

Interpretation Number: 2-11/06
Topic: MDI impedance balance
Relevant Clause: Clause 55
Classification: Defect

Interpretation Request

This is a request for interpretation of subclause 55.8.2.2 of the recently published 10GBASE-T standard, IEEE Std 802.3an-2006.

Subclause 55.8.2.2 states:

Impedance balance is a measure of the impedance-to-ground difference between the two MDI contacts used by a duplex link channel and is referred to as common-mode-to-differential-mode impedance balance. The common-mode-to-differential-mode impedance balance, $Z_{\text{bal}}(f)$, of each channel of the MDI shall meet the relationship:

$$Z_{\text{bal}}(f) \geq \begin{cases} 48 & 1 \leq f < 30 \\ 44 - 19.2 \left(\frac{f}{50} \right) & 30 \leq f \leq 500 \end{cases} \quad (55-55)$$

where f is the frequency in MHz when the transmitter is transmitting random or pseudo random data.

Equation 55-55 therefore provides the limit to which MDI impedance balance must be equal to or exceed. When however this limit line is plotted it passes through zero at 120MHz, representing it would appear no limit, and then continues to be increasingly negative after that.

On comparison with equivalent cabling specification it would appear that the equation is missing a $\log(10)$ frequency dependency. This seems to be confirmed by the presentation 'Impedance Balance' given by Terry Cobb at the July 2005 meeting [http://www.ieee802.org/3/an/public/jul05/cobb_1_0705.pdf]. Based on this information it appears that the equation should actually read:

$$Z_{\text{bal}}(f) \geq \begin{cases} 48 & 1 \leq f < 30 \\ 44 - 19.2 \log_{10} \left(\frac{f}{50} \right) & 30 \leq f \leq 500 \end{cases}$$

Please could you confirm if this is correct.

Interpretation for IEEE Std 802.3an-2006

This appears to be an error in the standard and has been referred to the Maintenance Task Force for correction through a [corrigendum](#) (see minutes of 11/06 802.3 closing plenary).