IEEE 802.3 Ethernet Working Group
TIA TR-42 Liaison to IEEE 802.3

Valerie Maguire

The Siemon Company

San Antonio, TX

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Introduction to TIA

- **Telecommunications Industry Association**
- **www.tiaonline.org**
- **TR-42: Defines mechanical and transmission requirements for copper twisted-pair, optical fiber, and coaxial cabling and components**
- **Chris DiMinico is outgoing liaison from IEEE 802.3 to TIA TR-42**

Agenda and TIA Meeting Overview

- **Most recent TR-42 Plenary week:**

  October 3 - 6, 2016 in Philadelphia, PA
- **Review TR-42 subcommittee activities**
  - **8 subcommittees met**
- **Update on project development**
- **☞ This symbol highlights key points of interest**

2 TIA TR-42 Liaison Letters to IEEE 802.3

1. **TIA has started work to define cabling for the IEEE 802.3bp type B link segment. A Task Group has been established to consider:**
   - **IEEE P802.3bu Power over Data Lines (PoDL)**
   - **Potential premise applications of IEEE 802.3bp 1000BASE-T1 and IEEE 802.3bw 100BASE-T1**
   - **Potential premise applications of 10 Mb/s single twisted-pair Ethernet**

The group requests progress updates on single-pair projects, including multi-gigabit automotive Ethernet

2 TIA TR-42 Liaison Letters to IEEE 802.3

2. TIA responds to IEEE 802.3 inquiry regarding elevated temperature operation of cabling. The scope of TIA's response is limited to Environmental Classification C1 (commercial space) as specified in TIA-568-0.D. The key areas affected by temperature are:

- **Transmission**
- **Electrical**
- **Mechanical**
- **Environmental**

Elevated Temperature - Transmission

ANSI/TIA-568-C.2, specifies transmission performance for cabling from -10 ºC to 60 ºC. Performance above 60 ºC would need to be studied to determine its impact on all transmission parameters and if its impact on insertion loss (IL) de-rating at higher temperatures may be different from the de-rating already specified up to 60 ºC. De-rating of IL for balanced cables up to 60 ºC is shown below:

"The insertion loss for category 5e, 6, and 6A UTP horizontal cables shall be adjusted at elevated temperatures using a factor of 0.4 % increase per °C from 20 °C to 40 °C and 0.6% increase per °C for temperatures from 40 °C to 60 °C. The insertion loss for category 5e, 6, and 6A screened horizontal cables shall be adjusted at elevated temperatures using a factor of 0.2% increase per °C from 20 °C to 60 °C"

In addition, we would like to note that there would be a need for further study of electrical and mechanical performance for cables at operating temperatures that reflect maximum ambient temperature of 60 °C plus current-induced temperature rise associated with power delivery. This work would need to be carried out in coordination with cable Standards Development Organizations (SDO's) including ICEA.

Elevated Temperature - Electrical

ANSI/TIA-568-C.1 specifies operating temperature for C1 environments

"Temperature range without mechanical or electrical degradation (°C)

- *installation: 0 to +50*
- *operation: –20 to +60"*

ANSI/TIA-568-C.1 specifies that "*Performance of the connecting hardware shall be maintained over temperatures ranging from 10 °C to +60 °C"*

For DC resistance (DCR) and DCR unbalance, we make the following observations:

- DC resistance will increase with temperature by DCR = 0.4 % per °C;
- DCR unbalance, within a pair and pair-to-pair, has not been studied at temperatures greater than 60°C.

Elevated Temperature - Mechanical

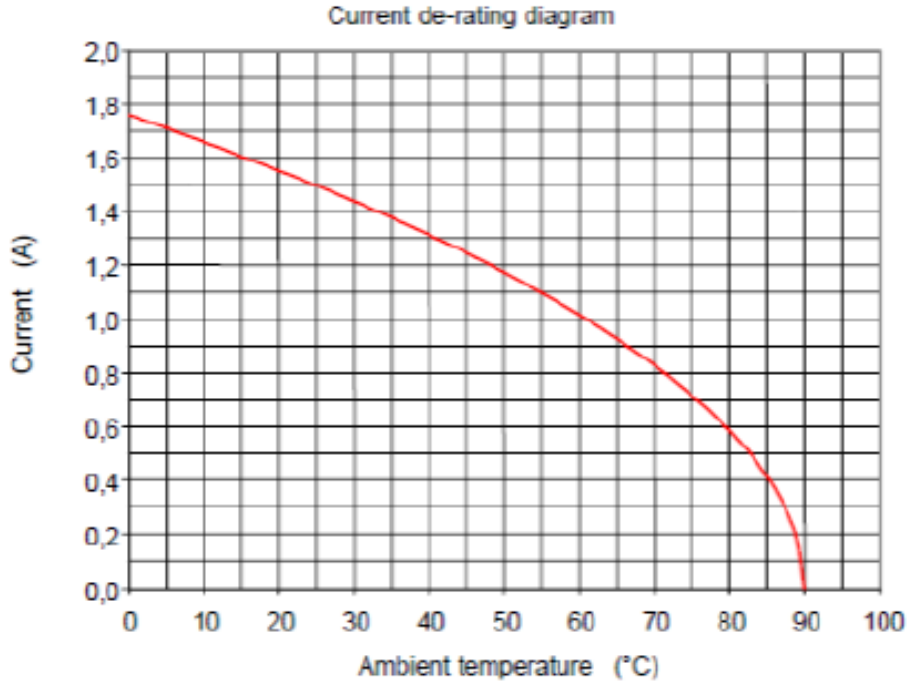
Materials generally age faster at higher temperatures and the impact of aging on key properties should be studied. Mechanical performance of cables is assured based on the temperature rating on the cable jacket, where 60 °C represents the vast majority of the installed base.

To enable Power over Ethernet support over the installed base as requested by IEEE 802.3, the maximum operating temperature of the cabling was established to be the temperature rating of the cable. In TIA TSB-184-A, the maximum assumed ambient temperature was reduced to 45 °C when these cables are used for remote powering, allowing for a temperature rise of 15°C.

Elevated Temperature – Mechanical, cont.

Mechanical performance of connecting hardware is assured by our standards for currents up to 0.75 A at ambient temperatures of 60 °C. The attached graph from IEC 60603-7 indicates rapid reduction of current capacity at higher temperatures to zero at 90 °C.

60603-7 © IEC:2008 – 27 –



Elevated Temperature - Environmental

Operating at higher temperatures increases the DC resistance significantly leading to additional losses within the cabling. This reduces the efficiency of power delivery and increases the amount of energy dissipated.

Operation over a wider temperature range may affect the consistency of other parameters such as delay skew.

Elevated Temperature - Conclusions

- **Extending the temperature range beyond 60° C would take considerable investment of time, resources, and coordination with ICEA and IEC component committees**
- **TIA is happy to address any specific requests or questions that IEEE 802.3 has regarding the operation of communications cabling at higher temperatures**

TIA TR-42 Activities

- **TR-42.1 (Commercial Building Cabling):**
  - **New project: ANSI/TIA-1179-A “Healthcare Facility Telecommunications Infrastructure Standard” circulating for industry ballot**
  - **New project: ANSI/TIA-942-B “Telecommunications Infrastructure Standard for Data Centers” circulating for industry ballot**
  - **New project: ANSI/TIA-568.D-0-1, “Updated References, Accommodation of New Media Types” under development**

TIA TR-42 Activities

- **TR-42.1 (Commercial Building Cabling), cont.:**
  - **New project: ANSI/TIA-568.D-1-1, “Updated References, Accommodation of New Media Types” under development**
  - **PAR for new project: ANSI/TIA-xxxx, “Places of Assembly” under development**

TIA TR-42 Activities

- **TR-42.3 (Pathways and Spaces):**
  - **ANSI/TIA-569-D-1 “Revised Temperate and Humidity requirements for Telecommunications Spaces” approved for publication**
  - **New project: ANSI/TIA-569-D-2 “Guidelines for Supporting Remote Powering” circulating for committee ballot**

TIA TR-42 Activities

- **TR-42.5 (Terms and Symbols):**
  - **Definitions, acronyms, units of measure, and symbols maintained in a working document**
  - **New project: ANSI/TIA-440-C, “Fiber Optic Terminology” circulating for industry ballot**
- **TR-42.6 (Infrastructure Administration):**
  - **ANSI/TIA-606-C, “Administration Standard for Telecommunications Infrastructure” approved for publication**

TIA TR-42 Activities

- **TR-42.7 (Copper Cabling):**
  - **ANSI/TIA-1152-A, “Requirements for Field Test Instruments” approved for publication**
  - **New project: TSB-184-A, “Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling” circulating for default ballot (drafts 6.1b and 7.1 available in the IEEE P802.3bt private area)**

TIA TR-42 Activities

- **TR-42.7 (Copper Cabling), cont.:**
  - **New project: TSB-5021, “Guidelines for the use of Installed Cabling to Support 2.5GBASE-T and 5GBASE-T” circulating for default ballot (drafts 1.0 and 1.1 available in the IEEE P802.3bz private area)**
  - **New project: ANSI/TIA-1183-A, “Measurement Methods and Test Fixtures for Balunless Measurements of Balanced Components and Systems” circulating for industry ballot**

TIA TR-42 Activities

- **TR-42.7 (Copper Cabling), cont.:**
  - **New project: ANSI/TIA-568.4-D, “Broadband Coaxial Cabling and Components Standard” circulating for industry ballot**
  - **New project: ANSI/TIA-568.2-D, “Balanced Twisted-Pair Telecommunications Cabling and Components Standard” circulating for subcommittee “mock” ballot review**
  - **Task Group formed to study testing and application of end plugs**

TIA TR-42 Activities

- **TR-42.9 (Industrial Infrastructure):**
  - **New project: ANSI/TIA-1005-A-2, “1G Industrial Cabling for Four Pair (100 meters) (1000BASE-T) for E2 and E3 Environments” under development**
  - **New project: ANSI/TIA-1005-A-3, “1G Industrial Cabling for One Pair Type B (40 meters) (1000BASE-T1) for E2 and E3 Environments” under development**

TIA TR-42 Activities

- **TR-42.10 (Sustainable Information Communications Technology)**
  - **New project: TSB-5046, “Standard Process for Sustainable Information Communications Technology Manufacturers” circulating for default ballot**
- **TR-42.11 (Optical Fiber Systems):**
  - **Group did not meet**
  - **ANSI/TIA-568.3-D: "Optical Fiber Cabling and Components Standard” published**
  - **ISO/IEC “OM5” terminology will be adopted**

TIA TR-42 Activities

- **TR-42.16 (Grounding and Bonding):**
  - **New project: ANSI/TIA-607-C-1, "Bonding in Multi-tenant Buildings" circulating for industry ballot with conditional approval to publish**

Upcoming TIA Meetings

TR-42 Plenary Meetings

February 6 - 10, 2017

Philadelphia, PA

www.tiaonline.org

Thank you

Contact Information:

Valerie Maguire

The Siemon Company

101 Siemon Company Drive

Watertown, CT 06795

phone: (602) 228-7943

valerie_maguire@siemon.com