



KRONE

## Mitigation Techniques To Reduce Alien Crosstalk Noise In 10GBE Channels Using UTP Cabling

These mitigation techniques are good installation practices that will benefit both Class E and Class E<sub>A</sub> performance.

Always use the Random Lay mantra;

**“Random lay in the bundle and tray**

**For Cat 6 cable and Cat 6<sub>A</sub> “ © P. Meijer**

An existing Class E channel using Category 6 components will have its performance improved to a level where it may comfortably carry 10GBE applications by applying where possible a combination of some of the following;

### **At the Floor Distributor**

Remove cable ties from bundles in the telecommunication room racks, cabinets and pathways. The majority of ANEXT occurs in the first 15 meters from the patch panel or termination modules where the signal strength is greatest.

Apply cable bundle fasteners only where necessary to mechanically support the cables and at both sides of a change in vertical direction of the cabling.

Use only ‘hook & loop’ type fasteners, at least 12 mm wide, or approved elastic bundle fasteners. Do not use nylon ties or ‘zip ties’.

Upgrade patch cords to CopperTen Cat 6<sub>A</sub> patch cords. Use longer patch cords to provide more ANEXT noise attenuation, but do not exceed the allowable Channel Insertion Loss. The minimum patch cord length must be 2.1 metres. 3 metre CopperTen patch cords give even better ANEXT mitigation.

Place the patch cords in Random Lay so that there is less chance of coupling from parallel runs.

Replace existing Category 6 patch panels with polymer Category 6<sub>A</sub> staggered-socket patch panels. This increases the separation between outlets and minimises coupling.

Where patch panel replacement is not possible, use non-adjacent sockets and non-adjacent channels for the 10GBE.

Use patch cord management systems like the ADC Glide Managers that allow room and facility for Random Lay and/or patch cord separation.

Change from a cross-connect to an interconnect cabling arrangement. The unused cross-connect panels or modules are re-usable for other circuits or other locations.



KRONE

### **In the Horizontal Cable runs**

Where metallic or mesh trays are used, the cables should be physically separated and placed in Random Lay to minimise alien crosstalk. Earth all metal and mesh trays with at least 2.5 mm<sup>2</sup> Gn/YI earth wire connected to protective earth. Do not fasten cables into bundles. Do not fasten any cables onto the tray/mesh except for change of vertical direction >45° or to maintain a fixed separation from a hazardous service.

At the consolidation point, replace the Category 6 modules with CopperTen Modules and ensure the cables are in a Random Lay configuration.

Reduce the length of the long Permanent Links and Channels. But be aware of possible AFEXT issues. Short run lengths produce high frequency AFEXT noise (unless power back-off is applied in transmitters). So, separate the short runs from the long runs, if possible. Apply the Random Lay principle.

If AACR-F noise is a problem the only remedy is to separate the channels over the entire length. Separating only at the beginning of the channel improves the ANEXT, but it does not improve AACR-F.

Replace the existing Category 6 cabling with CopperTen cabling.

### **At the TO**

When the connectors are grouped at the TO, use 2 dual socket faceplates instead of a single triple socket faceplate. If this is not possible, use different protocols like only one 10GBE and two Category 6 outlets in a triple socket faceplate.

In MUTO assemblies, ensure there is at least 20 mm separation all round between socket mounting holes (that the socket clips into).

### **General**

Consider doing several mitigation techniques together (e.g. removing fasteners, unbundling and applying Random Lay, plus changing patch cords and equipment cords, plus changing to a polymer staggered-socket patch panel).

If ANEXT margin up to 500 MHz is worse than - 6 dB, then mitigation may not be sufficient. Either replace the cabling system with CopperTen or limit the use of 10GBE to short channels with low Insertion Loss and low ANEXT.

Once the channels have been qualified for ANEXT, each channel needs to be further qualified for internal transmission parameters up to 500 MHz. If any channel fails these internal transmission parameters, the mitigation steps above need to be repeated.