Understanding the Dynamic Range Requirements for Far End Crosstalk Measurements

This paper examines the requirements for instrument dynamic range when performing field certification of ELFEXT per TSB95, "Additional Transmission Performance Guidelines for 100 Ω 4-Pair Category 5 Cabling " and TIA-568-A-A5, "Additional Transmission Performance Specifications for 4-Pair 100 Ω Enhanced Category 5 Cabling".

Generally, the level of the signal being measured dictates the requirements for the dynamic range of the measuring instrument. The lower the level of the measured signal, the wider the dynamic range of the instrument has to be. In the case of the ELFEXT measurement, the level of the signal reaching the test tool is as shown in the following figure.

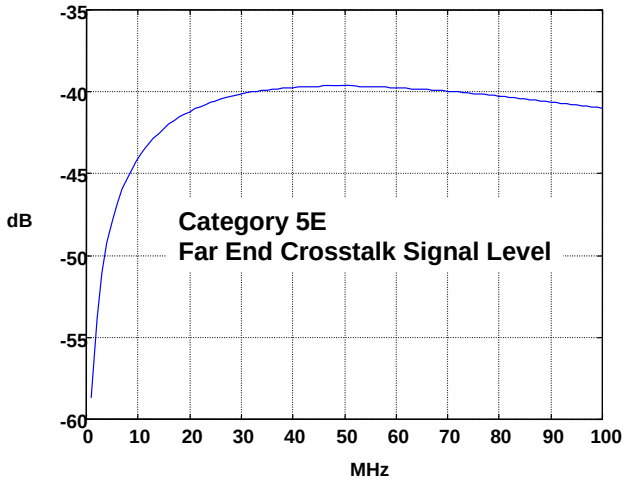

Figure 1: Far End Crosstalk Channel Limit

Regardless of whether the test instrument reports ELFEXT or FEXT, the measured signal is always at the FEXT level – the level shown above.[1]

Based on Figure 1, it is clear that the worst case signal level to be measured is 41 dB at 100 MHz. The WireScope 155 has sufficient dynamic range to guarantee ELFEXT measurement accuracy of ± 2 dB – an accuracy that is 30% better than required by the TIA Level II-E specification[2].

[1] The only difference between ELFEXT and FEXT is in that the 0 dB reference for ELFEXT is the attenuated signal while the 0 dB reference for FEXT is the original transmit signal.

[2] Level II-E accuracy is specified in the draft TIA documents -- TSB95 and TIA-568-A-A5. Level II-E testers are expected to measure return loss, ELFEXT, delay and delay skew in addition to the parameters specified in TIA TSB67. The WireScope 155 exceeds all Level II-E requirements.