

To: 3P Customers and Business Partners

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Status of Class E_A / Category 6A Cabling

Class E_A / Category 6A cabling is generally accepted by the market as a future common cabling which extends the support of Class E / Category 6. This cabling type covers new requirements both with respect to extended frequency range to 500 MHz and a few parameters having more strict requirements than Class E / Category 6. It is worth stressing that this cabling has **performance in excess of 10 Gigabit Ethernet**, i.e. it is a cabling class / category reaching out also for more demanding unborn applications. Other and even higher classes / categories are being offered to the market at the same time, i.e. the existing Class F cabling having Category 7 components and the new Class F_A cabling having Category 7_A components.

Names of cabling and components are defined in the traditional way. TIA/EIA identifies both cabling and components by "Category 6A" while ISO/IEC, IEC and CENELEC applies the name "Class E_A" for the permanent links and channels and "Category 6_A" for the components (note the subscript of A in the international standards).

1. Class E_A / Category 6A Specifications

No specifications for Class E_A / Category 6A have actually been published at present, which means that Class E_A / Category 6A cabling is so far installed based on draft standard requirements. New standards are being generated from both ISO/IEC, IEC (only component requirements), CENELEC and TIA/EIA. 3P is active in all the international standardisation groups working to prepare specifications for the new cabling, cables, patch cords, connectors and field testing. We are not members of the TIA/EIA committees, but follow their work closely through liaison in the international committees from the US delegations. In total 3P participates in 15 different standardisation committees and working groups, most of which are (also) involved in development of the Class E_A / Category 6A cabling.

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The main standards of the three cabling families are:

ISO/IEC:

Amendment 1.1 to 2nd edition ISO/IEC 11801 for channel requirements and amendment 1.2 to 2nd edition ISO/IEC 11801 for permanent link and component requirements.

TIA/EIA:

ANSI/TIA/EIA-568-B.2-10 for channel, permanent link and component requirements.

CENELEC:

Amendment 2 to EN 50173-1 for channel, permanent link and component requirements.

The ISO/IEC and CENELEC cabling standards are making reference to relevant component standards being developed in the component committees in question. TIA/EIA standards contain requirements for both cabling and components.

ANSI/TIA/EIA-568-B.2-10 will be the first published Class E_A / Category 6A standard, probably around March this year.

2. Critical Parameters

Class E_A / Category 6A cabling is based on a new step in transmission technology, i.e. a high extent of compensation of main traditional noise parameters like near end crosstalk, far end crosstalk and return loss. In this way the “impossible” may be achieved, i.e. very high speed data transmission (10 Gigabit Ethernet) is possible even if noise exceeds the signal strength. Earlier this noise to signal ratio (ACR) was the critical factor limiting the usable bandwidth of unscreened cabling to 250 MHz. Class E_A / Category 6A cabling now has a 500 MHz usable bandwidth.

However, this technology step creates new critical points. The two main issues are (I) noise from the exterior environment and (II) attenuation of the signal. Also specified traditional parameters may become extremely strict due to the higher bandwidth. Thus near end crosstalk is also very critical at the highest frequencies, but mostly in the ISO/IEC cabling standard, which has significantly more demanding near end crosstalk requirements for channels, permanent links and connectors than in TIA/EIA. This is a requirement which is actually more critically specified than necessary to run 10 Gigabit Ethernet.

I: Noise from the exterior environment

Noise from the exterior environment is now the critical noise source as it can not be compensated, basically because it is unpredictable. The part of the noise coming from other cables is called alien crosstalk (in Europe also named exogeneous crosstalk). It is a very critical parameter for unscreened cabling thus causing completely new technology developments for both testing procedures and unscreened cable constructions.

For properly screened cabling alien crosstalk is no problem and the somewhat time consuming testing of this parameter is therefore not an issue for correctly screened cabling.

II: Attenuation of the signal

Signal strength is still significant and attenuation must therefore be improved compared with Class E / Category 6 to allow acceptable signal strength in the full 500 MHz bandwidth.

General requirements:

The actual requirements for Class E_A / Category 6A cabling are becoming mature in most standards now. An early indication of all coming requirements can be found in the soon published ANSI/TIA/EIA-568-B.2-10, but as usual there will probably be some small and a few significant differences between the various standards.

3. Market Development

Class E_A / Category 6A cabling will undoubtedly be a general popular cabling in the future and will have a major influence on development of new cabling technology. Already today we see the first significant changes, i.e. (A) larger diameter or new shapes of UTP cables, (B) a growth in screened cabling, (C) new non-EMC related screening types, (D) growing popularity of Class F cabling and (E) field testing requiring training and on-line evaluation of data.

Each of these points will be discussed separately below.

A: Larger diameter or new shapes of UTP cables

The major source of alien crosstalk noise of unscreened cabling is from neighbour cables in bundles, etc. An effective way to reduce alien crosstalk between UTP cables is to increase the distance between the cables. This may be done by increasing the cable diameter, which will of course make UTP cables significantly thicker. A way to compensate for the increased diameter is to change the shape of the cable from round which may also create larger distance between neighbour cables.

B: Growth in screened cabling

The alien crosstalk superiority of screened cables together with the larger diameter of Category 6_A / Category 6A unscreened cables is making screened cabling much more competitive than was the case for Class E / Category 6 cabling. 3P therefore expects that we will see a fast growing market share for screened cabling, also in traditionally unscreened countries. The screening needs to be separate for each connector port, which means that the modular / keystone type screened connector will gain relatively more importance.

C: New non-EMC related screening types

Up till now screening has had the primary target to offer EMC performance of the cabling. This is changing for Class E_A / Category 6A cabling, which has a basic need for alien crosstalk protection. Traditional screening types do of course offer this, but simple cable screens may also reduce alien crosstalk significantly. Unscreened cables are generally the biggest source of alien crosstalk noise of an installation. Alien crosstalk protection be accomplished by having different types of cable screens, for instance aluminium foil which is not connected to the connecting hardware. Such screens may or may not pass specified EMC requirements. EMC protection for such types of screening will hardly be much better than for UTP cabling, but also often not worse.

3P has already decided to match this coming market requirement for this type of Class E_A / Category 6A semi-screened cabling by developing a new certification rating called “screen continuity”, alternative to “unscreened” or “screened”. For this type of certification we do not measure transfer impedance and therefore screening performance might not pass the traditional screened cabling requirements. Overall EMC performance must, of course, in any case always pass the cabling requirements.

D: Growing popularity of Class F cabling

Class F cabling and Category 7 cables has for a long time only had a significant market share in a few European countries. TIA/EIA has not even prepared a specification for this type of cabling. The new 10 Gigabit Ethernet requirements have specifically pointed on this type of cabling as a fine supporting medium and its benefits are unquestionable with respect to both near end crosstalk, far end crosstalk, alien crosstalk and attenuation performance. 3P is therefore experiencing a sudden and major growth in the interest for this cable type from traditionally unscreened markets.

E: Field testing requiring training and on-line evaluation of data

Field testing of installations has for a long time been fairly uncomplicated, at least when problems during testing were not found. All outlets were tested and reported as passing or failing the requirements (marginal results should be decided before testing is started).

With respect to alien crosstalk measurements the case is completely different. The number of possible combinations of outlets is impossibly large for even a small size installation. Consequently a selection process for ports to be measured is vital. Field testers can do the measurements and it is 3P’s experience that the measurements themselves do not cause any



problems to carry out (3P field testing experience is based on Fluke DTX 1800 measurements). The selection procedure is found in IEC field testing standard and will require that an active analysis of results is made during the installation testing in order not to return for additional testing one or more times. 3P estimates that 1 - 2 days training will be required before one can carry out field testing of Class E_A / Category 6A installations.

Yours sincerely,
3P Third Party Testing

A handwritten signature in blue ink that reads "Poul Villien". The signature is written in a cursive style.

Poul Villien