect to an initial value at 2 ns after the zero crossing and a final value at 8 ns after the zero crossing, when measured in test mode 6 using transmitter test fixture 1 or test fixture 3 Status: M Support: Yes [ ]
Peak Distortion Limit	192.5.2.2	The peak distortion values... **shall** be less than 20 mV... and less than 15 mV for PAM4 transmitters.	225	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT3 Feature: Transmitter peak distortion Subclause: 192.5.2.2 Value/Comment: Less than 20 mV when the peak signal level is normalized to 1 V for PAM2 transmitters and less than 15 mV for PAM4 transmitters, measured at a minimum of 10 equally spaced phases of a single symbol period Status: M Support: Yes [ ]
LEADER RMS Jitter	192.5.2.3	...jitter frequencies greater than 100 kHz... **shall** be less than 1 ps when supporting 10 Gb/s, 2 ps... 5 Gb/s/, and 4 ps... 2.5 Gb/s.	227	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT4 Feature: RMS jitter, Leader mode Subclause: 192.5.2.3 Value/Comment: Less than 1 ps when supporting 10 Gb/s, less than 2 ps when supporting 5 Gb/s/, and less than 4 ps when supporting 2.5 Gb/s for jitter frequencies greater than 100 kHz, measured in test mode 2 using test fixture 1 for -T1 and test fixture 3 for -V1 Status: M Support: Yes [ ]
LEADER TIE Limit	192.5.2.3	Peak-to-peak of Time Interval Error... **shall** be less than 10 ps when supporting 10 Gb/s, 20 ps... 5 Gb/s, and 40 ps... 2.5 Gb/s.	227	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT5 Feature: Time Interval Error, Leader mode Subclause: 192.5.2.3 Value/Comment: Less than 10 ps when supporting 10 Gb/s, less than 20 ps when supporting 5 Gb/s, and less than 40 ps when supporting 2.5 Gb/s, measured in test mode 1 using test fixture 2 over a period of 100 μs Status: M Support: Yes [ ]

FOLLOWER RMS Jitter	192.5.2.3	...jitter frequencies greater than 1 MHz... **shall** be less than 1 ps when supporting 10 Gb/s, 2 ps... 5 Gb/s, and 4 ps... 2.5 Gb/s.	227	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT6 Feature: RMS jitter, Follower mode Subclause: 192.5.2.3 Value/Comment: Less than 1 ps when supporting 10 Gb/s, less than 2 ps when supporting 5 Gb/s/, and less than 4 ps when supporting 2.5 Gb/s for jitter frequencies greater than 1 MHz, measured in test mode 1 Status: M Support: Yes [ ]
FOLLOWER TIE Limit	192.5.2.3	Peak-to-peak of Time Interval Error over any period of 10 μs... **shall** be less than 15 ps for 10 Gb/s, 30 ps for 5 Gb/s, and 60 ps for 2.5 Gb/s.	227	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT7 Feature: Time Interval Error, Follower mode Subclause: 192.5.2.3 Value/Comment: Less than 15 ps when supporting 10 Gb/s, less than 30 ps when supporting 5 Gb/s, and less than 60 ps when supporting 2.5 Gb/s, measured in test mode 1 over 50 overlapping periods of 10 μs Status: M Support: Yes [ ]
Transmit Power	192.5.2.4	The measured transmit power shall be in the range specified in Table 192–19 when using the same test fixture as used for PSD measurement.	227	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT8 Feature: Transmitter power levels Subclause: 192.5.2.4 Value/Comment: In the range of values specified in Table 192–19 when using the PSD measurement test fixture Status: M Support: Yes [ ]
Quiet Signal Level	192.5.2.4	...the transmit signal **shall** be less than -36 dBm for frequencies greater 10 MHz.	227	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT9 Feature: MDI transmit signal Subclause: 192.5.2.4 Value/Comment: Nominally zero and less than -36 dBm for frequencies greater 10 MHz Status: M Support: Yes [ ]

Transmit PSD Masks	192.5.2.4	...the power spectral density... **shall** be between the upper and lower masks specified in Equation (192–17) and Equation (192–18).	227	192.13.3 Major capabilities/options Item: *PHY-T1 Feature: MultiGBASE-AT1 capability Subclause: 192.1.1 Value/Comment: Supports MultiGBASE-AT1 operation Status: O Support: Yes [ ], No [ ] Item: *PHY-V1 Feature: MultiGBASE-AV1 capability Subclause: 192.1.1 Value/Comment: Supports MultiGBASE-AV1 operation Status: O Support: Yes [ ], No [ ] 192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT10 Feature: Transmitter power spectral density, -T1 Subclause: 192.5.2.4 Value/Comment: Between the upper and lower masks specified in Equation (192–17) and Equation (192–18), measured into a 100 Ω differential load using test fixture 1 Status: *PHY-T1:M Support: Yes [ ], N/A [ ]
Local Symbol Rate	192.5.2.6	...the symbol transmission rate **shall** be within the range 6 × S GBd ± 100 ppm with drift less than 1 ppm/sec).	230	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT11 Feature: Symbol transmission rate Subclause: 192.5.2.6 Value/Comment: Within the range of 6 × S GBd ± 100 ppm with drift less than 1 ppm/sec Status: M Support: Yes [ ]
Recovered Symbol Rate	192.5.2.6	...the symbol transmission rate (scaled by S) **shall** be within ± 10ppm of the recovered clock.	230	192.13.4.7 PMA electrical specifications 192.13.4.7.2 Transmitter Item: PMAT12 Feature: Recovered symbol rate Subclause: 192.5.2.6 Value/Comment: Within ± 10ppm of the recovered clock used by the Follower Status: M Support: Yes [ ]
HS Received BER (-T1)	192.5.3.1	Differential signals... **shall** be received with a BER less than 10–12 after RS-FEC decoding...	230	192.13.4.7 PMA electrical specifications 192.13.4.7.3 Receiver Item: PMAR1 Feature: Bit error rate, -T1 Subclause: 192.5.3.1 Value/Comment: Less than 10^{-12} after RS-FEC decoding Status: *PHY-T1:M Support: Yes [ ], N/A [ ]

HS Received BER (-V1)	192.5.3.1	Single-ended signals... **shall** be received with a BER less than 10–12 after RS-FEC decoding...	230	192.13.4.7 PMA electrical specifications 192.13.4.7.3 Receiver Item: PMAR2 Feature: Bit error rate, -V1 Subclause: 192.5.3.1 Value/Comment: Less than 10^{-12} after RS-FEC decoding Status: *PHY-V1:M Support: Yes [ ], N/A [ ]
Insertion Loss (-T1)	192.7.1.1	The insertion loss of a -T1 link segment **shall** meet the values determined using Equation (192–19).	232	(Source reference P802.3da 188.12.3) 192.13.3 Major capabilities/options Item: *INS-LS, T1 Feature: Installation/link segment, -T1 Subclause: 192.7 Value/Comment: Items marked with INS-LS,T1 include installation and cabling specifications for link segments and are not applicable to a PHY manufacturer Status: O Support: Yes [ ], No [ ] (Source reference P802.3da 188.12.4.7) 192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST1 Feature: -T1 insertion loss Subclause: 192.7.1.1 Value/Comment: Meets requirements of 192.7.1.1 Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]
Return Loss (-T1)	192.7.1.3	The return loss of a -T1 link segment **shall** meet the values determined using Equation (192–20).	233	192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST2 Feature: -T1 return loss Subclause: 192.7.1.3 Value/Comment: Meets requirements of 192.7.1.3 Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]
Coupling Atten (-T1)	192.7.1.4	The coupling attenuation of a -T1 link segment **shall** be as specified in 149.7.1.4.	233	192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST3 Feature: -T1 coupling attenutation Subclause: 192.7.1.4 Value/Comment: Meets requirements of 149.7.1.4 Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]
Screening Atten (-T1)	192.7.1.5	The screening attenuation of a -T1 link segment **shall** be as specified in 149.7.1.5.	233	192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST4 Feature: -T1 screening attenutation Subclause: 192.7.1.5 Value/Comment: Meets requirements of 149.7.1.5 Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]

Max Link Delay (-T1)	192.7.1.6	The propagation delay of a -T1 link segment **shall** not exceed 160 ns for all frequencies...	234	192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST5 Feature: -T1 propagation delay Subclause: 192.7.1.6 Value/Comment: Not more than 160 ns for all frequencies between 3 MHz and 4 GHz Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]
PSANEXT Loss (-T1)	192.7.2.1	The PSANEXT loss... **shall** meet the values determined using Equation (192–22).	234	192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST6 Feature: -T1 PSANEXT loss Subclause: 192.7.2.1 Value/Comment: Meets requirements of 192.7.2.1 Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]
PSAACRF (-T1)	192.7.2.2	The PSAACRF... **shall** meet the values determined using Equation (192–24).	235	192.13.4.8 Link segment 192.13.4.8.1 Link segment characteristics, -T1 Item: LST7 Feature: -V1 PSAACRF Subclause: 192.7.2.2 Value/Comment: Meets requirements of 192.7.2.2 Status: INS-LS, T1:M Support: Yes [ ], N/A [ ]
Insertion Loss (-V1)	192.8.1.1	The insertion loss of a -V1 link segment **shall** meet the values determined using Equation (192–25).	237	(Source reference P802.3da 188.12.3) 192.13.3 Major capabilities/options Item: *INS-LS, V1 Feature: Installation/link segment, -V1 Subclause: 192.8 Value/Comment: Items marked with INS-LS,V1 include installation and cabling specifications for link segments and are not applicable to a PHY manufacturer Status: O Support: Yes [ ], No [ ] (Source reference P802.3da 188.12.4.7) 192.13.4.8 Link segment 192.13.4.8.2 Link segment characteristics, -V1 Item: LSV1 Feature: -V1 insertion loss Subclause: 192.8.1.1 Value/Comment: Meets requirements of 192.8.1.1 Status: INS-LS, V1:M Support: Yes [ ], N/A [ ]
Return Loss (-V1)	192.8.1.3	The return loss of a -V1 link segment **shall** meet the values determined using Equation (192–26).	238	192.13.4.8 Link segment 192.13.4.8.2 Link segment characteristics, -V1 Item: LSV2 Feature: -V1 return loss Subclause: 192.8.1.3 Value/Comment: Meets requirements of 192.8.1.3 Status: INS-LS, V1:M Support: Yes [ ], N/A [ ]

Screening Atten (-V1)	192.8.1.5	The screening attenuation of a -V1 link segment... **shall** meet the values determined using Equation (192–27).	239	192.13.4.8 Link segment 192.13.4.8.2 Link segment characteristics, -V1 Item: LSV3 Feature: -V1 screening attenutation Subclause: 192.8.1.5 Value/Comment: Measured in accordance with ISO 19642–11 and meets requirements of 192.8.1.5 Status: INS-LS, V1:M Support: Yes [ ], N/A [ ]
Max Link Delay (-V1)	192.8.1.6	The propagation delay of a -V1 link segment **shall** not exceed 160 ns for all frequencies...	239	192.13.4.8 Link segment 192.13.4.8.2 Link segment characteristics, -V1 Item: LSV4 Feature: -V1 propagation delay Subclause: 192.8.1.6 Value/Comment: Not more than 160 ns for all frequencies between 3 MHz and 4 GHz Status: INS-LS, V1:M Support: Yes [ ], N/A [ ]
PSANEXT Loss (-V1)	192.8.2.1	The PSANEXT loss... **shall** meet the values determined using Equation (192–29).	240	192.13.4.8 Link segment 192.13.4.8.2 Link segment characteristics, -V1 Item: LSV5 Feature: -V1 PSANEXT loss Subclause: 192.8.2.1 Value/Comment: Meets requirements of 192.8.2.1 Status: INS-LS, V1:M Support: Yes [ ], N/A [ ]
PSAACRF (-V1)	192.8.2.2	The PSAACRF... **shall** meet the values determined using Equation (192–31).	241	192.13.4.8 Link segment 192.13.4.8.2 Link segment characteristics, -V1 Item: LSV6 Feature: -V1 PSAACRF Subclause: 192.8.2.2 Value/Comment: Meets requirements of 192.8.2.2 Status: INS-LS, V1:M Support: Yes [ ], N/A [ ]
MDI Mating Spec	192.9.2	The electrical requirements... **shall** be met when the PHY is connected to the -T1 MDI connector...	242	192.13.4.9 MDI 192.13.4.9.1 MDI specification, -T1 Item: MDIT-1 Feature: MDI, -T1 electrical requirements Subclause: 192.19.2. Value/Comment: Electrical requirements are for when a PHY is connected to the -T1 MDI connector mated with a specified connector to a shielded balanced pair of conductors Status: M Support: Yes [ ]
MDI Return Loss (-T1)	192.9.2.1	The differential impedance at the -T1 MDI for each transmitter/receiver shall be such that any reflection due to signals incident upon the -T1 MDI from the cabling relative to the incident signal are per the relationship shown in Equation (192–32).	243	(Source reference P802.3da 188.12.4.8 TC12) 192.13.4.9 MDI 192.13.4.9.1 MDI specification, -T1 Item: MDIT-2 Feature: MDI, -T1 return loss Subclause: 192.9.2.1 Value/Comment: For each transmitter/receiver, measured with a nominal impedance of 50 Ω Status: M Support: Yes [ ]

MDI Fault Tolerance (-T1)	192.9.3	The -T1 MDI fault tolerance **shall** comply with 96.8.3.	243	(Source reference P802.3da 189.8.4.5 AES8) 192.13.4.9 MDI 192.13.4.9.1 MDI specification, -T1 Item: MDIT-3 Feature: MDI, T1 fault tolerance Subclause: 192.9.3 Value/Comment: Meets requirements of 96.8.3 Status: M Support: Yes [ ]	
MDI Mating Spec (-V1)	192.10.2	The electrical requirements... **shall** be met when the PHY is connected to the -V1 MDI connector...	244	192.13.4.9 MDI 192.13.4.9.2 MDI specification, -V1 Item: MDIV-1 Feature: MDI, -V1 electrical requirements Subclause: 192.10.2 Value/Comment: Electrical requirement are for when a PHY is connected to the -V1 MDI connector mated with a specified connector to a single coaxial cable Status: M Support: Yes [ ]	
MDI Return Loss (-V1)	192.10.2.1	The differential impedance at the -V1 MDI for each transmitter/receiver shall be such that any reflection due to signals incident upon the -V1 MDI from the cabling relative to the incident signal are per the relationship shown in Equation (192–33).	243	(Source reference P802.3da 188.12.4.8 TC12) 192.13.4.9 MDI 192.13.4.9.2 MDI specification, -V1 Item: MDIV-2 Feature: MDI, -V1 return loss Subclause: 192.10.2.1 Value/Comment: For each transmitter/receiver, measured with a nominal impedance of 50 Ω Status: M Support: Yes [ ]	
MDI Fault Tolerance (-V1)	192.10.3	The coaxial cable interface of the MDI **shall**... withstand without damage the application of short circuits...	245	(Source reference P802.3da 189.8.4.5 AES10) 192.13.4.9 MDI 192.13.4.9.2 MDI specification, -V1 Item: MDIV-3 Feature: MDI, V1 fault tolerance Subclause: 192.10.3 Value/Comment: MDI coaxial cable interface withstands, without damage, 50 V dc with the source current limited to 150 mA. Normal operation resumes after all short circuits are removed. Single MDI conductor withstands, without damage, high-voltage transient noises and ESD per application requirements. Status: M Support: Yes [ ]	VM: I think the "per application requirements" text here might be hard to quantify? I submitted a comment to potentially address Note - editors to make decision and align clause 192 and 191 treatment. See 191.3.2.2.7 & 191.4.2.2.7 (about rows 33-35 and 80-82) in clause 191.
MDI Short Circuit Resilience (-V1)	192.10.3	Normal operation shall resume after the short circuit(s) is (are) removed.	245	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - above (192.10.3)	
MDI Noise Resilience (-V1)	192.10.3	The single conductor of the MDI **shall** also withstand without damage high-voltage transient noises and ESD...	245	P802.3da 189.8.4.5 AES10 groups three related shalls. I think it it appropriate to do that here. See proposed PICS - above (192.10.3)	Note - editors to make decision and align clause 192 and 191 treatment. See rows 33-35 and 80-82 in clause 191.

Delay Constraints	192.12	...sum of the transmit and receive data delays... **shall** not exceed the limits shown in Table 192–24.	246	(Source reference P802.3da 188.12.4.10) 192.13.4.10 Delay constraints Item: DC1 Feature: Delay constraints Subclause: 192.12 Value/Comment: Comply with Table 192-24 Status: M Support: Yes [ ]