

Application note



10GIGABIT SUPPORTING CABLING SYSTEMS ?

What's the latest on 10Gigabit Ethernet over copper?

Outcome of the latest committee meeting on 10Gbase-T IEEE 802.3 dated November 2003 has approved the PAR (project authorization request) and objectives for 10Gbase-T and has forwarded to IEEE 802 standards executive committee (SEC). Latest news now is that also the SEC has approved the PAR and has forwarded to NESCOM (new standards committee) for approval in January. NESCOM approval should be a mere formality. Assuming the PAR is indeed approved, the 10Gbase-T study group will become IEEE 802.3an in March 2004. The approved objectives include the following:

- support operation over 4-connector structured 4-pair twisted pair copper cabling for all supported distances and classes
- define a single 10Gb/s physical layer that would support links of at least 100m on 4-pair class F balanced copper cabling or at least 55m to 100m on 4-pair Class E balanced copper cabling
- support a BER of 10⁻¹² on all supported distances and classes

What is the remaining challenge to achieve it?

Strong focus will be brought on 625MHz bandwidth which is required for the PAM-5 codification. This will require a new and augmented definition of Class E/Category 6 cabling. Current Category 6 cabling might be ready to support the application but expected only over limited lengths. More critical for unscreened systems will be the importance of Alien NEXT specification. Research and development is needed to find cabling solutions which will offer alien crosstalk compliance. Both these challenges are already now tackled by Class F/Category 7 cabling. Bandwidth requirements already allow 625MHz communication, and the screening already offers alien crosstalk compliance.

What exactly is ANEXT, Alien Crosstalk and AXTIR?

ANEXT or Alien NEXT or Alien Crosstalk is the crosstalk noise from other cables in a bundle of cables or from a second cable unit in a dual or shotgun cable. With the arrival of 10Gbase-T this parameter has gained a lot of attention as this and other future high speed applications are especially sensitive to these parameters. As Nexans is one of the only manufacturers to offer a full alien crosstalk compliant UTP shotgun cable, we have always taken special consideration of this parameter. Moreover, as quoted from the IEC cable standard "Alien crosstalk is only a consideration for unscreened cables." Therefore Nexans profits from its expertise in screened cabling systems by being the first offering a fully alien crosstalk compliant cabling system. Experts agree on the fact that only screening will effectively prevent the noise coupling, making screened systems superior with respect to alien NEXT. Unscreened systems have quite a challenge to face when it comes to respecting alien crosstalk. AXTIR stands for Alien CrossTalk to Insertion Loss ratio, and thus might be seen as the equivalent of ACR, but then for ANEXT instead of NEXT.

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Does a structured cabling exist which supports the current identified needs of 10Gbase-T?

Yes, and Nexans is the first and currently only one to offer it. The only complete cabling system on the market now that IEEE states as ready to support the 10Gigabit application over 100m is the Class F/Category 7 cabling system as defined in the ISO/IEC 11801:2002. Nexans LANmark-7 system is made up of the LANmark-7 1000MHz STP cable and the GG45 Category 7 connector. The GG45 is the full IEC 60603-7-7 compliant connector as specified in the Category 7 standard. Belonging to the RJ45 family (IEC 60603-7) it is fully backward compatible to RJ45. The LANmark-7 system can now be fully field-tested up to 600MHz. The system is specified to 625MHz and beyond and is fully alien crosstalk compliant thanks to the screening performance

What are claims of 10Gigabit UTP cable worth?

Requirements for 10 Gigabit application support over 100m copper cabling are not yet defined. Needs will be above Category 6 but perhaps less than Category 7.

It is impossible to claim 10 GBase T will work on a cabling system performing lower than Cat7 / Class F until there is a definition.

Some manufacturers already claim to have 10 Gigabit UTP cables but the claims of cables do not cover a cabling system. Even if such a cable would exist, question remains on what connectivity needs to be used with it. A paper circulating on the "world first with 10 Gigabit UTP cable" contains quite some open issues to consider:

- **Cost** : considering an extra cost that a UTP system needs to incorporate to cover the new design, the special installation care, the need for metal conduits etc might end up being at the same price or higher that a screened solution
- **Bundle tested on ANEXT** : ANEXT test are done using 7 cable bundles. In a standard cabling structure, far bigger bundles appear on-site, which results in more disturbing neighbours all contributing to the alien crosstalk level. When using screened systems, the cables are isolated from its neighbours in a bundle and therefore has no alien crosstalk issues.
- **Connecting hardware** : the tests performed are done using shielded jacks. This proves that unshielded connectivity cannot be used and either will be the retarding factor to bring a full unscreened system on the market or might be impossible to respect the alien crosstalk at all.
- **Metal conduits** : the tests have been performed using metal conduits and metal cable trays. This proves that the cables anyway will need a full metal construction around it to be alien crosstalk compliant. This proves that a level of screening is required, be it not in the cable but outside it. This adds to both the cost and the installation complexity when considering UTP systems. Screened systems avoid this as they kind of 'carry' their screening protection in it.