

To: 3P Customers and Business Partners

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3P Newsletter No. 8/2006

International Cabling Standardisation: Outcome of the ISO/IEC JTC 1, SC 25, WG 3 Meeting

An international cabling standardisation meeting of ISO/IEC takes place every six months in the working group ISO/IEC JTC 1, SC 25, WG 3 (In the following called ISO/IEC WG 3). ISO/IEC WG 3 is responsible for world wide international cabling standardisation and in principle similar specifications from the two other cabling standardisation groups, i.e. TIA/EIA and CENELEC, should be in line with the the requirements of ISO/IEC WG 3. This is generally also the case, although small differences in requirements do exist within both cable, connecting hardware and cabling specifications.

The present 3P Newsletter will discuss the outcome of the September ISO/IEC WG 3 meeting and in connection with this briefly conclude main differences with the TIA/EIA and CENELEC cabling specifications.

3P has been asked in the past about how ISO/IEC WG 3 work is carried out in practice. Therefore, as a second part of the 3P Newsletter I will discuss the way in which this practical work is carried out. This section of the 3P Newsletter can be read independently of the first part which discusses the outcome of the latest meeting.

PART 1: Outcome of the ISO/IEC WG 3 Meeting in September

The meeting took place in Berlin, Germany from 18 - 21 September 2006. A total of 61 participants from 19 countries joined the meeting. The following countries participated in this meeting:

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- Australia
- France
- Japan
- New Zealand
- Switzerland
- Belgium
- Germany
- South Korea
- Norway
- United Kingdom
- Canada
- Ireland
- Mexico
- Spain
- USA
- Denmark
- Israel
- Netherlands
- Sweden

The meeting had many issues on the agenda and 3P has of course more interest in some developments than other. The author's participation in the meeting has been specially focused on the subjects dealing with the developments of future copper cabling requirements, which has also been the major points of the meeting. It should be remembered when reading the discussion below that it is only intended as a subjective opinion about the outcome of the meeting.

The main three points of the meeting were the continued developments of standards (1) in support of 10 Gigabit Ethernet cabling over Class E / Category 6 cabling, (2) for 3rd generation cabling and (3) for higher power over ethernet. Other subjects like models for calculation of permanent link and component requirements, acceptance of a new low form factor fiber back up connector, MICE guide, and status of industrial, home and data center standards were also discussed, but my main focus will be on the first three issues.

1.1 Standard in Support of 10 Gigabit Ethernet over Class E / Category 6 Cabling

The future document will be a technical report ISO/IEC TR 24750.

IEEE have this summer agreed on the requirements for running 10 Gigabit Ethernet over twisted pair copper cabling and the standard has been published. Now the task is for the cabling and component groups to finalise the standards giving requirements according to this specification. 10 Gigabit Ethernet is also intended to run on shorter lengths of traditional unscreened Class E / Category 6 cabling and a specification (in the form of a technical report) is therefore being developed to provide the requirements for this cabling.

The draft technical report was agreed before the meeting and the **comments had to be considered and implemented** if possible. This was done and the specification is now prepared for the final approval.

The main content of the document is:

- A: It contains channel requirements and some, but not all, permanent link requirements. This means that **traditional installation testing as permanent links is not possible** with reference to this standard. When performing channel testing the patch cords will be included in the requirements and testing. Changing of the patch cords of the installation will have the unattractive effect that the test results become invalid and new channel testing is required.
- B: It contains guidelines (mitigation techniques) how to improve the probably most critical parameter for unscreened cabling, i.e. alien crosstalk.

Considering the missing permanent link shortcome of the technical report it is recommended by 3P to apply the similar specification TIA/EIA TSB-155 for requirements for permanent link testing. This standard is still a draft, but I expect that it will be published by the end of the year.

1.2 Standard for 3rd Generation Cabling (including Class E_A / Category 6A and Class F_A / Category 7A)

The document will be future Amendment 1.1 to 2nd edition ISO/IEC 11801.

The earlier circulated draft standard had been rejected by national voting before the meeting and the **comments had to be considered and implemented** as far as possible to allow a positive vote at a repeated circulation of the draft. Special points of discussion and agreement were:

A: It had been realised that short channels (and permanent links) had uncharacteristic much worse behaviour than predicted for alien crosstalk. This potential performance problem is critical for unscreened cabling at the highest frequencies. Different types of relaxation of the earlier proposed alien near end crosstalk requirements in the high frequency range were discussed and it was agreed that (1) no relaxation of Class F_A / Category 7A cabling shall apply and (2) Class E_A / Category 6A channel requirements to near end alien crosstalk shall be relaxed as follows for short channels:

"If attenuation (insertion loss) is below 7 dB at 100 MHz (i.e. a short channel) then the requirements over 100 MHz shall be relaxed with $3 \cdot (f-100)/400$ dB, where f is the frequency in MHz."

The high frequency critical alien crosstalk behaviour of unscreened short cabling will also be taken into account in the laboratory test method for permanent links and channels specified in draft IEC 61935-1, edition 3.0. Here short permanent link and channel configurations will be specified for the testing.

B: The strict near end crosstalk requirements for Class E_A / Category 6A cabling are maintained. These NEXT requirements do not contain the same relaxation at high frequencies which are found in the similar TIA/EIA draft standard (568-B.2-10).

C: Alien crosstalk of channels now needs to be measured. An earlier note that alien crosstalk of installations was met by design was removed.

All comments to the standard were considered and a new draft was developed. The author believes that the modified standard will be positively voted and can be prepared for the final agreement at the next ISO/IEC WG 3 meeting in February.

The main content of the document is:

A: It contains only channel requirements. No component or permanent link requirements are included, but will be developed as a new and separate Amendment 1.2 to 2nd edition ISO/IEC 11801.

B: Requirements for near end crosstalk are significantly more strict than for TIA/EIA-568-B.2-10.

Considering the missing permanent link and component requirements it is recommended by 3P to apply the similar specification TIA/EIA-568-B.2-10 for requirements for permanent link testing **until the component and permanent link requirements from ISO/IEC WG 3 are mature.** This standard is still a draft, but I expect that it will be published in approx. one year. Component requirements are presently also drafted in the TIA/EIA standard, and in IEC and CENELEC cable draft specifications.

Present component requirements are estimated by the author to be subject to change, as ISO/IEC WG 3 has not yet decided how to calculate requirements from the agreed channel performance.

1.3 Higher Power over Ethernet

IEEE has requested ISO/IEC WG 3 for support with respect to possibility of specifying increased power over ethernet, "PoEP". The intension is to have **minimum** 30 Watt power supply over the signal wires with power delivered over two or four pairs. Approx. 50 Vdc will be applied and typical current could be around 250 - 500 mA on each conductor.

The problems primarily concern (1) heating of the cable bundles and (2) separation of the patch cords from the RJ 45 connectors while under power load.

1.3.1 Cable heating in bundles

Heating of cables in bundles was addressed by the meeting and a number of investigations were presented and discussed during the ISO/IEC WG 3 and later IEC cable meetings. Temperature increase of for instance 3-15°C was reported in cable bundles containing 37 cables, depending on bundling, cable type, total power and number of powered conductors.

Further investigations are needed to conclude acceptance of temperature increases. An interesting side effect of PoEP is that temperature of an environment (as measured outside the cables) is not the same as the application temperature (as measured on the surface of the conductor). Application temperature is therefore not easily concluded anymore.

1.3.2 Separation of RJ 45 connectors under Power Load

The IEC connector group met during the ISO/IEC WG 3 meeting and the separation under power load was addressed. Two investigations were presented and discussed. The outcome of the investigations was that breaking of the power caused arcing which caused a significant degradation in the separation points of the contacts. However, due to the location of the separation points away from the actual contact points it appeared that the contact reliability might stay high even after a large number of matings.

Different lengths of contact caused first breaking only at one of the contacts, and therefore the arching and degradation of this contact became significantly more critical.

Further studies including long term environmental tests are needed to finally conclude the maximum power over breaking RJ 45 contacts.

1.4. Other points of Discussion

The meeting also discussed other issues and the main points were:

- A: It was agreed to discuss a guide to application of the MICE concept at the next meeting. The new work item proposal for this work had been agreed.
- B: A small form factor connector, type Duplex LC, shall be included in the coming cabling component requirements as a back up for the presently only specified fiber optical connector at the wall outlet..
- C: Model calculation of component and permanent link requirements from the channel specification was started. Different models for calculations were presented and discussed, but no agreement was reached about which one to apply for the calculations. It was decided that this should be done by the beginning of the next ISO/IEC WG 3 meeting in February in order that component requirements could be drafted there.

Already now component and permanent link requirements have been drafted by other committees which means that different and conflicting requirements might be generated by ISO/IEC WG 3 dependent on the model being selected. Consequently there is a significant risk that component and permanent link requirements as now being proposed by other standards are subject to modifications by ISO/IEC WG 3.

An overall conclusion of the meeting is that the ISO/IEC WG 3 made a lot of progress with the market significant issues of 10 Gigabit Ethernet and Power over Ethernet Plus, but that much difficult work lies ahead with specifying component and permanent link requirements. Especially estimating that establishing of connecting hardware high frequency requirements will be a significant challenge.

PART 2: Practical Working Methods of ISO/IEC WG 3

2.1 Participation and decision making

The ISO/IEC WG 3 meetings are intense with meeting times from approx. 08:30 to 18:00 each day. The participants are officially identified as "experts", although one cannot of course be an expert in all the different subjects treated at a meeting.

Voting takes place in the parent committee and on national level, and not in working groups such as ISO/IEC WG 3. However, decisions have to be made and therefore hearings are frequently necessary when unanimous agreement of a specific subject cannot be made. This is done using either as expert opinions or country opinions. For country hearings all country opinions have equal weight. It is evident that many experts and countries having the same opinion will have significant influence on the development of the draft requirements, which is of course very important as companies and countries do not want to see standards develop which invalidate their products or traditions.

2.2 General Content of ISO/IEC WG 3 Meetings

ISO/IEC WG 3 meetings treat different issues each time, but the same overall issues of the meeting are included in the agenda. These are:

- **Updating of information** about developments in countries and other standardisation committees. This is done by reports from national committees and, more important, liaison letters from other committees concluding new developments and technical questions. In this way it is assured that latest information about developments is available for the experts before the start of the technical work.
- **Technical discussions and decisions** of the issues important for generation of the new standards. Due to the tight programme with very varying technical issues the discussions are run in two different ways. As discussions in the full working group or in ad-hoc meetings, Ad-hoc meetings are established to treat specific issues in a smaller group. The outcome of the ad-hoc discussions is then presented to the full committee later during the meeting, who then decide to agree or modify the ad-hoc decisions.
- **Communication** of decisions and technical problems out to relevant third parties is an important part of each meeting in order that progress of standardisation can be made, and to obtain technical support from for instance component committees for the coming meetings. Contact to other committees is made in the form of liaison letters which are officially written to the committees in question and also communicated by liaison persons from ISO/IEC WG 3, who participate in these committees.

Yours sincerely,
3P Third Party Testing

A handwritten signature in blue ink that reads "Poul Villien".

Poul Villien