

Changes to add 2.5GBASE-T and 5GBASE-T

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Overview

- This proposal adds 2.5G and 5GBASE-T to 802.3bt based on D2.0 of 802.3bz
- Approach is to minimize complexity and types of devices by considering midspans and endpoint PSEs separately
 - 10GBASE-T Midspans will be capable of 2.5GBASE-T and 5GBASE-T – no need for additional new Midspan types
 - PSEs may have speed specific specifications
- Detailed text edits are provided

Edit Summary

- General references to speeds get 2.5GBASE-T and 5GBASE-T inserted.
 - (sometimes it's “and” sometimes it's “or”)
- Midspans: additional midspan types for 2.5GBASE-T, 5GBASE-T, and 10GBASE-T
 - Change from prior version
 - allows for cost reduction
- Noise voltages & Impedance balance
 - These get frequency dependent & specific to supported speeds, with some reformatting

Impedance balance (33.4.3)

- Requirement: “shall exceed the limits in Table 33-30a for all supported PHY speeds. (equations replaced) [updated from previous version with latest BZ spec from this meeting]

Insert Table 33-30a and Editor’s Note:

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	$1 \leq f < 10.0$ MHz
	$48.0 - 20.0 \times \log_{10} (f/10.0)$ dB	$10.0 \leq f < 20.0$ MHz
	$42.0 - 15.0 \times \log_{10} (f/20.0)$ dB	$20.0 \leq f \leq 125.0$ MHz
5 Gb/s PHY	48 dB	$1 \leq f \leq 30.0$ MHz
	$44.0 - 19.2 \times \log_{10} (f/50.0)$ dB	$30 < f \leq 250.0$ MHz
10 Gb/s PHY	48 dB	$1 \leq f < 30.0$ MHz
	$44.0 - 19.2 \times \log_{10} (f/50.0)$ dB	$30 \leq f \leq 500.0$ MHz

Editor’s Note (to be removed prior to publication): Impedance balance limits for 2.5Gb/s and 5Gb/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.

Common-mode output voltage (33.4.4)

- Reformat as a table, with the frequency ranges given:

“ E_{cm_out} shall not exceed the values in Table 33-30b while operating at the specified speed, when measured over the specified bandwidth

Table 33-30b- Common-mode output voltage vs Operating Speed

Operating Speed	Common-mode output voltage (E_{cm_out})	Measurement Bandwidth
10 Mb/s MAU	50 mV peak	$1 \leq f \leq 100.0$ MHz
100 Mb/s or 1000 Mb/s PHY	50 mVpp	$1 \leq f \leq 100.0$ MHz
2.5 Gb/s PHY	50 mVpp	$1 \leq f \leq 100.0$ MHz
5 Gb/s PHY	50 mVpp	$1 \leq f \leq 250.0$ MHz
10 Gb/s PHY	50 mVpp	$1 \leq f < 500.0$ MHz

Common Mode Noise TBD Removal

- 50 mVpp noise spec is consistent with differential noise spec and 10GBASE-T specified noise tolerance in Clause 55
 - Tonal noise is $< 2.9\text{mVpp}$ at any frequency (w.c. is 500 MHz)
 - Wideband noise $< 1.48\text{ mVpp}$, by comparison, assuming only 3-sigma peaks, this is 7 dB lower than required alien crosstalk tolerance
 - Typical noise is lowpass, $\ll 100\text{ MHz}$, worst-case tonal noise is $< 0.6\text{mVpp}$
- This is consistent with Differential noise spec in 33.4.6 (1mVpp)
- *Remove TBD on P145 L40 and Editor's note on page 146*

Differential Noise Voltage (33.4.6)

- Differential noise voltage (33.4.6):
 - **Change L 37 to include 2.5GBASE-T and 5GBASE-T:** “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.”

Midspan Specifications

- 2.5GBASE-T and 5GBASE-T specifications align with Cat5e/1000BASE-T.
 - 5GBASE-T specifications are extended to 250 MHz, as in 802.3bz
- Exception: cord-midspan PSEs, cable requirements
 - Reference for 2.5GBASE-T cord midspans meets Category 5e patch cords (to 100 MHz)
 - Reference for 5GBASE-T cord midspans reflects Category 6 patch cords (to 250 MHz)

One other thing

- 33.4.9.2, a subclause, inserted by 802.3bt, doesn't seem to have any technical content or purpose – added editor's note to flag this

33.4.9.2 Transmission parameters for Midspan PSEs with a link segment

In order to maintain the transmission parameters for a link segment, the transmission parameters of the Midspan PSE are defined. These include insertion loss, delay parameters, nominal impedance, NEXT loss, FEXT and return loss. In addition, for 10GBASE-T operation, the requirements for the alien cross talk coupled “between” link segments are specified.

Thank You!