Detail of IEEE 802.3bt proposed edits to include 2.5GBASE-T and 5GBASE-T – Rev A

Contribution to IEEE P802.3bt Task Force at the March 2016 Plenary meeting in Macau

George Zimmerman, CME Consulting / Aquantia, Commscope, and LTC

15 March 2016

MODIFIED TO HAVE SEPARATE TYPES OF MIDSPANS FOR (UP TO) 2.5GBASE-T, 5GBASE-T, OR 10GBASE-T

Page	Line	Subclause	Edit
43	17	33.1	*Insert* "2.5GBASE-T, 5GBASE-T, " between "1000BASE-T, " and "or 10GBASE-T"
47	39	33.2.2	*Insert* "2.5GBASE-T, 5GBASE-T, " between "1000BASE-T" and "and/or"
48	1	33.2.3	*Insert* "2.5GBASE-T Midspan PSE: A Midspan PSE that results in a link that can support 1000BASE-T and 2.5GBASE-T operation, and optionally support 10BASE-T and 100BASE-TX operation (see Figure 33–9). 5GBASE-T Midspan PSE: A Midspan PSE that results in a link that can support 1000BASE-T, 2.5GBASE-T, and 5GBASE-T operation, and optionally support 10BASE-T and 100BASE-TX operation (see Figure 33–9)." and *Change* "10GBASE-T Midspan PSE" to "2.5G, 5G, or 10GBASE-T Midspan PSE" And *change* "support 1000BASE-T and 10GBASE-T" to "support 1000BASE-T, 2.5GBASE-T, 5GBASE-T, and 10GBASE-T"
50	45	33.2.3	Figure 33-5 caption, *change* "1000BASE-T/10GBASE-T" to "1000/2.5G/5G/10GBASE-T" same *change* to Figure 33-7 (P51 L38)
53	48	33.2.3	Figure 33-9 caption, *change* "1000BASE-T/10GBASE-T" to "1000BASE-T, 2.5G, 5G, or 10GBASE-T" Same *change* on Figure 33-11 (P54 L47)
142	47	33.4	*Change* "and the 100BASETX, and 1000BASE-T, and 10GBASE-T PHYs.", as follows: "and the 100BASETX, ~~and~~ 1000BASE-T, 2.5GBASE-T, 5GBASE-T and 10GBASE-T PHYs."
144	39	33.4.3	*Change* "shall exceed:" to "shall exceed the limits in Table 33-30a for all supported PHY speeds. *Insert Table 33-30a and Editor's Note:* **Table 33-30a Impedance Balance Limits vs Supported Speeds** (see table below) *Editor's Note (to be removed prior to publication): Impedance balance limits for 2.5 Gb/s and 5 Gb/s are to match MDI Impedance balance in 126.8.2.2 for IEEE P802.3bz currently in ballot. These ballots reflect MDI impedance balance in IEEE P802.3bz D2.1. These values to be updated prior to sponsor ballot by which time IEEE P802.3bz should be stable or published.*

Table 33-30a Impedance Balance Limits vs Supported Speeds

Supported Speed	Impedance Balance Limit	Frequency Range
10 Mb/s MAU	$29.0 - 17.0 \times \log_{10}(f/10.0)$ dB	$1 \leq f \leq 20.0$ MHz
100 Mb/s or 1000 Mb/s PHY	$34.0 - 19.2 \times \log_{10}(f/50.0)$ dB	$1 \leq f \leq 100.0$ MHz
2.5 Gb/s PHY	48 dB $48.0 - 20.0 \times \log_{10}(f/10.0)$ dB $42.0 - 15.0 \times \log_{10}(f/20.0)$ dB	$1 \leq f < 10.0$ MHz $10.0 \leq f < 20.0$ MHz $20.0 \leq f \leq 125.0$ MHz
5 Gb/s PHY	48 dB $44.0 - 19.2 \times \log_{10}(f/50.0)$ dB	$1 \leq f < 30.0$ MHz $30 \leq f \leq 250.0$ MHz
10 Gb/s PHY	48 dB $44.0 - 19.2 \times \log_{10}(f/50.0)$ dB	$1 \leq f < 30.0$ MHz $30 \leq f \leq 500.0$ MHz

			Delete P144 L40 – P145 L3 (Equations 33-31 through 33-34 and associated text) *Change Value/Comment in PICS EL13 (P183 L45):* change Value/Comment from: "Exceeds Equation (33–31) for 10Mb/s PHYs and Equation (33–32) for 100Mb/s or greater PHYs" TO: "Exceeds value in Table 33-30a for all supported PHY speeds."
145	39	33.4.4	*Change* lines 36-40 as follows: "E_{cm_out} shall not exceed 50 mV peak ~~when operating at 10 Mb/s, and 50 mV peak-to-peak when operating at 100 Mb/s or greater. The frequency of the measurement shall be from 1 MHz to 100 MHz. For 10GBASE-T systems, 50 mVpp (TBD), for 1 MHz to 500 MHz.~~ the values in Table 33-30b while operating at the specified speed, when measured over the specified bandwidth. *Insert Table 33-30b as shown:* **Table 33-30b- Common-mode output voltage vs Operating Speed** | Operating Speed	Common-mode output voltage (E_{cm_out})	Measurement Bandwidth
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10 Mb/s MAU	50 mV peak	1 ≤ f ≤ 100.0 MHz
100 Mb/s or 1000 Mb/s PHY	50 mVpp	1 ≤ f ≤ 100.0 MHz
2.5 Gb/s PHY	50 mVpp	1 ≤ f ≤ 100.0 MHz
5 Gb/s PHY	50 mVpp	1 ≤ f ≤ 250.0 MHz
10 Gb/s PHY	50 mVpp	1 ≤ f < 500.0 MHz	

146	1	33.4.4	*Delete Editor's note (TBD removed in the above change):*
			50 mVpp CM noise spec is consistent with differential noise spec and 10GBASE-T specified noise tolerance in Clause 55
			    • Tonal noise is < 2.9mVpp at any frequency (w.c. is 500 MHz)
			    • Wideband noise < 1.48 mVpp, by comparison, assuming only 3-sigma peaks, this is 7 dB lower than required alien crosstalk tolerance
			    • Typical noise is lowpass, << 100 MHz, worst-case tonal noise is < 0.6mVpp
			This is consistent with Differential noise spec in 33.4.6 (1mVpp)

148	37	33.4.6	*Change L37 to include 2.5G/5GBASE-T as follows:*: "For 2.5GBASE-T, 5GBASE-T or 10GBASE-T" *Change* Equation 33-35 upper frequency from 500 to f_{max} , and *Change* line 48 as shown "*f* is the frequency in MHz ~~for a 10 Gb/s PHY~~, and f_{max} is 100 MHz for 2.5GBASE-T, 250 MHz for 5GBASE-T and 500 MHz for 10GBASE-T."
152	12	33.4.9.1	*Change* "six variants" to "ten variants"
152	18	33.4.9.1	*Insert* after item (4) "5) 2.5GBASE-T connector or telecom outlet Midspan PSE 6) 5GBASE-T connector or telecom outlet Midspan PSE" *Renumber* existing item (5) as item (7) ("10GBASE-T connector or telecom outlet Midspan PSE") *Insert* after new item (7) "8) 2.5GBASE-T work area or equipment cable Midspan PSE 9) 5GBASE-T work area or equipment cable Midspan PSE

			Renumber existing item (6) as item (10) ("10GBASE-T work area or equipment cable Midspan PSE")
152	25	33.4.9.1.1	*Change* "1000BASE-T and lower rates" to "2.5GBASE-T and lower rates" on line 25 *Insert* after "to 100 MHz." at the end of line 26: "For 5GBASE-T, NEXT loss for Midspan PSE devices shall meet the values determined by Equation (33–36) when measured for the transmit and receive pairs from 1 MHz to 250 MHz. " *Change* line 27, to read: "For operation with 5GBASE-T and lower rates, for frequencies that correspond to calculated values…"
153	4	33.4.9.1.2	*Change* "10GBASE-T operation" to "5GBASE-T or 10GBASE-T capable midspans" on line 4, *Insert* "For 5GBASE-T capable midspans, insertion loss for Midspan PSE devices shall meet the values determined by Equation (33–38) when measured for the transmit and receive pairs from 1 MHz to 250 MHz."
153	39	33.4.9.1.3	*Change* "10/100/1000BASE-T" to "10/100/1000BASE-T, or 2.5G/5GBASE-T" (editorial license to break lines where necessary) *Insert* row above "10GBASE-T" as follows: | 5GBASE-T	100 < f ≤ 250.0 MHz	14 dB	
153	49	33.4.9.1.4	*Change as follows:* "This cable shall meet the requirements of this clause and the specifications for a ~~Category 5~~ (jumper) cord ~~as specified in ISO/IEC 11801:2002 or ANSI/TIA/EIA-568-A~~ for insertion loss, NEXT, and return loss for the transmit and receive pairs, as shown in Table 33-32." *Insert Table 33-32 as follows:* Table 33-32 – Specifications for cables in Midspan PSEs 	Highest PHY rate supported	Cabling Specification	Frequency Range
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Up to 1000BASE-T	Category 5 cord in ISO/IEC 11801:2002 or ANSI/TIA/EIA-568-A:1995	1 ≤ f ≤ 100 MHz
Up to 2.5GBASE-T	Category 5e cord in ISO/IEC 11801:2002 or ANSI/TIA/EIA-568-C.2	1 ≤ f ≤ 100 MHz
Up to 5GBASE-T	Category 6 cord in ISO/IEC 11801:2002 or ANSI/TIA/EIA-568-C.2	1 ≤ f ≤ 250 MHz
Up to 10GBASE-T	Category 6a cord in ISO/IEC 11801:2002 Amendment 2 or ANSI/TIA/EIA-568-C.2	1 ≤ f ≤ 500 MHz	
154	13	33.4.9.1.7	*Change* "10GBASE-T" to "2.5G/5G/10GBASE-T" and *Change* "variants 5 and 6" to "variants 5 through 10"
154	22	33.4.9.1.8	*Change* "10GBASE-T" to "2.5G/5G/10GBASE-T"
154	37	33.4.9.1.9	*Change* "10GBASE-T" to "2.5G/5G/10GBASE-T"
154	48	33.4.9.2	*Insert Editor's Note:* "Editor's Note (to be removed prior to Working Group Ballot): Subclause 33.4.9.2 was inserted by bt, but seems to be hanging here without technical content or purpose. Reviewers are requested to consider whether it is necessary, and, if so, to provide appropriate text or guidance as to its purpose."
154	53	33.4.9.2	*Change* "10GBASE-T operation" to "2.5G/5G/10GBASE-T capable midspans"