

Alien Crosstalk: The Limiting Noise Factor in Category 6A Channel Performance

It is generally understood by most in the Ethernet industry that active equipment is able to eliminate much of the internally generated noise within a 10GBASE-T channel. However, many in the industry are not aware that cancellation technology has improved, making alien crosstalk (AXT) the limiting factor in the overall noise level of 10GBASE-T systems. This paper explains that the overall noise level for Category 6A (CAT 6A) channels can only be improved by adding additional immunity to AXT in the system.

CAT 6A systems are more sensitive to noise because of:

- High bandwidth (500 MHz) required for 10 Gbps
- High volume of cables in ducts, raceways, trays, cabinets, and racks
- Cable with different design, category, or manufacturers

CAT 6A Systems must have some way of reducing INTERNAL CROSSTALK in order to deliver 10 Gbps.

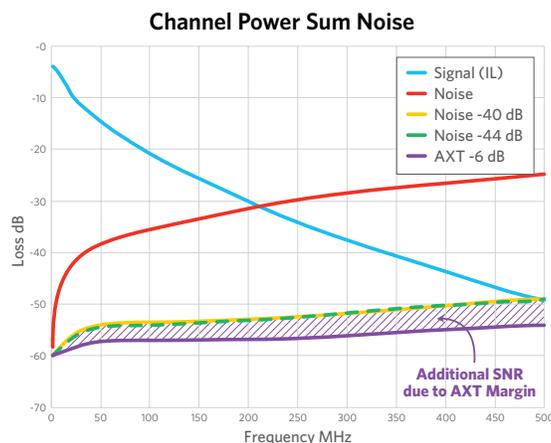
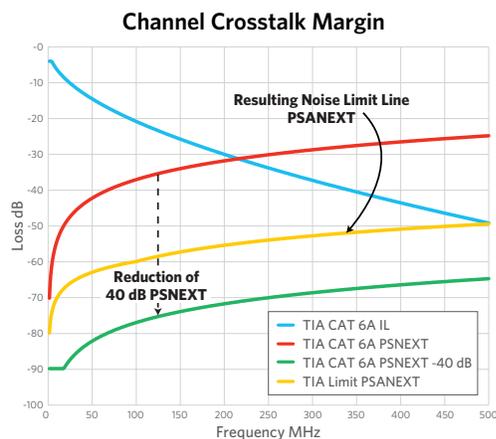
Noise level (internal NEXT/FEXT) can be improved by:

- Cabling system design
- Signal processing improvement by 10GBASE-T transceivers (PHY)

The noise impact of NEXT and FEXT can be reduced by cancellation techniques. ANEXT and AFEXT cannot.

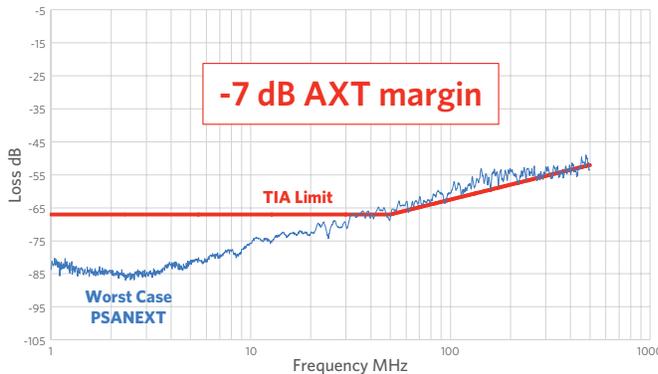
Alien Crosstalk is the Limiting Noise Factor in CAT 6A UTP Systems

- After PHY noise cancellation (>40 dB NEXT), AXT is the limiting noise factor in CAT 6A UTP systems and the primary cause of channel capacity limits.
- System Margin on NEXT or higher PHY methods will not improve your system signal-to-noise ratio (SNR).

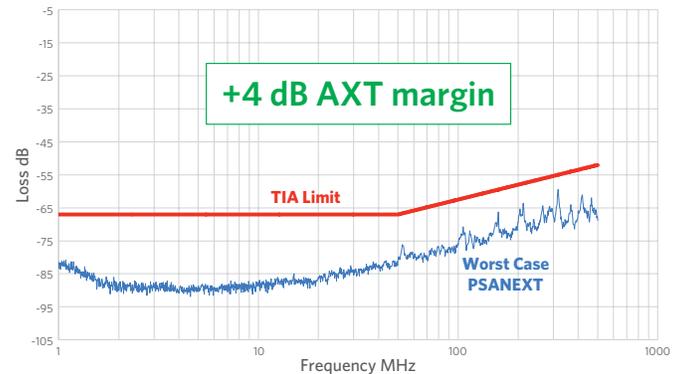


In all CAT 6A systems, cables and connectors are never perfectly balanced. The unbalance is enhanced when you combine connectivity products, introducing additional alien noise that the typical CAT 6A cabling system is not necessarily designed to protect against.

**Industry Standard CAT 6A PSANEXT
CAT 6 Disturbers**



**Superior Essex 10Gain® XP CAT 6A PSANEXT
CAT 6 Disturbers**



Conclusions

- Noise cancellation technologies inherent in 10GBASE-T PHY reduces impact of internal noise (NEXT, PSNEXT, FEXT, PSACRF) by over 40 dB on average.
- Once noise cancellation is considered, noise from AXT is the limiting factor in overall channel noise for CAT 6A UTP systems.
- Noise margin for CAT 6A channels can be improved by adding margin to PSANEXT, PSAACRF performance, but not by adding margin to NEXT, FEXT, PSNEXT, PSACRF of cabling system.

If a robust network is your priority, the most effective way to add margin to the channel performance is to choose a cabling system that provides guaranteed AXT margin above the TIA-568-C.2 minimum requirements.

Superior Essex **10Gain® XP**, part of the nCompass™ (nCompass-Systems.com) CAT 6A+ U/UTP copper cabling system, offers one of the smallest diameters at 0.275" and has industry-leading AXT margin performance.

Obtain a copy of the full white paper [here](#) (bit.ly/Alienxtalk).

