

What you need to know now for the future of your network

Welcome to the fourteenth edition of the Standards Advisor. This report is issued quarterly and provides updates on the standards relevant to the structured cabling industry, and the impact they have on your network design, planning and operations.

This summary represents standards meetings held during the first quarter of 2017 and reports on activities from all aspects of the cabling industry. These activities range from the applications standards (IEEE 802.3 and 802.11 and T11—Fibre Channel) to the cabling standards (ANSI/TIA, ISO/IEC, CENELEC) and, finally, cover new developments in the world of multisource agreements (MSAs).

62nd ISO/IEC JTC1/SC25 WG3: Singapore, 16-20 January 2017

1. ISO/IEC 11801 3rd Edition Parts 1 to 6 advanced to FDIS stage

- The Draft International Standard (DIS) circulation of Parts 1 to 6 of the 3rd Edition of ISO/IEC 11801 received positive votes. All country comments were resolved at the Singapore meeting, and the documents will be advanced to the final stage of development, Final Draft International Standard (FDIS).

2. OM5 Wideband Multimode Fiber

- WG3 agreed to implement the results of the country questionnaire on the naming of WBMMF, adopting OM5 as the new cabled fiber category name.
- A note was inserted to state that "In addition to supporting the same 850nm and 1300nm as OM4, OM5 offers advantage for future applications using wavelength division multiplexing in the 850 nm to 953 nm wavelength range".
- The CDV of IEC 60793-2-10 ed.6, the MMF detailed specification, was approved subsequent to the WG3 meeting, providing the required reference for OM5 prior to circulation of the 11801 ed.3 FDIS, expected shortly.

3. Multimode Fiber Attenuations

- Comments to update the attenuation of OM3 and OM4 to 3.0 dB at 850 nm were rejected, due to concerns about backward referencing and potential market confusion.
- OM3 and OM4 attenuation at 850 nm was left unchanged at 3.5 dB/Km, and 3.0 dB/km was adopted only for the new OM5 cabled fiber category.

4. Optical Fiber connectors for more than two optical fibers

- A comment to add explicit reference to "8-way" optical fiber connectors was not accepted.
- The recognized interfaces at the EO (Equipment Outlet) in FDIS ISO/IEC 11801-5 (Data Centers) are those in IEC 61754-7-1 (12-fiber MPO) and IEC 61754-7-2 (24-fiber MPO).
- Additionally, reference to 16-fiber and 32-fiber MPOs was removed due to lack of mature IEC specifications.

5. Color coding of optical fiber types

- A comment to specify turquoise and magenta color coding of connectors/adapters for OM3 and OM4, respectively, was not accepted.
- Additionally, references to 62.5 micron fiber connector/adaptor color coding (beige and black) were removed, since 62.5 micron multimode is no longer supported for new installations.

6. Cleaning and inspection of optical fiber connectors

- Text regarding cleaning and inspection of optical fiber connectors in FDIS 11801-1 was updated to read: "Connector end-faces shall be inspected

for contamination with low resolution microscopes, according to ISO/IEC 14763-3 and cleaned, if necessary. Prior to any connection being made, the connector end-faces shall be re-inspected to verify that the cleaning has been effective. The quality of plugs of the test cords may be inspected using the inspection requirements as stated in annex B of 14763-3."

7. Balanced cabling components and remote powering applications

- Text was added to the ISO/IEC 11801-1 channel performance clause to state that, in addition to the Channel transmission performance specifications, "For applications requiring remote power delivery, the individual components shall comply with the DCR, DCR unbalance requirements in ISO/IEC 11801-1. See ISO/IEC TR 29125 for consideration of installation conditions".

8. ISO/IEC TS 29125 Remote powering over balanced cabling

- The Draft Technical Specification (DTS) of the remote powering document was positively voted. All comments were resolved, and the document was approved for publication.

9. ISO/IEC TR 11801-9904 Qualification of installed cabling in support of 2.5 and 5GBASE-T

- The DTR for qualification of installed cabling for 2.5 and 5GBASE-T was positively voted. All comments were resolved, and the document was approved for publication.

10. ISO/IEC TR 11801-9905 Qualification of installed cabling in support of 25GBASE-T

- The DTR for qualification of installed Category 7A, Category 7, and Category 6A cabling for 25GBASE-T was positively voted. All comments were resolved, and the document was approved for recirculation as a PDTR.

11. Developments related to 1-pair applications for balanced cabling

- The WG agreed to review a new Working Draft of the Technical Report for cabling in support of IEEE 802.3 1000BASE-T1 in a series of teleconferences, to prepare the circulation of a 1st CD after the next meeting.
- Other 1-pair projects in IEEE of interest to WG3 were also discussed, including IEEE P802.3cg 10 Mb/s Single Pair Ethernet with up to 1 Km reach, and multi-gigabit automotive 1-pair developments.
- A use case for single pair applications based on the proposed amendment to ISO/IEC 11801-6 approved at the Reutlingen meeting was also discussed.
- The proposed informative Annex to ISO/IEC 11801-6 will provide guidelines to support single-pair applications including building controls, access control, audio-visual, security and IoT in the service distribution cabling subsystem.

- It was stated that this architecture may represent an attractive use case for IEEE 1-pair specifications ranging from 10 MB/s to multi-gigabit transmission.
- A liaison letter was sent to IEEE 802.3 and IEC 46C/48B component committees to foster collaboration in this area.

12. ISO/IEC 14763-2 Planning and Installation

- All comments to the 2nd Working Draft ISO/IEC 14763-2 Edition 2 were resolved, including planning and installation guidelines for cabling in support of remote powering up to 100W.
- The stacking height for non-continuous pathways systems was reduced by approximately 50%.
- It was agreed to delete the requirement for 1 phase circuits in the zero segregation chapter.
- To keep fiber polarity recommendations for 24 fiber MPOs in line with the 12 fiber MPO polarity, this text was added "For MPO connectors with more

than one row of fibers a similar approach should be used to ensure the minimum number of component configurations."

- The WG agreed to send out the document as a first Committee Draft (CD).

13. ISO/IEC 30129 Telecommunications Bonding Networks

- The published ISO/IEC 30129 document (also published as EN 50310:2016) received a number of comments that will be handled in an interim ad-hoc. This may result in a short amendment or a revision.

14. Automated Infrastructure Management

- Now that the ISO/IEC 18598 standard for AIM has been published, the following text was added to ISO/IEC 11801-6: "For administration and maintenance of complex/large installations, an AIM system compliant to ISO/IEC 18598 should be considered."

The 63rd ISO/IEC JTC1/SC25 WG3 meeting will be held 11-15 September 2017 in Bruges, Belgium

TIA TR-42: Philadelphia, Pennsylvania USA 6-10 February 2017

1. TR42.1 Commercial Building Cabling

- Comments were resolved of the following which have been re-circulated as default ballots:
 - TIA -1179-A healthcare
 - TIA-942-A data centers
- Comments were resolved of the following which have been re-circulated as second industry ballots:
 - ANSI/TIA-568.0-D-1 generic cabling addendum
 - ANSI/TIA-568.1-D-1 commercial cabling addendum
- "OM5 Wideband" was inserted as a recognized and recommended media for both horizontal and backbone cabling in:
 - ANSI/TIA-568.0-D-1 generic cabling
 - ANSI/TIA-568.1-D-1, commercial cabling
 - ANSI/TIA-1179-B healthcare
 - ANSI/TIA-942-B data centers

2. TR-42.3 Pathways and Spaces

- TIA-569-D Addendum 2: Additional requirements for pathways used to support cabling for remote powering ballot comments were resolved and the document approved for re-circulation as a second TIA ballot
 - The document has low, medium, high performance ratings for different types of pathways
 - Bundles above 91 cables are not characterized and not recommended

3. TR-42.6 Telecommunications Administration

- Agreed to adopt ISO/IEC 18598 AIM standard as ANSI/TIA 5048 standard and reference this from the TIA-606-C standard

4. TR42.7 Copper cabling systems and components

- Resolved ballot comments on ANSI/TIA 1183-A, consolidation of 1183 and 1183-1, and authorized publication. (This is the standard for balun-less testing, extended to 2000 MHz for cat 8.)
- Resolved default ballot comments on TSB-184-A (support for 4-pair remote power) and authorized publication
- ANSI/TIA-568.2-D, revision of 568-C.2, for copper data networks, was circulated for a first committee ballot.
- Resolved comments from industry ballot for ANSI/TIA-568.4-D, revision of ANSI/TIA-568-C.4, coaxial cabling, authorized 2nd industry ballot
- Agreed to liaise draft of TSB-184-A to the NFPA NEC task group where there is a proposal to reference TIA TSB-184-A for installation guidelines
- Task group finished studying the testing and applications of end plugs, produced annex for modular plug terminated link, text in annex added to 568.2-D

- A task group was established to study 28 AWG for patch cords
- A task group was established to study transmission properties at temperatures above 60 C

5. TIA TR42.9 Industrial cabling

- Approved the 1G industrial cabling addendum 2 to ANSI/TIA-1005-A-2012 for cabling supporting 1000BASE-T for E2 and E3 environments as a Committee ballot
- Approved one pair cabling supporting Type B of IEEE 1000BASE-T1 for E2 and E3 environments as an Addendum 3 to ANSI/TIA-1005-A-2012, to be circulated as a mock ballot
- Participating in a joint task group with TR42.7 and TR42.1 for one pair cabling
- Drafted and sent liaison letter to IEEE 802.3 providing an update on 1-pair activities and also attaching the MICE table to request if environments beyond MICE 3 were contemplated in any IEEE 802.3 single pair applications

6. TIA TR42.10 Sustainable Information Communications Technology

- TSB-5046 ballot comments were reviewed and the document was approved for recirculation as a second default ballot
- The committee agreed to publish the document if no technical comments are received

7. TIA TR-42.11 - Optical Fiber Systems

- A project to create a Technical Systems Bulletin on fiber polarity was cancelled.

8. TR42.12 - Fiber and Cable

- The project to develop TIA-598-D addendum 1 to define four new fiber colors (magenta, lime, tan, olive) for fiber numbers 13 to 16 advanced to second ballot.
- The CommScope proposal to use Lime as the jacket color for OM5 cabling was accepted. A second addendum to TIA-598-D will be created to document the color definition.

9. TR-42.13 - (Optical) Connectors and Metrology

- The revision of ANSI/TIA-455-171 regarding measurement of insertion loss of terminated assemblies advanced to ANSI ballot. The major update is with regard to the use of the encircled flux launch condition.
- Projects to revise TIA-604-5 (MPO connector) and TIA-604-18 (MPO-16 connector) were initiated to update and harmonize with the work in IEC 86B.

The next plenary meeting of TIA TR42 committees is scheduled for 12 - 16 June 2017 in Quebec City, Canada

FC-PI-7 [64GFC & 256GFC]

- OM5 has been approved as an equivalent transmission medium as OM4, and will be included in FC-PI-7 document.
- The first FC-PI-7 draft will be published before the June meeting for further review.

- MMF variants were reviewed and will be included in the FC-PI-7 first draft.
- To Be Confirmed (TBC) values need to be validated, most likely at the August meeting. Electrical and SMF variants are still under development.

The next meeting of INCITS/T11 will be held
5-9 June 2017 in Anchorage, AK, USA

CENELEC

CENELEC TC215 WG1 meeting 67, Frankfurt, Germany, 1-2 March 2017

- EN 50173 series draft updated in accordance with the development of ISO-IEC 11801 series, EN documents will include design objectives that are not included in the ISO/IEC documents.
- In EN 50173-2 the requirement of two TOs at the work area is under consideration especially when overlay installations according to EN50173-6 are used

CENELEC TC215 WG2
CENELEC TC215 WG3
CENELEC TC215

- Text to recommend factory terminated cords was included.
- The entire EN 50173 series of standards will go out for CLC Enquiry and thereafter final vote. Expected publication early 2018

The next meeting of CENELEC TC215 WG1 will be held
3-4 June 2017 in location TBA.

The next meeting of CENELEC TC215 WG2 is 5-7 April 2017 in Vienna.
The next meeting of CENELEC TC215 WG3 is 3-4 April 2017 in Vienna.
The next meeting of CENELEC TC215 is 5 April 2017 in Vienna.

IEEE 802.3 Ethernet Meetings:

Huntington Beach, California USA 9-13 January 2017 (Working Group Interim)
Vancouver, British Columbia Canada 12-16 March 2017 (IEEE 802 Plenary)

1. IEEE 802.3bt 4 pair Power over Ethernet

- The IEEE 802.3bt 4-pair power over Ethernet Task Force continues through working group ballot. The document is technically complete and no new features are being added, but has undergone substantial editorial changes, splitting the two new "Types" of PoE, Type 3 (up to 60W on 4 pairs) and Type 4 (up to 90W at the PSE) from the existing specifications for PoE (802.3af and 802.3at are "Type 1" and "Type 2").
- The IEEE 802.3bt draft currently references TIA TSB-184-A and ISO/IEC TR 29125 for cabling requirements. Additionally, the 802.3bt draft expands all Types of end-point PoE (PoE delivered from a switch) to support 10GBASE-T and the new 2.5G and 5GBASE-T speeds, and defines new midspan PSE variants for the new speeds as well.
- The group approved a new timeline, slipping the completion of Working Group Ballot by four months to July 2017, but did not expect to slip the approval out beyond first quarter of 2018.

Single Twisted Pair Copper Standards

2. IEEE P802.3bu Single-pair power over data lines (PoDL)

- IEEE Std 802.3bu-2016 was approved by the Standard board in December 2016 and published by the IEEE-SA on 7 February 2017. This standard specifies powering over single-pair copper media up to 6.5 ohms loop resistance, designed to be compatible with IEEE Std 802.3bw-2015 100BASE-T1 and IEEE Std 802.3bp-2016 1000BASE-T1 PHYs, which operate on 15m single-twisted pair media for automotive and other applications.
- IEEE Std 802.3bu powering provides power ranging from 0.5W to 50W at 12V, 24V, or 48V can also be used without a data link.

3. IEEE P802.3cg 10 Mbps Single-Twisted-Pair Ethernet

- The 10 Mbps Single Pair Ethernet project was approved by the Standards Board in December 2016, and held its first 2 meetings as a Task Force in the January and March 2017 meeting cycles.
- The project objectives cover industrial, automotive, and building automation use cases, with two dominant, but different application reaches, one up to 15m, and one of approximately 1km.

- The project scope includes both the potential for multiple PHY transceiver types and associated powering for the target applications.
- The Task Group adopted a link segment specification for transmission on up to 1km of 18AWG cabling with up to 10 inline connectors, primarily for process control and building automation applications, including remote powering.
- The Task Force heard presentations for PHY transceiver proposals and powering concepts for the 1km application. Additionally, the Task Force is working on link segment specifications for 15m point-to-point applications and investigating multi-drop applications for up to 25m. Use cases for these modes and an emerging 200m link segment include building and industrial automation, automotive and even server infrastructure networking.
- The Task Force is on track to adopt baseline proposals for PHYs in the July timeframe, and produce a Working Group ballot draft around March of 2018.

4. IEEE 802.3 Multigigabit Automotive Ethernet Study Group

- The Multigigabit Automotive Ethernet Study Group was approved by the IEEE 802 Executive Committee in November 2016 and held its first two meetings in January and March of 2017.
- The study group is focused on automotive applications in excess of 1Gbps. Applications were discussed for speeds of 2.5 Gbps, 5Gbps, and 10Gbps. Project documentation was completed to submit to the IEEE standards board for approval in May 2017.
- The objectives may address a wide range of media types and multiple rates, including 2.5Gbps, 5Gbps and 10Gbps in harsh EMC environments such as automotive. The project objectives include copper applications at all 3 speeds, up to 15m and 4 connectors, on copper media without specifying the type at this time (e.g., UTP, FTP, S/FTP, or Coax would be acceptable).
- While there has been discussion around optical PHY types, an optical media objective has not yet been adopted. The project objectives also include use of 802.3bu PoDL for remote powering and auto-negotiation with the existing 100 Mbps and 1 Gbps single-pair Ethernet PHYs.

5. IEEE 802.3bs 400G and 200G on SM fiber

- The draft has progressed through first Sponsor ballot, the last stage. The Task Force had been grappling with finding a resolution to situations related to multiplexing four lanes with specific skew offsets that can cause a reduction in transition density for clock recovery circuits. The resolution was to add a precautionary note. The work remains on track to publish at the end of 2017.

6. IEEE 802.3cd 50G, 100G, and 200G

- The draft has progressed through three Task Force reviews in preparation for Working Group ballot.

- Objectives have been stable since September 2016. The wideband multimode fiber specification, TIA-492AAAE (a.k.a. OM5), was added as a recognized media to 400GBASE-SR16. Because cabling made with wideband fiber meets OM4 requirements at the 850 nm operating wavelength, it supports the same reach as OM4.
- The work remains on track to publish in September 2018.

The next IEE 802.3 meeting will be held

22-26 May 2017 in New Orleans, Louisiana USA (Working Group Interim).

Multi-Source Agreements (MSAs)

SWDM4 MSAs

The SWDM Alliance announced that a group of companies lead by Finisar and Lumentum have formed a Multi-Source Agreement for transceivers utilizing short-wavelength division multiplexing. The first two specifications were immediately published that define the optical parameters for 40GE-SWDM4 and 100GE-SWDM4 devices. Founding members include CommScope, Finisar, Lumentum, Hisense, OFS, and Prysmian. More information may be found at www.swdm.org/msa. The reach capabilities for these 1-fiber-pair (duplex) applications are tabulated here.

Reach of two SWDM4 MSA applications for laser-optimized multimode fiber (m)			
Application	OM3	OM4	OM5
40GE-SWDM4	240	350	440
100GE-SWDM4	75	100	150