Detail of IEEE 802.3bt edits to clause 33 to put back in 2.5G/5G/10GBASE-T at draft 2.25 status

* Should align with Clause 145 treatment of 2.5G/5G/10GBASE-T, which is independent of PSE Type

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| --- | --- | --- | --- |
| Page | Line | Subclause | Edit |
| 1 | 19 | 33.1 | DTE powering is intended to provide a 10BASE-T, 100BASE--TX, 1000BASE-T, 2.5GBASE-T, 5GBASE-T, or ~~1000BASE-~~10GBASE-T device with a single interface to both the data it requires and the power to process this data. |
| 2 | 1 | 33.1.1 | c) *Compatibility*—Clause 33 utilizes the MDIs of 10BASE-T, 100BASE-TX, ~~and~~ 1000BASE-T, 2.5GBASE-T, 5GBASE-T, and 10GBASE-T without modification. Type 1 operation adds no significant requirements to the cabling. Type 2 operation requires ISO/IEC 11801:1995 Class D or better cabling and a derating of the cabling maximum ambient operating temperature. ~~The clause does not address the operation of 10GBASE-T. For 10GBASE-T operation, the channel model specified in Clause 55 needs to be met without regard to DTE Power via MDI presence or operation.~~d)*Simplicity*—The powering system described here is no more burdensome on the end users than the requirements of 10BASE-T, 100BASE-TX, ~~or~~ 1000BASE-T, 2.5GBASE-T, 5GBASE-T, or 10GBASE-T. |
| 8 | 11 | 33.2.2 | PSEs can be compatible with 10BASE-T, 100BASE-TX~~, and/or~~ 1000BASE-T, 2.5GBASE-T, 5GBASE-T, and/or 10GBASE-T. PSEs may support either Alternative A, Alternative B or both. |
| 8 | 16 | 33.2.3 | There are ~~two types~~ several variants of Midspan PSEs defined***Insert (after 1000BASE-T Midspan PSE description):***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).”10GBASE-T Midspan PSE:A Midspan PSE that results in a link that can support 1000BASE-T, 2.5GBASE-T, 5GBASE-T, and 10GBASE-T operation, and optionally support 10BASE-T and 100BASE-TX operation (see Figure 33–9).” |
| 10 | 46 | 33.2.3 | Figure 33-5 caption, ***change*** “1000BASE-T” to “1000/2.5G/5G/10GBASE-T” same ***change*** to Figure 33-7  |
| 17 | 41 | 33.2.3 | Figure 33-9 caption, ***change*** “1000BASE-T” to “1000BASE-T, 2.5G, 5G, or 10GBASE-T” Same ***change*** on Figure 33-11 |
| 155 | 23 | 33.4 | The requirements of 33.4 are consistent with the requirements of the 10BASE-T MAU and the 100BASE-TX ~~and~~, 1000BASE-T, 2.5GBASE-T, 5GBASE-T, and 10GBASE-T PHYs. |
| 158 | 45 | 33.4.3 | ***(note 33.4.3, 33.4.4, and 33.4.6 should be exactly as 145.4.3, 145.4.4, and 145.4.6)******Change*** “shall exceed:” to “shall exceed the limits in Table 33-30a for all supported PHY speeds.***Delete equations 33-15 and 33-16 (and associated text)******Insert Table 33-30a:*****Table 33-30a Impedance Balance Limits vs Supported Speeds**

|  |  |  |
| --- | --- | --- |
| **Supported Speed** | **Impedance Balance Limit** | **Frequency Range** |
| 10 Mb/s MAU | 29.0 - 17.0 × log10 (*f*/10.0) dB | 1 ≤ *f* ≤ 20 MHz |
| 100 Mb/s or1000 Mb/s PHY | 34.0 – 19.2 × log10 (*f*/50.0) dB | 1 ≤ *f* ≤ 100 MHz |
| 2.5 Gb/s PHY | 48.0 dB48.0 – 20.0 × log10 (*f*/10.0) dB42.0 - 15.0 × log10 (*f*/20.0) dB | 1 ≤ *f* < 10 MHz10 ≤ *f* < 20 MHz20 ≤ *f* ≤ 125 MHz |
| 5 Gb/s PHY | 48.0 dB44.0 – 19.2 × log10 (*f*/50.0) dB  | 1 ≤ *f* < 30 MHz30 ≤ *f* ≤ 250 MHz |
| 10 Gb/s PHY | 48 dB44.0 – 19.2 × log10 (*f*/50.0) dB | 1 ≤ *f* < 30.0 MHz30 ≤ *f* ≤ 500.0 MHz |

***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.” |
| 159 | 47 | 33.4.4 | ***Change*** as follows: “*Ecm\_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 (*Ecm\_out*)** | **Measurement Bandwidth** |
| 10 Mb/s MAU | 50 mV peak | 1 ≤ f ≤ 100 MHz |
| 100 Mb/s or 1000 Mb/s PHY | 50 mVpp | 1 ≤ f ≤ 100 MHz |
| 2.5 Gb/s PHY | 50 mVpp | 1 ≤ f ≤ 100 MHz |
| 5 Gb/s PHY | 50 mVpp | 1 ≤ f ≤ 100 MHz |
| 10 Gb/s PHY | 50 mVpp | 1 ≤ f < 100 MHz |

 |
| 164 | 33 | 33.4.6 | ***Change 33.4.6 as follows:***~~The~~ For 10/100/1000 Mb/s, the coupled noise, *E*d\_out in Figure 33–49, from a PSE or PD to the differential transmit and receive pairs shall not exceed 10 mV peak-to-peak when measured from 1 MHz to 100 MHz under the conditions specified in 33.4.4, item 1) and item 2). ***Insert after the above paragraph:***For 2.5GBASE-T, 5GBASE-T, or 10GBASE-T, the coupled noise, Ed\_out in Figure 33–49, from a PSE or PD to the differential transmit and receive pairs shall not exceed the requirements Equation (33–17a) under the conditions specified in 33.4.4, item 1) and item 2).***Insert Equation 33-17a: (from equation 145-34)*** |
| 165 | 3 | 33.4.7 | ***Change to insert 2.5G, 5G and 10G references:***The differential impedance of the transmit and receive pairs at the PHY’s MDI shall be such that anyreflection shall meet the return loss requirements as specified in 14.3.1.3.4 for a 10 Mb/s PHY, inANSI X3.263:1995 for a 100 Mb/s PHY, ~~and~~ in 40.8.3.1 for a 1000 Mb/s PHY, 126.8.2.2 for a 2.5 Gb/s or 5 Gb/s PHY, and 55.8.2.1 for a 10 Gb/s PHY . |
| 171 | 12 | 33.4.9.1 | ***Change*** “six variants” to “10 variants” |
| 152 | 18 | 33.4.9.1 | ***Insert*** after item (4) (this will match 145.4.9.1)“5) 2.5GBASE-T connector or telecom outlet Midspan PSE6) 2.5GBASE-T work area or equipment cable Midspan PSE7) 5GBASE-T connector or telecom outlet Midspan PSE8) 5GBASE-T work area or equipment cable Midspan PSE9) 10GBASE-T connector or telecom outlet Midspan PSE10) 10GBASE-T work area or equipment cable Midspan PSE” |
| 171 | 28 | 33.4.9.1.1 | ***Change as shown: (to match 145.4.9.1.1)***NEXT loss is a measure of the unwanted signal coupling from a transmitter at the near-end into neighboring pairs measured at the near-end. NEXT loss is expressed in dB relative to the received signal level. For operation with 2.5GBASE-T and lower rates, NEXT loss for Midspan PSE devices shall meet the values determined by Equation (33–48) when measured for the transmit and receive pairs from 1 MHz to 100 MHz. For 5GBASE-T, NEXT loss for Midspan PSE devices shall meet the values determined by Equation (33–48) when measured for the transmit and receive pairs from 1 MHz to 250 MHz. ~~However~~For operation with 5GBASE-T and lower rates, for frequencies that correspond to calculated values greater than 65 dB, the requirement reverts to the minimum requirement of 65 dB. ***Insert the next paragraph from 145.4.9.1.1:*** |
| 172 | 12 | 33.4.9.1.2 | ***Change as shown:***Insertion loss is a measure of the signal loss between the transmitter and receiver, expressed in dB relative to the received signal level. For other than 5GBASE-T or 10GBASE-T operation, insertion ~~Insertion~~ loss for Midspan PSE devices shall meet the values determined by Equation (33–50) when measured for the transmit and receive pairs from 1 MHz to 100 MHz. ~~However for~~For 5GBASE-T capable midspans, insertion loss for Midspan PSE devices shall meet the values determined by Equation (33–50) when measured for the transmit and receive pairs from 1 MHz to 250 MHz. For frequencies that correspond to calculated values less than 0.1 dB, the requirement reverts to the maximum requirement of 0.1 dB. |
| 172 | 43 | 33.4.9.1.3 | ***Delete “***when measured for the transmit and receive pairs from 1 MHz to 100 MHz.” and replace table 33-20 with a duplicate of table 145-35: |
| 173 | 16 | 33.4.9.1.4 | ***Change (to read as 145.4.9.1.4) 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 – Cable specifications for use with Midspan PSEs

|  |  |  |
| --- | --- | --- |
| Highest PHY rate supported | Cabling Specification | Frequency Range |
| Up to 1000BASE-T | Category 5 cord in ISO/IEC 11801:2002 or ANSI/TIA-568-A:1995 | 1 ≤ f ≤ 100 MHz |
| Up to 2.5GBASE-T | Category 5e cord in ISO/IEC 11801:2002 or ANSI/TIA-568-C.2 | 1 ≤ f ≤ 100 MHz |
| Up to 5GBASE-T | Category 6 cord in ISO/IEC 11801:2002 or ANSI/TIA-568-C.2 | 1 ≤ f ≤ 250 MHz |
| Up to 10GBASE-T | Category 6a cord in ISO/IEC 11801-1 or ANSI/TIA-568-C.2 | 1 ≤ f ≤ 500 MHz |

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| 173 | 39 | 33.4.9.1.5-33.4.9.1.9 | ***Insert 33.4.9.1.5-33.4.9.1.9 exactly as 145.4.9.1.5-145.4.9.1.9*** |