

IEEE Power and Energy Society Entity Annual Report

2020

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:

The PSCCC C0 working group completed work on IEEE Std C93.5, Standard for Power Line Carrier Transmitter/Receiver Equipment used to Transfer Discrete Teleprotection Signals. The standard clarifies and updates some of the testing requirements and includes a new requirement for self-monitoring capability. It also adds a “simple” self-monitoring requirement for on-off systems, ensuring end-to-end compatibility where different manufacturers are used.

The PSCCC E0 subcommittee re-established a member as the IEEE External Representative, or liaison, to the National Fire Protection Association (NFPA) 70 (or the National Electric Code [NEC]) Code-Making Panel 16 Principal sponsorship and input to directed votes for NEC development. Liaison work provided input to NFPA 70, NFPA 780 (Lightning Protection Systems), IEEE Std C2 (National Electrical Safety Code), and other Task Groups. This liaison also provided NEC Temporary Interim Amendment reviews and input.

The significant accomplishments of the PSCCC F0 subcommittee were:

- Publication of IEEE Std 1222, IEEE Standard for Testing and Performance for All-Dielectric Self-Supporting (ADSS) Fiber Optic Cable for Use on Electric Utility Power Lines.
- Publication of IEEE Std 1593, Helically-applied Fiber and IEEE Std 1591.4 for attachments to helically-applied fiber.
- Recommendation to the T&D Committee, who sponsors the revision of IEEE Std 524, IEEE Guide for the Installation of Overhead Transmission Line Conductors, regarding the sheave and bull wheel sizes for installation of aerial fiber optic cables (optical ground wire [OPGW], ADSS, helically wrapped [Skywrap] and Optical Phase Conductor [OPPC]). The recommendation must be acceptable to manufacturers as well as end users and installation service providers.

The significant accomplishments of the PSCCC P0 subcommittee were:

- Submission for dual logo support with IEC TC57 of IEEE Std 1815.1, IEEE Standard for Exchanging Information Between Networks Implementing IEC 61850 and IEEE 1815 (Distributed Network Protocol [DNP3]).
- Publication of IEEE Std 1615, Recommended Practice for Network Communication for Electric Power Substation Monitoring and Control.

- Publication of a technical report PES-TR74 recommending the mapping approach between IEEE Std C37.118.2-2011, IEEE Standard for Synchrophasor Data Transfer for Power Systems, and IEC 61850.

The significant accomplishments of the PSCCC S0 subcommittee were:

- Publication of their first standard in January 2020, IEEE Std 1711.2-2019, Standard for Secure SCADA Communications Protocol (SSCP).
- Completion of a roadmap for future S0 activities, resulting in the formation of three new groups: implementation guidance on IEC 62351-6 Power systems management and associated information exchange - Data and communications security - Part 6: Security for IEC 61850, the application of an Intrusion Detection System (IDS) or Intrusion Prevention System (IPS) to Electric Power Systems, and using Hypertext Transfer Protocol Secure (HTTPS) and Transport Layer Security (TLS) for devices in Electric Power Systems.

The PSCCC also supported its educational outreach goals by reviewing 43 paper submissions to the 2020 PES General Meeting.

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

The inclusion of manufacturer-agnostic testing and self-monitoring facilities to IEEE Std C93.5 should allow utilities with transmission interties to simplify their end-to-end channel monitoring. The IEEE Std 643, Guide for Power Line Carrier Applications, was last revised in 2004. Since then much work has been done on carrier holes and other important considerations for power line carrier applications. These will be included in the ongoing revision for the education and benefit of the industry and PES members.

Updates to standards addressing the utilization of inter-station optical fiber cables as a part of their telecom/protection networks should provide valuable tools for manufacturers, test laboratories, communications service providers, and power utilities.

Progress on cybersecurity standards formalizes and documents standards, practices, and guidance to the industry where none presently exists today: how to deploy IDS/IPS, how to use HTTP and TLS, and how to implement IEC 62351-6. This work fills several gaps in the industry and confirms the importance of centralizing cybersecurity topics within one technical committee of the PES.

The PSCCC P0 subcommittee provides the technical details supporting the industry's use of protocol-based standards (e.g., DNP3 as specified by IEEE Std 1815) necessary to implement smart grids, digital substations, and grid automation technologies.

The PSCCC also provides valuable tools for communications service providers and power utilities alike who utilize and maintain wire-line voice-grade and broadband facilities as a part of their communications networks. In particular, new/revised reference material and improved clarity of engineering guidelines and applications of the IEEE Std 367, Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault, and the IEEE 487 series of high voltage interface standards should offer significant increases in value to industry and PES members.

3. Benefits to Volunteer Participants from the Committee Work:



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The PSCCC carefully structures its meetings using a combination of face-to-face and virtual formats to increase volunteer participation. This variety provides a great opportunity for interaction between manufacturers, utilities, research institutions like national laboratories and educational institutions, and consultants. New members and guest participants help increase salience in updated standards while supporting continuity of established knowledge and techniques in the industry. Participants continually benefit from knowledge sharing and collaboration while solving challenges encountered in developing and updating our standard documents, technical reports, tutorials, panel sessions, and other outputs. Presentations from new members and guest participants are included in meetings to increase efficacy and allow knowledge transfer. Participants can provide input into the process of developing standards and other work, giving the participants the opportunity to increase their knowledge in new areas. Participants can exchange present experiences with and strategies for communication-based technologies and architectures applied to power system protection, automation, and control.

4. Recognition of Outstanding Performance:

The PSCCC recognizes the outstanding performance of the following people:

- Rafael Garcia (Oncor) for his work reviewing initial drafts of IEEE PC57.13.9.
- William A. Byrd, former chair of F0 (Fiber Optics Subcommittee), who effectively managed F0 in its various forms for more than twenty years. He has also been of significant service to other standards associations, the T&D Committee, and PES functions.
- Ron Farquharson, who leads the IEEE Std 1815 (DNP3) standard development and has done so for more than a decade. His leadership drives the continuous maintenance and industry use of DNP3 and he continues to be a prime example of IEEE excellence.
- Percy E. Pool, former Chair of PSCCC E0 Wire Line Subcommittee (WLS), has been a significant contributor and leader of WLS since at least 1992 (then Secretary of the Joint High Voltage Interface Group, which was then sponsored by the Communications Society and effectively evolved to the WLS) and continues to be a key contributor to the PSCCC. He has also been of significant service to other standards associations and PES functions, including as past Standards Coordinator for the Power System Communications Committee. In WLS, he served as Chair and Technical Editor for the expanded IEEE Std. 487 series, several other standards, and continues to provide crucial expertise for technical subject matter, industry standards, IEEE process, and administrative knowledge.

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

The C0 subcommittee coordinates with the PES Transformers Committee and its Instrument Transformers Subcommittee on updating IEEE PC57.13.9, Standard for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers. This standard will be updated to include the carrier-specific content from the previous standard IEEE/ANSI C93.1-1999, American National Standard Requirements for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers. C0 continues to provide input throughout the draft development process. The C0 chair and vice-chair are coordinating directly with the PC57.13.9 working group chair and plan to attend the next working group meeting.

The F0 subcommittee:

- Liaisons with Wireline Subcommittee (PSCCC E0) to help ensure harmonization with wired system communications circuits and networks.
- Liaisons with PES T&D Committee working on IEEE 524, where a more comprehensive collaboration is envisioned.
- Liaisons with PES Substations Committee D2 working group, providing comments on the IEEE Std 525, Guide for the Design and Installation of Cable Systems in Substations. The F0 chair participates in a subgroup set up within D2 to deal with grounding issues.
- Liaisons with IEC on testing standards, specifically for ADSS.
- Liaisons with ITU on fiber optic standards.
- Collaborates with CIGRE at member level and supported by officers: CIGRE working group B1.73, Recommendations for the Use and Testing of Fibre Optic Cables used in Land Cable Systems.
- Liaisons with IEEE Smart Grid.

The S0 subcommittee works closely and coordinates with the PSRC Committee.

The P0 subcommittee works with the IEEE PES Substations Committee, T&D Committee, PSRC Committee; and IEC TC57.

The E0 subcommittee liaisons with the F0 Subcommittee to ensure harmonization with optical fiber-based communications circuits and networks; along with NFPA 70, 70E, 780; and coordinates with IEEE C2 via member liaisons and Task Group participation.

The PSCCC main committee liaisons with CIGRE D2 (Dennis Holstein), IEC TC57 WG15 (Marc Lacroix), and NEC (Bill McCoy).

6. New Technologies of Interest to the Committee:

The members of PSCCC working group C1 revising IEEE Std 643 developed sections about new technologies for protective gaps and for monitoring devices.

The F0 subcommittee members are interested in Distributed Strain and Temperature Sensing (DSTS), technology being used by utilities, manufacturers, and test labs for spatial and temporal monitoring of strain and temperature along aerial fiber cables, specifically on OPGW and ADSS. DSTS technology allows remote monitoring and characterization of optical fiber cables without taking them out of service. F0 desires closer coordination with IEEE Smart Grid in order to work on new technologies using optical fiber cables in the distribution grid.

The S0 subcommittee's interest in technologies (some old, some new) being used in industry culminated in the formation of three new subgroups within the subcommittee to address technologies supporting IEC 62351-6, IDS, IPS, and HTTPS using TLS. Other technologies and topics identified as "high" interest include:

- Precision Time Protocol (e.g., IEEE Std 1588, Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems).
- Syslog.
- X.509 Certificate management.



- IEEE 802.11.
- Cyber resiliency.
- Security architecture design.

The P0 subcommittee’s interest in new technologies has initiated work on new streaming protocols and data exchange that could open new possibilities in wide area efficiencies for large scale power systems data exchange.

1. Global Involvement

The PSCCC supports increasing involvement from Regions 8, 9, and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific) with the following members from those regions:

Total Number of committee members	Officers from regions 8,9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
115	0	3	8

2. Problems and Concerns:

The PSCCC is concerned about overlapping requirements in existing IEEE standards and the need for harmonization and reduction in duplicate standards.

The financial burden of face-to-face meetings on retired members is also a concern because they often combine very valuable expertise and historical perspective but limited financial means. One solution the PSCCC would like investigated is subsidy by IEEE PES for those members who would like to continue but are no longer supported financially by their companies.

In addition, COVID-19 caused a major disruption in the ability of PSCCC subgroups to conduct their business. With some significant time from key volunteers, many adverse impacts were mitigated but not completely minimized. Better web conference tools are needed so that taking meeting attendance is easier.

The policy and procedures in place by the PSCCC are old and focused on face-to-face meetings; so, going virtual proved overly restrictive in being able to attain quorum, resulting in arcane electronic balloting processes. There should be no differences between balloting at a face-to-face meeting, balloting at a virtual meeting, and electronic balloting. Updates to our manuals were delayed by eighteen months as we waited for updated manuals to be posted; had we understood that the manuals would take this long to update, we would have sought to use the manuals in place at the time.

The PSCCC is also concerned about the emergence of our first satellite committee from China and being able to establish a collaborative environment where both groups will flourish. Somewhat related to the satellite committee are our concerns with the Entity Method of standards development. Recent innovations by the PES may improve the Entity Method process while also not hindering the committee’s ability to support ongoing work and new work generated outside of the Entity Method.

The PSCCC is also concerned about overlap between the different technical committees of the PES. Observed overlaps exist with the following committees: Substations, T&D, SCC21. Overlap has been

largely avoided with the PSRC Committee due to careful crafting of scopes during the reorganization; however, four years later there are still volunteers that misunderstand and misapply these defined scopes. Other larger overlaps exist with the IEEE Communications Society and their support for smart grid through its Smart Grid Communications Technical Committee (<https://sg.committees.comsoc.org/>). A formal liaison relationship may be needed to improve collaboration and understanding between these groups.

The PSCCC is concerned that our involvement and support of the IEEE Smart Grid community (<https://smartgrid.ieee.org/>) is inadequate. There are many synergies between the PSCCC and this community that could be better leveraged to improve participation in the PSCCC.

The PSCCC is concerned about our limited membership growth since the PES reorganization in 2016. Outreach with other organizations such as BICSI (<https://www.bicsi.org/>), Utilities Technology Council (UTC) (<https://utc.org/>), IEEE 802 Committee (<https://www.ieee802.org/>), Telecommunications Industry Association (TIA) (<https://standards.tiaonline.org/>), etc. may help increase PSCCC participation. Support from PES in establishing relationships with these other organizations.

3. Significant Plans for the Next Period:

The C0 subcommittee expects to continue work on IEEE Std 643 and identify new opportunities for report development and begin work.

The F0 subcommittee expects to:

- Develop new standards: IEEE Std 1595, OPPC standard and IEEE Std 1591.4 on OPPC attachment hardware.
- Revise IEEE Std 1591.1, Optical Ground Wire Attachment hardware.
- Re-write section of the IEEE Std 524 standard in coordination with the PES T&D Committee to improve treatment of the installation of aerial optical cables (OPGW, ADSS, Skywrap, and OPPC).
- Investigate creating a new standard for splice/joint boxes serving optical aerial cables.
- Investigate the effect of variation in X/R in calculating short circuit and its specification for both OPGW and OPPC.

The P0 subcommittee expects to support the joint revision of IEEE/IEC 61850-9-3-2016, IEC/IEEE International Standard - Communication networks and systems for power utility automation – Part 9-3: Precision time protocol profile for power utility automation, led by TC57 WG10. Joint work with the T&D Committee will start on revising IEEE 1854-2019, IEEE Trial-Use Guide for Smart Distribution Applications. Revision of C37.118.2 should near completion. Continued work on IEEE P1615 and IEEE P1815. Other new work includes:

- Working group P10 developing an IEEE P2664, Standard for Streaming Telemetry Transport Protocol (Ken Martin, chair).
- Study group P19 investigating Universal Utility Data Exchange (UUDEX) in collaboration with Pacific Northwest National Lab (Scott Mix, chair).
- Study group P21 investigating whether a standard document should be created to address system architectures supporting the virtualization of substation protection and control applications. This work complements work already underway in the PSRC Committee working group H45 that is developing PC37.300 to address centralized protection and control applications.

The E0 subcommittee expects to:

- Publish revisions to IEEE Std 820, Standard Telephone Loop Performance Characteristics.
- Publish revisions to IEEE Std 1692, Guide for the Protection of Communication Installations from Lightning Effects
- Publish a new addendum to IEEE Std 487, creating a new informative annex that provides applications and examples for the calculations of electric supply location power ground potential rise.
- Publish a new Addendum to IEEE Std 487.3, Standard for the Electrical Protection of Communication Facilities Serving Electric Supply Locations Through the Use of Hybrid Facilities, that provides requirements for implementation of a new powering option at Copper to Fiber Junction (CFJ) equipment locations.
- Process revision of IEEE Std 367 (now in study group).

The PSCCC is also supporting the memorandum of understanding between the IEEE PES and the North American Electric Reliability Corporation (NERC)¹ in developing the Joint IEEE PES-NERC Technical Report on Integration of Cyber and Physical Security into Bulk Power System Planning, Operations, Design, and Restoration Activities. This work is expected to continue through 2021.

Submitted by: Craig Preuss, PSCCC Chair

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¹ https://www.ieee-pes.org/images/files/pdf/technical-council/NERC_MoU_Signed_20161023.pdf