ISO/IEC JTC 1/SC 25/WG 3 N 602

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ISO/IEC JTC 1/SC 25/WG 3

Customer Premises Cabling

Secretariat: Germany (DIN)

TITLE: **Draft Liaison Report from ISO/IEC JTC 1/SC 25/WG 3 to IEEE 802:3 on Power feeding of DTEs via customer premises cabling**

SOURCE: **WG 3 Secretariat** (WG 3 N 594 and Tromsø 73A)

PROJECT: **25.03.02.xx: Generic cabling for customer premises**

STATUS: **As instructed at Tromsø this liaison report is drafted by the Secretary of SC 25/ WG 3 based on WG 3 N 594 and Tromsø 73A and distributed in WG 3 for review. In parallel it is sent to IEEE 802 as a draft for consideration.**

ACTION ID: **FYI**

DUE DATE: **2000-07-31**

REQUESTED ACTION: **This draft is distributed in SC 25/WG 3 with the kind request to bring comments to the attention of WG 3 Secretariat by 2000-07-31 at the latest. To IEEE for preliminary information.**

MEDIUM: **Def**

No of Pages: **4 (excluding cover)** **Size in kB:** **27 (including cover)**

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Draft Liaison Report from ISO/IEC JTC 1/SC 25/WG 3 to IEEE 802:3 on Power feeding of DTEs via customer premises cabling

To: IEEE 802.3

copy to IEC SC 46C and IEC 48B

From: ISO/IEC JTC 1/SC 25/WG 3

Subject: **Power feeding of DTEs via customer premises cabling**

Date: July, 2000

During its meeting in Sydney, 2000-02-07/11, ISO/IEC JTC 1/SC 25/WG 3 received your liaison report on Power feeding of DTEs via customer premises cabling and resolved to distribute a questionnaire to its members, asking for input. This questionnaire was distributed shortly before our last meeting at Tromsø 2000-06-12/15, thus only one answer had arrived by that meeting.

During its meeting at Tromsø 2000-06-12/15, ISO/IEC JTC 1/SC 25/WG 3 developed the following (partly preliminary) answers to your questions on the input provided by one country (US) and experts present (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Norway, the Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA).

Questions from IEEE 802.3 and answers from SC25/WG3

Note of the Secretary: the scope of IEEE 802.3 project P802.3af specifies "unshielded twisted pair cabling" as the medium to be considered. ISO/IEC 11801 does not use this terminology. It specifies **balanced cables** with an impedance of 100 Ω, 120 Ω and in the first edition also with 150 Ω. Any of these cables may have shields around cable elements (pairs and quads) and / or overall shields. Thus all the cables and connectors referenced in the answers below may have (optional) shields.

Question 1: Worst case loop resistance (element-by-element analysis)

Response:

The following values for DC loop resistance apply to categories 5 and higher and classes D and higher:

Solid Cable (@20 °C)	**18,8 Ω/100m**
Stranded Cable (@20 °C)	**28,2 Ω/100m**
Connector (@20 °C)	**0,40 Ω (loop)**
Channel (-10 to +60 °C)	**25 Ω**

Note: Although the 1st edition of ISO/IEC 11801 (1995 plus edition 1.2: 2000-01) allows for loop resistance of up to 40 Ω, the intent is to specify a maximum loop resistance of 25 Ω in the 2nd edition (expected publication 2002) for future installations.

Rational:

100 m Solid Cable (@20 °C)	**18,8 W as per IEC 60334 (cl 8)**
100 m Stranded Cable (@20 °C)	**28,2 W as per IEC 60334 (cl 8)**
Connector (@20 °C)	0,20 W x 2 directions = 0,40 W
Permanent Link (@20 °C):	(solid cable * 0,9) + (connector * 3) = 18,1 W
Perm Link Requirement:	**18,1 W + 2,9 W allocated margin = 21 W (cl 6)**
Channel (@20 °C):	(solid cable * 0,9) + (stranded cable * 0,1) + (connector * 4) = 21,3 W
Channel Requirement:	**21,3 W + 3,7 W allocated margin = 25 W (cl 6)**

Bold indicates new requirements.

Applicable to categories 5 and higher and classes D and higher. This approach deviates from the existing basis for link and channel attenuation requirements. The proposed link and channel resistance requirements will allow for operation up to 60 °C (based on a temp dependence factor of 0,004 per °C), whereas the existing class attenuation requirements are aligned with component values at 20 °C.

Question 2: Allowable loop dissipation (temp rise in worst case bundles), maximum temperature of cabling behind the wall?

Response:

The maximum current for categories 5 and higher and classes D and higher should not exceed 0,175 per conductor (0,35 A per pair) for ambient temperatures up to 60 °C for solid cables (45 °C for 0,4 mm equivalent stranded cables). Analysis assumes that conductor diameters of less than 0,4 mm (or equivalent) are not used.

Note - No change required to 11801.

Rational

Assuming an allowed 40 °C rise for PVC insulating materials and an ambient temperature of 25 °C, the current capacity of 0,5 mm (24 AWG) and 0,4 mm (26 AWG) conductors is 2,1 A and 1,3 A respectively. Using the assumption that the total current in all conductors of multiple conductor cables may not exceed 20% of the sum of the individual ratings of all conductors, the current capacity for is:

Solid cable: 2,1 A * 0,2 = 420 mA per conductor

Stranded cable: 1,3 A * 0,2 = 260 mA per conductor

A maximum current of 420 mA per solid conductor allows for 840 mA per pair based on an ambient temperature of 25 °C. Derating by a factor of 53 % (using the chart shown in IEC 60603-7 from 25 °C to 60 °C) allows for a steady state current of 395 mA per pair. This current assumes that stranded cables are exposed to ambient temperatures of less than 45 °C. Connector current capacity of 0,75 A @ 60 °C per conductor as specified in IEC 60603-7 is not the limiting factor.

Question 3: Worst case connector contact resistance, capacity, cycling with power

Response:

The following values apply to all categories of connectors:

Input to output resistance: **200 mW max** (ISO/IEC 11801 present draft 2nd edition)

Capacity: **0,75 A @ 60 °C max (IEC 60603-7)**

Cycling with power: **10 W max load per pair**

Rational:

Desired to keep steady state load below 10 W per pair to control arcing damage during unmating. Based on a voltage of 48 V dc and current of 350 mA for a supply pair and 350 mA for a drain pair (i.e., 175 mA per conductor), maximum load is less than 10 W per pair.

Question 4: Information on parameter limits (voltage, current, power, source impedance, etc.) for world-wide standard (I.e. restrictions beyond SELV)

Response:

The following values apply to all categories and classes:

Voltage/current: **48 V dc max @ 175 mA max per conductor**

Power: **10 W max per pair (20 W max per 4-pair cable)**

Question 5: Specification references for parameter limits

Response:

Cable: **IEC 61156**

Connector: **IEC 60603-7**

Link & channel: **ISO/IEC 11801** (ISO/IEC 11801 present draft 2nd edition)

Question 6: What percentage of 60603-7 connectors world-wide terminate less than 4-pair?

Preliminary response:

North and South America	**up to 10%**
Germany, Austria & Swiss	**up to 60 %**
Other Western Europe	**up to 20 %**
Eastern Europe	**up to 10 %**
Asia/Pacific	**up to 10 % (share of 2-pair TOs expected to raise in Australia)**
Africa	**up to 10 %**

NOTE - The above values are not backed by any formal surveys of these markets. The only written answer to WG 3 N 594 came from the US, there was no expert form Africa, Eastern Europe or South America present at the meeting at Tromsø.

Note of the Secretary: ISO/IEC 11801 specifies a minimum of two pairs per TO. Some countries e. g. the US - in accordance with ISO/IEC 11801 - have specified a higher minimum of four pairs in their national standards. Many countries, e. g. The European countries of CENELEC have endorsed the minimum of two pairs in their national standards. The present draft for the 2nd edition of the international standard specifies a **minimum** of two pairs **per TO**.

Question 7: DC unbalance in cables, cabling

Response:

The following cable (categories 5 and higher) and channel (classes D and higher) values for DC unbalance apply to all categories and classes:

Solid Cable (@20 °C): 0,56 W/100m

Stranded Cable (@20 °C): 0,84 W/100m

Channel (-10 °C to +60 °C): 1,0 W

Rational:

Analysis for categories 5 and higher and classes D and higher (bold indicates new requirement):

100 m Solid Cable (@20 °C): 0,03 * 18,8 = 0,56 W (cl 8)

100 m Stranded Cable (@20 °C): 0,03 * 28,1 = 0,85 W (cl 8)

Connector (@20 °C) 0,25 * 200 = 0,050 W per connector (cl 9)

Permanent Link (@20 °C): (solid cable * 0,9) + (connector * 3) = 0,66 W

Perm Link Requirement: 0,66 W + 0,14 allocated margin = 0,80 W (cl 6)

Channel (@20 °C): (solid cable * 0,9) + (stranded cable * 0,1) + (connectors * 4) = 0,80 W

Channel Requirement: 0,80 W + 0,20 allocated margin = 1,0 W (cl 6)

NOTE - This approach deviates from the existing basis for link and channel attenuation requirements in the same way as loop resistance.

Question 8: What did we miss?

Recommended response:

Some of the values provided for cabling and components are not currently specified in ISO/IEC 11801. For the next edition, SC 25/WG 3 intends to adopt new requirements that are consistent with these responses.

If there is contemplation of connection of additional transmission elements in the cabling channel to apply power, their effects on signal balance should be considered.

Question 6 does not catch the cases of one outlet being used for two applications. Also the IEC 60603-7 connector would be terminated with four pairs, only two pairs are available for one application in this case. As ISO/IEC 11801 specifies additional NEXT requirements for cable sharing a unknown but not negligible number of outlets are installed and will be installed which provide two pairs power application only also for pairs are terminated at the IEC 60603-7 connector.

Also the next edition of ISO/IEC 11801 will not specify 150 W cabling, there is still a considerable base of this cabling installed, which might be worth while to consider.