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Standards Quarterly Update:

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

Welcome to the 36th 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 third quarter of 2022 and reports on activities from all aspects of the cabling industry. These activities range from the applications standards (IEEE 802.3 and T11 Fiber Channel) to the cabling standards (ANSI/TIA, ISO/IEC, IEC, ITU-T and CENELEC). It also covers new developments in the world of multi-source agreements (MSAs).

73rd ISO/IEC JTC1/ SC25 WG3: September 26-29, 2022, Virtual meeting

Working Group 3 Meeting Highlights

The 73rd ISO/IEC JTC1/SC25 Working Group 3 (WG3) virtual meeting was attended by 70 experts and observers from 17 countries including Australia, Belgium, Canada, China, Denmark, France, Germany, Great Britain, Ireland, Israel, Japan, Netherlands, Singapore, Spain, Sweden, Switzerland, and the United States.

1. Development of generic single pair cabling specificationse

- Comments to the sixth Committee Draft (CD) of the Amendment to ISO/IEC 11801-1 that is primarily aimed at including single pair cabling specifications were resolved and the document was approved to proceed to a seventh CD for circulation.
- The single pair Classes T1-A-100 (20 MHz), T1-B (600 MHz) and T1-C (1,250 GHz) are specified to 100 m. Classes T1-A-250, T1-A-400 and T1-A1000 (20 MHz) are specified to 250 m, 400 m and 1000 m, respectively.
- A placeholder was added for a 100 MHz single-pair cabling Class as T1-B, and Classes T1-B and T1-C were renamed to T1-C and T1-D.
- Comments to recognize the 63171-4 connector for T1-C were rejected. The recognized connectors for single pair are the IEC 63171-1 copper LC style and the IEC 63171-6 industrial connector.

2. Single pair cable current carrying capacity

- Five IEEE 802.3 experts attended the WG3 meeting to convey IEEE 802.3 concerns, summarized in a presentation, regarding the use/reuse of 4-pair cabling to support single pair applications. Of particular concern is the 0.75A limitation of 4-pair cabling which is well below the 2.0 A needed to deliver the desired power levels. After much discussion, it was agreed to include text highlighting that since multipair cabling components may support less than 2.0 A the resulting single pair channel is limited to the current carrying capacity of the multipair components, and such channel is considered an "engineered approach."

3. Sheath sharing and single pair cabling

- Comments to the second Working Draft (WD) of 11801-9911 were partially reviewed. It was agreed to limit the scope of this document to 0.75 A. There will be an interim web meeting to address remaining issues including bonding for circuits originating in different PSEs, administration, transmission support mitigation, and others.

4. ISO/IEC 11801-6 Amendment 1, to include single pair cabling

- Comments to the fifth CD were resolved, and a sixth CD will be circulated. Single pair cabling specifications from the Service Consolidation Point (SCP) will be aligned with the those in the ISO/IEC 11801-1 Amendment.

5. Single pair multi-drop cabling

- This Technical Report will cover the modeling and specification of multi-drop cabling constructed from balanced 1-pair cabling components intended for use in cooperation with ISO/IEC 11801 generic cabling systems. Although participation in the multi-drop ad hoc is currently low, a show of hands indicated that additional country experts may join. A New Proposal (NP) will be circulated to countries for approval to officially start this work.

6. ISO/IEC 14763-3 Testing of Optical Fiber

- The ad hoc group completed the comment resolution of the 4th CD, and the document will now be circulated as a Committee Draft for Vote (CDV).

- Due to lack of reliable data, the following connector specifications are to be removed from document: MM and SM MPO32, SM MPO24, SM MPO16 and SM single-fiber Grade 1. The remaining connector specifications (MM single-fiber, MPO12, MPO24, MPO16, MPO16 APC, MPO32, SM single-fiber Grade 2 and MPO12 APC) have been confirmed by IEC SC86B and will remain in the 14763-3 document.
- Due to lack of reliable data, the following connector specifications are to be removed from document: MM and SM MPO32, SM MPO24, SM MPO16 and SM single-fiber Grade 1. The remaining connector specifications (MM single-fiber, MPO12, MPO24, MPO16, MPO16 APC, MPO32, SM single-fiber Grade 2 and MPO12 APC) have been confirmed by IEC SC86B and will remain in the 14763-3 document.
- The MPO test equipment Encircled Flux requirement was changed from "at the equipment bulkhead" to "at the end of the launch cord", under the circumstance that the measurement uncertainty is known and documented.

7. Optical trends ad-hoc meeting

- The objective for this ad-hoc group is to identify emerging fiber technologies for their possible inclusion in WG3 standards and align with IEC SC86 developments. The ad-hoc group reviewed presentations surrounding FTTR (Fiber-to-the-room) proposals and an update on the ITU-T SG15 progress on such topic. The decision was to put this activity on-hold until the relevant connecting hardware and hybrid cabling are standardized. The group also discussed newer applications developed by IEEE and Fiber Channel, which will be handled outside of the ad-hoc via National Committee comments.

8. Network Physical Security (NPS)

- Comments to the fifth CD of the ISO/IEC 24383 Physical Network Security standard were reviewed and the document will be circulated as a sixth CD with major structural changes to re-focus the document more on the security aspect of cabling infrastructure. While much content was added this time, there are many areas where large amounts of information is still missing. The document covers the security of telecommunications cables, pathways, spaces, and other infrastructure components of the telecommunications physical infrastructure to protect the telecommunications infrastructure from theft, vandalism, intrusions, and unauthorized modifications. The document adds levels of security to cabling, above the installation requirements of ISO/IEC 14763-2.

9. Bonding

- The ISO/IEC 30129 standard for bonding is due for review. A second Working Draft (WD) will be circulated since there a number of comments to the first WD were rejected.

10. Installation

- ISO/IEC 14763-2 for installation is due for review. A WD will be circulated. It was agreed to keep the chapter for remote powering of 4 pair cabling and develop a similar chapter for 1 pair cabling.

11. ISO/IEC 14763-5 Sustainability of Cabling Installations

- The ad hoc resolved comments to the first CD and a second CD will be circulated. The scope of this document includes requirements and recommendations to maximize the sustainability of cabling systems by addressing the cabling design, selection, packaging and transportation of components and related materials, operation and maintenance of the installation, waste management, and related skillsets for designers, installers and users.

The next scheduled ISO/IEC JTC1/SC25 WG3 meeting will be held February 27 to March 3, 2023, Location TBD.

TIA TR-42: No meetings were held during Q3, 2022

The next scheduled TIA TR-42 meeting will be held January 30 - February 3, 2023, Location TBD.

CENELEC TC86BXA: No meetings were held during Q3, 2022

The next scheduled CLC TC86BXA meeting will be held November 22-24, 2022, Paris, France.

IEEE 802 resumed face-to-face plenaries with remote access (a "hybrid" meeting) in July 2022, while the IEEE 802.3 working group and Task Forces continue to hold interim meetings electronically. IEEE 802 will continue to hold hybrid meetings, and IEEE 802.3 is expected to transition back to in-person interaction in the first half of 2023. Remote access is expected to continue for all IEEE 802 and 802.3 meetings, and IEEE 802.3 is expected to continue holding telephonic interim task force meetings.

Single-twisted-pair copper standards

1. IEEE P802.3da Single Pair Multidrop Segments Enhancement Task Force

   - The main progress in this group was consideration of decision trees for completing the work, which seemed to be stalled. The July meeting focused on those decisions, and made progress focusing the work.
   - The Task Force reviewed a revised timeline in July 2022 targeting a 1.0 draft specification out of the November 2022 meeting. The timeline was viewed as aggressive, but potentially achievable.
   - This project is developing extensions to the Clause 147 10BASE-T1S multidrop (10 Mbps shared media) PHY defined in 802.3cg, interoperable with the PHY in 802.3cg. The major objectives the project is working on include the following (for more objectives, see objectives on the IEEE 802.3da site:

     1. Adding interoperable multidrop power over Ethernet and reach extensions for multidrop to better accommodate building automation.

     2. Extending multidrop networks to support at least 16 nodes and 50m of reach (32 nodes and 70m are desired, but the objective is only 15 nodes and 50m)

     3. Define plug-and-play multidrop powering, and

     4. Selecting a single equipment connector.

   - The Task Force has adopted a baseline and is in Task Force review of a protocol for automatically configuring the node ID's associated with the (IEEE 802.3cg) Clause 148 Physical Layer Collision Avoidance (PLCA) protocol. The task force has also adopted minor corrections to the PLCA (Clause 148) state diagrams to eliminate potential race conditions and improve predictable behavior.
   - The Task Force is focused on reusing the already specified active PHY components of the 10BASE-T1S PHY in IEEE Std 802.3cg clause 147. This means that focus has been on the electrical parameters for the shared-media 'mixing segment' – wiring that connects the various multidrop nodes, and on the interface to the media. During the period, the Task force made substantial progress on an open-source consensus model of the mixing segment and receiver.
   - A framework for new specifications on the mixing segment was reached, awaiting results from the consensus model. This work is expected to result in some new specifications by early 2023, including consideration for inductive compensation of attached nodes.
   - The Task Force has not made substantial progress on powering a multidrop segment, although this remains one of the key objectives, and a threat to the timeline.

2. IEEE P802.3cy Greater than 10 Gb/s Electrical Automotive Ethernet Task Force

   - This project is developing new electrical (as opposed to optical) PHY specification for greater than 10 Gb/s Ethernet, at distances of up to 11m, suitable for automotive use. It is primarily driven by requirements for autonomous vehicle networking, and the project scope includes both symmetric and asymmetric transmission (where one of the directions is at a much lower speed).
   - The 802.3cy draft completed initial Working Group ballot and two recirculations. It is expected to proceed to the final stage of balloting (SA ballot) out of the November 802 meeting.
   - The 802.3cy draft includes:
     - Link segment electrical parameters, based on channels with shielded differential pair cabling suitable for automotive use, with 8 GHz bandwidth. Both twisted pair or parallel pair constructions are considered. Because it is required to operate in an automotive environment, this cabling differs from existing twinax data center cabling.
     - A 25 Gb/s PHY using PAM-4 line coding at about 14 Gbaud and Reed-Solomon FEC.
     - Specifications for Energy Efficient Ethernet operation including links with asymmetric data rates
   - The project is on track to a completed standard in Q3 2023.
   - While motivated by automotive applications, the standard does not limit the application of the PHY and may find use in short-range high-speed applications on shielded balanced pair cabling which could be used as an alternative to direct-attach twinaxial cables.

3. IEEE P802.3de: IEEE Time Synchronization for Point-to-Point Single Pair Ethernet Task Force

   - This project completed with approval by the IEEE-SA Standards Board at the September 2022 meeting. The amendment makes minor changes to support TSN with the new point-to-point 10 Mb/s Single Pair Ethernet PHYs (10BASE-T1L and 10BASE-T1S) specified by IEEE 802.3cg with the 802.3 specifications used for Time Sensitive Networking.

4. IEEE P802.3dg 100 Mb/s Long-Reach Single-Pair Ethernet Task Force

   - IEEE P802.3dg held its first meeting in May 2022, and is expected to begin by solidifying requirements for applications for 100 Mb/s long-reach single-pair Ethernet (likely called 100BASE-T1L). The new 100BASE-T1L project objectives is a 500m-reach 100 Mb/s PHY for industrial and building automation environment, with line powering, and supporting low latency operations. This is expected to be further advanced at the May

meeting, with baseline proposals for new physical layer devices near the end of 2022, on a timeline for a standard in late 2024, early 2025.
- The project has initiated with models of existing cabling in process control and building automation. Management of alien crosstalk, particularly with the installed base of screw-terminal connections, is a substantial technical concern. There is discussion over whether and how to mitigate this impairment.
- While the study group also considered including 1 Gb/s long-reach PHYs in the project, IEEE 802.3 declined to pursue work on a long reach 1 Gb/s PHY at this time.

Optical Fiber Standards

5. IEEE P802.3cs Central office consolidation (super PON) Task Force

- The main objectives of this Study Group are:
  - Support a passive point-to-multipoint ODN with a reach of at least 50 km with at least 1:64 split ratio per wavelength pair
  - Support at least 16 wavelength pairs for point-to-multipoint PON operation
  - Support the MAC data rate of 10Gb/s downstream
  - Support the MAC data rates of 2.5Gb/s and 10Gb/s upstream
  - Support tunable transmitters
- This amendment was approved by the IEEE-SA Standards Board for publication.

6. IEEE P802.3cw 400 Gb/s Operation over DWDM Systems Task Force

- This project was split from P802.3ct for the 400G objective.
- The main objective is:
  - 400 Gb/s operation on a single wavelength capable of at least 80 km over a DWDM system (400GBASE-ZR).
- DP-16QAM coherent modulation format will be used for 400GBASE-ZR
- ·Draft 2.0 was reviewed by the Working Group.

7. IEEE P802.3cz Multi-Gigabit Optical Automotive Ethernet Task Force

- This project will define the performance characteristics of an automotive link segment and an optical PHY to support 2.5, 5, 10, 25, and 50 Gb/s over 40 m of automotive cabling.
- This Task Force will focus on glass fiber and P802.3dh will focus on plastic optical fiber.
- Draft 2.3 was reviewed by the Working Group.
- Draft 3.0 was generated for Standards Association review.

8. IEEE P802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s Short Reach Fiber Task Force

- This project will define standards for 100, 200, and 400 Gb/s over 50 m multimode fiber and over 100 m multimode fiber.
- This will allow for Top-of-Rack switch elimination by connecting Middle-of-Row switches directly to servers (VR).
- This will also provide switch-to-switch connectivity and support the installed base of multimode fiber (SR).
- This amendment was approved by the IEEE-SA Standards Board for publication.

9. IEEE P802.3df 200 Gb/s, 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet Task Force

- This Task Force is a result of the Beyond 400G Study Group
- This Task Force will be split into P802.3df and P802.3dj
- The objectives for P802.3df include:
  - 400G over 4 pairs of SMF up to 2 km
  - 800G over 8 pairs of MMF up to 50 m
  - 800G over 8 pairs of MMF up to 100 m
  - 800G over 8 pairs of SMF up to 500 m
  - 800G over 8 pairs of SMF up to 2 km
- The objectives for P802.3dj will include:
  - 200G over 1 pair of SMF up to 500 m
  - 200G over 1 pair of SMF up to 2 km
  - 400G over 2 pairs of SMF up to 500 m
  - 800G over 4 pairs of SMF up to 500 m
  - 800G over 4 pairs of SMF up to 2 km
  - 800G over 1 pair of SMF with 4 wavelengths over 2 km
  - 800G over 1 pair of SMF up to 10 km
  - 800G over 1 pair of SMF up to 40 km
  - 1.6T over 8 pairs of SMF up to 500 m
  - 1.6T over 8 pairs of SMF up to 2 km
- Baseline proposals are being considered.

10. IEEE Greater than 50 Gb/s Bidirectional Optical Access Study Group

- This Study Group will investigate 100G and 400G over 10, 20, and 40 km using bidirectional transmission.

The next scheduled meeting of IEEE Plenary will be held November 14-17, 2022 in Bangkok, Thailand

IEEE 802.3 Task Force electronic Interims are expected to continue telephonically in the meantime, and the IEEE 802.3 interim in January 2023 is considering limited in-person components, but is also expected to be provide remote access. Information on the plenary can be found at https://www.ieee802.org/3/interims/index.html and information on 802.3 interims and electronic meetings at http://www.ieee802.org/3/calendar.html.

OIF Standards: August 2-4, 2022, Hybrid Meeting in Toronto, Canada

1. **Common Electrical Interface – 224G Development Project (CEI-224G)**
   - This project will develop a body of knowledge summarized into a white paper that will enable new project launches for specific next generation 224 Gbps clauses.
   - PAM4, PAM6, and PAM8 modulation formats are being considered.
2. **Co-Packaging Framework Project**
   - The Co-Packaging Framework IA is an umbrella project that will study the application spaces and relevant technology considerations for co-packaging of communication interfaces with one or more ASICs.
   - Co-packaging Framework Document was published.
3. **Implementation Agreement for a 3.2 Tb/s Co-Packaged Optical (CPO) Transceiver**
   - This Implementation Agreement specifies key aspects and electo-optical-mechanical details of a 3.2Tb/s Co-Packaged Optical Module.
   - This project will draw on 400G-FR4 and 400G-DR4 IEEE standards as well as the CPO JDF.
   - ·Project was launched at the February meeting.
   - ·Draft Implementation Agreement is under review.

The next scheduled OIF Standards meeting will be held on November 1-3, 2022 in Kona, Hawaii, USA.

INCITS Fiber Channel T11.2: August 9-11, Virtual & Face-to-face meeting, Chicago, IL, USA

1. **FC-PI-8 Ad Hoc (128GFC Serial)**
   - Committee resolved all comments of the FC-PI-8 Request For Comment (RFC). Document was approved for committee ballot (closed on September 19th).
   - Preliminary project proposal for FC-PI-9 was reviewed. Modifications will be made based on discussions. Target to approve project at the next meeting in October.

The next scheduled INCITS T11 meeting will be virtual/face-to-face on on October 4-6, 2022, Dallas, TX, USA.

IEC SC48B: September 12-16, 2022, Virtual meeting

- IEC63171 ED2 1st CD generated a large volume of comments. A separate meeting is being scheduled for comment resolution review and discussion.
- The 2nd CD of IEC 63171-1 ED2 comment resolution was published by IEC 9/8/2022. The document is being updated for distribution as a CDV.
- Work is ongoing for clarifying contact resistance measurement points and vibration fixturing for typical connector measurement.

The next scheduled IEC SC48B meeting will be virtual March 13-17, 2023.

IEC SC86A: No meetings were held in Q3, 2022

The next scheduled IEC SC86A meeting will be held on October 24 - November 4, 2022, in San Francisco, CA, USA

IEC SC86B: No meetings were held in Q3, 2022

The next scheduled IEC SC86B meeting will be held October 24 - November 4, 2022, San Francisco, CA, USA.

IEC SC86C: No meetings were held in Q3, 2022

The next scheduled IEC SC86C meeting will be held on October 24 - November 4, 2022, San Francisco, CA, USA.

IEC TC46 SC46C/WG7: September 9, 2022, Virtual meeting

Highlights of the meeting include:

- At this meeting, comments on the 61156-11 ED2: Multicore and symmetrical pair/quad cables for digital communications - Part 11: Symmetrical single pair cables with transmission characteristics up to 1,25 GHz - Horizontal floor wiring - Sectional specification were reviewed which clarified terminology/ requirements related to conductor size specification, the use of balanced twisted pairs, and the upper frequency limit for cable coupling attenuation measurements for T1-C cables.
- Comments on the 61156-13 ED1: MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS - Part 13: Symmetrical single pair cables with transmission characteristics up to 20 MHz - Horizontal floor wiring - Sectional specification were reviewed and identified the need for collaboration between the editors of the 61156-11 and 61156-13 documents so that a TCL comment could be resolved.

The next scheduled IEC TC46 SC46C/WG7 meeting will be held the week of November 30, 2022, Arlington, VA, USA.

ITU-T SG15 WP2: September 19-30, 2022, Geneva, Switzerland

1. **SG15Q5 Characteristics and test methods of optical fibres and cables, and installation guidance**
   - Document approved for publication:
     - L.109.1 (previously L.oehc) - Type II optical/electrical hybrid cables for access points and other terminal equipment. This document describes an optical/electrical hybrid cable (OEHC) in which a copper pair is used for power delivery (not for telecommunication) and an optical fiber can support data transmission up to and beyond 1 Gbit/s.
   - Ongoing activities:
     - TR.sdm - Optical Fiber, Cable, and Components for Space Division Multiplexing Transmission. This new technical report on optical fiber and cable for space division multiplexing (SDM) transmission is analyzes the current state of SDM technical maturity, clarifies the technical and commercial aspects of this technology, and highlight the characteristics of related technologies and network configuration/ installation/operations.
2. **SG15Q7: Connectivity, operation and maintenance of optical physical infrastructures (Continuation of Question 16/15)**
   - Following document was approved for publication:
     - L.210 (previously L.ncip) – Requirements for passive optical nodes: optical wall outlets and extender boxes. This new recommendation refers to passive optical nodes (optical wall outlets and extender boxes) deployed in customer indoor premises. It deals with the protective housing, fiber management system and it specifies the mechanical and environmental performance requirements.
   - Ongoing activities:
     - LSTP-GLSR - L Series Technical Paper. This document gives a list and the new classification of all published L recommendations.
     - Revision L.250/90 (revision of L.90) - Topologies for optical access network. This document describes the optical access network to be used in the design and construction of fiber to the FTTX, centralized-radio access networks (C-RAN) for mobile communications, and other network services. It deals mainly with access network architectures and the upgrading or new deployment of optical fibre to optical access networks.
     - Revision L.340/74 (revision of L.74) - Maintenance of telecommunication underground facilities.

The next scheduled ITU-T SG15 meeting has been proposed to be held April 17-28, 2023, Geneva Switzerland

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