

IEEE Power and Energy Society Entity Annual Report

2022

Entity: Power System Communications and Cybersecurity Committee

Website: <https://site.ieee.org/pes-pscc/>

Chair: Craig Preuss

Vice-Chair: James Formea

Secretary: Marc Benou

Immediate Past Chair: Ken Fodero

1. Significant Accomplishments:

C0 – Power Line Carrier Subcommittee

1. C0 worked quickly to publish IEEE Standard C93.5 – Standard for Power Line Carrier Transmitter/Receiver Equipment used to Transfer Discrete Teleprotection Signals – Cor. 1. Publishing was delayed briefly to address small edits found by IEEE right before publishing.
2. A working group successfully went to ballot on PC57.13.9 – Draft Standard for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers. The C0 subcommittee continued to work in coordination with this working group in the Instrument Transformers subcommittee of the Transformers Committee. The C0 subcommittee provided the critical input for the carrier-related portions of the standard, ensuring no requirements from the previous standard were left out (previous standard was C93.1).
3. Working groups in the C0 subcommittee also continued their work to update the IEEE-643 Guide for Power Line Carrier Applications and PC93.4 – Standard for Power Line Carrier Line-Tuning Equipment Associated with Power Transmission Lines.

E0 – Wire Line Subcommittee

1. Published IEEE Std 820-2021, IEEE Standard Telephone Loop Performance Characteristics
2. Completed revisions and final editing for P487.3a, changes to IEEE Std 487.3-2014, IEEE Standard for the Electrical Protection of Communication Facilities Serving Electric Supply Locations Through the Use of Hybrid Facilities. Added requirements for new technology isolated DC power from power station to the Copper Fiber Junction (CFJ)
3. Continued development of content for the new engineering guide, P487a Introductory Information for Determining the Ground Potential Rise and Induced Voltages for the Design of Communications Installations at Electric Supply Locations. This will offer orientation and guidance for engineering processes addressed by IEEE 487 and 367 Standards.
4. Established inter-committee subgroup with expanded subject matter expertise for continued revisions and corrections to IEEE Std 367-2012, Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault.

F0 – Optical Fiber Subcommittee

1. Publication IEEE 1595-2022: IEEE Standard for Testing and Performance for Optical Phase Conductor (OPPC) for Use on Electrical Utility Power Lines standard. Publication in November 2022.
2. IEEE 1591.1 Optical Ground Wire (OPGW) hardware voted out of subcommittee in March 2022 and has gone through IEEE Mandatory Editorial Review. This standard has gone to ballot in November 2022.



3. Optical Phase Conductor (OPPC) attachment hardware standard: 1591.4 PAR is valid until December 2024. The standard to be voted out of subcommittee in December 2022 meeting.

P0 – Protocols and Architecture Subcommittee

1. Expansion to support to the industry, three liaisons were appointed to provide expertise to other working groups: PSRC D47 liaison for “Revision of C37.243 IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communication”; PSRC H41 liaison for “Revision of IEEE P1646 Standard for Power System Communication Delivery Time Performance Requirements”; and SC21 liaison for P1547.10 “Recommended Practice for Distributed Energy Resources (DER) Gateway Platforms”.
2. P1 and P9 - have moved their assignments to ballot.

S0 – Cybersecurity Subcommittee

1. Completed work and approved update to IEEE Standard 1686 – Standard updated to reflect current technology.
2. Created new task force to investigate use of Software Bill of Materials (SBOM) in the Energy Sector.

2. Benefits to Industry and PES Members from the Committee Work:

Manufacturers, users, and design engineers all benefit from the work done by the C0 subcommittee that standardizes power line carrier equipment requirements and lays out the technical and economic considerations in the application of the technology.

Updates to the optical fiber standards (IEEE 1222, IEEE 1138, IEEE 1594, and IEEE 1595) provide valuable tools for manufacturers, test laboratories, communications service providers and power utilities who utilize inter-station fiber optic cables as a part of their telecom/protection networks.

Critical technical details supporting use of the protocol-based standards necessary for Smart Grid, Digital Substation, and Grid Automation technologies.

E0 provides maintenance and updates for twelve standards that provide valuable tools for communications service providers, power utilities, and industry consultants who utilize and maintain wireless and wire-line voice-grade and broadband facilities for communications networks with endpoints at power stations. In particular, new/revised reference and guide material plus improved clarity of engineering guidelines and applications of the IEEE Std 367 ground potential rise and IEEE Std 487 high voltage interface standards, as well as updated guidance for advanced lightning effects protection, should offer significant increases in value to the user community.

3. Benefits to Volunteer Participants from the Committee Work:

Working group meetings provide a great opportunity for interaction between power line carrier manufacturers, users, and consulting engineers to discuss applications and best practices in different installations, utilities, etc. Volunteers are involved in these conversations and can participate in the discussion.

Participants continually benefit from knowledge sharing and collaboration while solving challenges encountered in developing/updating the standards under review. Presentations from new members and guest participants have been added to meetings in order to increase efficacy and allow knowledge transfer.

Exchange of present and future experiences with established and future communication-based technologies applied to power systems protection automation and control.

Participants continually benefit from knowledge sharing and collaboration while solving challenges encountered in developing/updating new and revised standards, both IEEE and electrical codes adopted into law, including in-depth evaluations of potential benefits of new or controversial electrical protection apparatus and techniques. New members and guest participants are included to help increase salience in updated standards while supporting continuity of established knowledge and techniques in the industry.

4. Recognition of Outstanding Performance:

1. Jeff Brown (Georgia Transmission Corporation) for his input to the C93.4 / IEEE Std 643 work.
2. IEEE 1222-2019 - IEEE Standard for Testing and Performance for All-Dielectric Self-Supporting (ADSS) Fiber Optic Cable for Use on Electric Utility Power Lines has been nominated for award as it has worldwide utilization. Much effort has been put into close coordination with IEC.
3. William A. Byrd, former Chair of F0 (Fiber Optics Subcommittee) has received IEEE PES Distinguished service award. Mr. Byrd managed this subcommittee very effectively for 20+ years. Due to COVID-19, the award has not been presented as there has not been a face-to-face meeting.
4. Chris Huntley has successfully led the P1 WG to a recirculation ballot with the assistance of Jay Anderson and the C37.238 amendment is expected to be complete in 2023 Q1.
5. Vasudev Gharpure lead the P9 WG revision of IEEE C37.118.2 (with C40 contribution) to ballot and it is expected to be published Q2 2023.
6. PSCCC Distinguished Service Award presented (virtually) to Percy E. Pool (IEEE Senior, S.A. #05727995) for exemplary leadership, dedicated service and exceptional technical contributions in Wire Line Subcommittee and Working Group (E0).

5. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):

1. C0 coordination with the PC57.13.9 working group in the Instrument Transformers subcommittee of the PES Transformers committee.
2. F0 guideline sent to T&D Committee's IEEE 524 group on sheave and bull wheel sizes for installation of aerial fiber optic cables (OPGW, ADSS, helically Wrapped and OPPC). Care has been taken to ensure that the recommendation is acceptable to both manufacturers as well as end users and installation service providers. Liaison with T&D IEEE 524 to provide final recommendations for sheave sizes for aerial fiber optic cable installations. A more comprehensive collaboration with IEEE 524 is envisioned.
3. Liaison with substation D2 working group and provide comments on IEEE 525 standard. F0 updated and provided Table Q in IEEE 525-2016 - IEEE Guide for the Design and Installation of Cable Systems in Substations to IEEE D2 525 working group for inclusion in the standard.
4. External Representation to IEC and ITU. Liaison with IEC on testing standards. Liaison with ITU on fiber optic standards.
5. On-going Liaison activity with Wireline Subcommittee (PSCCC-E0) to help ensure harmonization with wired system communications circuits and networks.

6. Collaboration with CIGRE at member level and supported by officers: CIGRE JWG D2 B2.39 (TB-746 published) and currently (2021) WG 1 B1.73 Recommendations for the use and testing of fiber optic cables used in land cable systems.
7. F0 Liaison with IEEE smart grid.
8. P0 Coordination with the Substation, T&D, PSRC, and IEC TC57 committees.
9. Working Group S5 (revision to IEEE C37.240) is coordinating with ISA on the development of energy industry profiles for IEC 62443.
10. E0 Members serve as IEEE External Representatives to NFPA70 (National Electrical Code) Panel 16, including Principal (Bill McCoy) and Alternate (Matt Midcap), who are also members of the IAS-PES Joint Technical Correlating Committee. Continued sponsorship and input to directed votes for National Electrical Code development. Highlights included support of NFPA 70 (NEC) Article 726 – Class 4 (Fault-Managed Power Systems) and clarity of optical fiber cables installation requirements (restored to NEC Article 770), as well as emerging powering and protection solutions for distributed cellular communications infrastructure such as that utilized for 5G networks (including Class 4 power).
11. E0 Member liaison input to NFPA70 (National Electrical Code) Correlating Committee and other Panels, NFPA 70E (Electrical Safety), NFPA 780 (Lightning Protection Systems), IEEE C2 (National Electrical Safety Code), and other Task Groups.
12. E0 Member liaison to PSCCC F0 (Optical Fiber SC) for various standards maintenance in progress.
13. E0 Member liaison input to Substations Committee Working Group D2 for IEEE Std. 525 Guide for the Design and Installation of Cable Systems in Substations.
14. E0 liaison activity with Optical Fiber Subcommittee (PSCCC F0) to help ensure harmonization with optical fiber based communications circuits and networks.
15. IAS-PES JTCC External Representatives (also E0 Members) input to NFPA 70 (NEC) Panel 16.
16. NFPA 70E, NFPA 780, and IEEE C2 member liaisons.

6. New Technologies of Interest to the Committee:

1. Working group C1 for IEEE Std 643 incorporated new sections on continuous monitoring technology for power line carrier systems that can help diagnose age-old problems like carrier holes.
2. PSCCC-F0 subcommittee plans to create a technical task force to gather information and investigate available literature pertaining to End Of Life (EOL) time criteria of the aerial fiber represented in PSCCC-F0. It is anticipated that as a result of this study predictive models and/or practical, laboratory or field tests, will be developed to determine the “state of health” of each type of cable. A PES technical report will be prepared.
3. Distributed Strain and Temperature Sensing (DSTS) is of interest to subcommittee members, utility end users and manufacturers/test labs for spatial and temporal monitoring of strain and temperature along aerial fiber cables, specifically on OPGW and ADSS.
4. Closer coordination with IEEE smart grid group in order to work on fiber optic design and implementation related issues specifically in distribution power system environment.
5. Work on new streaming protocols and data exchange could open new possibilities in wide area efficiencies for large scale power systems data exchange. P10WG - IEEE Standard for Streaming Telemetry Transport Protocol /Chair: Ken Martin is nearing completion and P19WG - Universal Utility Data Exchange (UDEX) / Chair: Scott Mix with PAR approved is completing the final draft of the standard and expected to go to ballot in 2023.

7. Global Involvement & YP Involvement

PES is looking to increase involvement with members from Regions 8, 9 and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific). Please provide the following information.

Please also provide information on the number of young professionals that are involved in your committee.

<i>Total Number of committee members</i>	<i>Number of Young Professionals (under 35 years of age) – Including committee & subcommittee</i>	<i>Officers from regions 8,9 and 10</i>	<i>Subcommittee officers from regions 8, 9 and 10</i>	<i>Subcommittee members from regions 8,9, and 10</i>
11	Unknown	0	0	0
25	Unknown	0	2	6
38	Unknown	0	0	1
27	Unknown	0	0	2
13	Unknown	0	0	0
114		0	2	9

8. Problems and Concerns:

1. Time commitment required from subcommittee or working group officers to complete IEEE administrative tasks has multiplied several folds in the past couple of years. This is becoming prohibitive and is dissuading subcommittee members from stepping up to leadership and officer positions.
2. Overlapping requirements in existing IEEE Standards and the need for harmonization and reduction in duplicate standards.
3. Financial burden of face-to-face meetings on members and especially retired members who often have very valuable expertise and historical perspective to pass on. Possibility of a general deep-discounted rate for rooms, conference room booking and audio-visual equipment to be negotiated by IEEE should be explored. Possibility of subsidy by IEEE for retired members who would like to continue but are no longer supported financially by their companies.
4. COVID-19 continued to cause a major disruption in the ability of our groups to conduct their business under our IEEE P&P procedures, this restricts not only our subcommittee, but especially the Working Groups conducting PAR-related work. The policy and procedures were not resolved in 2022.
5. S5 suspended work on the revision of IEEE C37.240 to allow the DOE-sponsored work in ISA 99 to complete, and will revisit the update process if that work does not address all concerns and to address any remaining gaps.
6. Obtaining assistance for completing administrative and standards work in the Subcommittee is increasingly challenging, due to low time availability on the part of members for volunteer services. Unrealized opportunities include E0 Secretary and at least two Technical Editor positions.

9. Significant Plans for the Next Period:

1. The C0 subcommittee will look to develop new reports on specific challenges facing the application of power line carrier technology in today’s grid, specifically on shorter lines with many taps and inverter-based resources.
2. Complete balloting and comment resolution to IEEE 1591.1-2012: IEEE Standard for Testing and Performance of Hardware for Optical Ground Wire (OPGW) Optical Ground Wire, with the goal of publication in 2022. PAR extension has been approved. Expires in December 2023.
3. Complete revisions to new standard IEEE 1591.4: IEEE Standard for Testing and Performance of Hardware for Optical Phase Conductor (OPPC) wire, with the goal of publication in 2023. PAR expires in December 2024.
4. Work closely with IEEE 524 group to help re-write additional sections of the IEEE 524 standard which handles installation of aerial optical cables (OPGW, ADSS, Skywrap, and OPPC).
5. Investigate the need for creating a new standard for splice /joint boxes serving optical aerial cables. This standard will allow type testing of various types of splice boxes and areas of concern.

6. Further investigate the effect of variation in X/R in calculating short circuit and its specification for both OPGW and OPPC. The size of aerial cable - especially OPGW and helically applied cable - short circuit (I^2R) can be affected when different X/R is considered.
7. Support joint revision of IEC61850-9-3 led by WG10 / TC57 and complete the work in 2022. Joint work on P1854 with the T&D committee lead by P16WG. Revision of C37.118.2 should near completion. Continued work on P2030, P1615, and IEEE 1815.
8. It is anticipated that Working Group S2 (IEEE 1711.2) will complete its drafting work and move the standard to ballot.
9. At least two technical reports are expected to be completed and approved for publication in the PES Resource Center. They are: “Utility IT-OT Cybersecurity challenges in roles and terminology” and “Utility & Municipality Challenges on Analyzing and Implementing Cybersecurity Standards and Best Practices.”
10. Continue work on P2808 Function Designations used in Electrical Power Systems for Cyber Services and Cybersecurity.
11. Continue work on P2658 Guide for Cybersecurity Testing in Electric Power Systems.
12. Continue work on IEEE Std 1547.3 Guide for Cybersecurity of DERs Interface with Electric Power Systems (joint sponsor).
13. Continue work on P2030.100.2 IEEE Guide for Securing Generic Object Oriented System Events (GOOSE) and Sampled Values (SV) Protocols of IEC 61850 using IEC 62351-6 and IEC 62351-9.
14. E0 Publishing new addendum to IEEE Std 487.3a (new technology inclusion).
15. E0 Publishing revisions to IEEE Std 1692.
16. E0 Balloting or Publishing new IESS Std 487a.
17. E0 Completing technical revisions to IEEE Std 367.

Submitted by: _Craig Preuss, 2020-2022 Chair

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