

Special Committee 1 - Smart Grid Support and EMC Issues

Online at <https://www.emcs.org/special-committee-smart-grid.html>

**IEEE EMC + SIPI 2022 Spokane Conference
Approved at the 31 July 2023 Grand Rapids Meeting**

SC 1 Meeting Minutes

Prepared by:

Dave Thomas, Secretary

Mike McInerney, Chair

Monday, 1 August 2022

Meeting from 17:35 – 18:37 (U.S. Pacific Daylight Time)

1. The meeting was opened by the Chair, Mike McInerney, at 17.35 EDT. Mike McInerney presented the proposed agenda, and it was approved.
2. Mike reminded the attendees of the scope of the special committee, which is to coordinate within the EMC Society on Smart Grid issues. As a coordinating committee SC 1 does not actively solicit papers and abstracts for IEEE EMC conferences, however, if an abstract or paper clearly addresses a Smart Grid issue then SC 1 will review it.

There were eight attendees at this meeting: Mike McInerney, Bill Radasky, Jerry Ramie, Dave Thomas, Robert Smolenski, Monrad Monsen, Iurie Nuca, and Dusan Kostic.

All present are considered members of SC 1. They will remain members for at least 2 years. Membership may be terminated if there has been no participation for several years.

3. Don Heirman initiated SC 1 and was the initial SC 1 chair. He passed away in the fall of 2020. Don had been an active member of the EMC Society for decades, leading many projects and committees; his passing was a great loss to the EMC community.
4. Mike McInerney reviewed the 2021 Glasgow virtual meeting minutes and asked if there were any corrections. A couple of spelling errors were noted and corrected.
5. Report on committee participation at the 2022 Spokane EMC Symposium. SC 1 reviewed two technical papers for the 2022 EMC conference. One paper was reviewed by three SC 1 technical experts and the other by three TC 7 technical experts.

Both were accepted with changes. They are:

“High Density Sensor Network for Monitoring Grid Events”
(to be presented in session TP-WE-AM2-TC7 LOW FREQUENCY EMC:
MEASUREMENT 10:20 AM - 12:00 PM)

“Effects of the MHz Frequency Range Electromagnetic Immunity of the
Swept Frequency Pulse Coupled on the kHz Frequency Range G3 Power
Line Communication”
(to be presented in session TP-TH-PM-TC1 EMC MANAGEMENT 2:00 PM
- 3:15 PM)

No abstracts were submitted to SC 1.

One SC 1 tutorial, “Smart Grid and EMC Issues” will be presented Wednesday
3 August from 1:30 PM - 5:30 PM.

The following topics will be presented:

Introduction to the IEEE EMC Society Special Committee 1 (SC 1) and an
Introduction to this Tutorial
Michael McInerney

SEPA (Smart Electric Power Alliance) Electromagnetic Interoperability
Issues Sub-Group (EMIISG) – Its History, Accomplishments and Status
William Radasky

Testing Requirements for Devices with Communications Functions Used
with Electric Power Apparatus
Jerry Ramie

The Interoperability of Power Converters with Power Line Communications
and their Effect on the Smart Grid
David Thomas

6. Review of action items:

ACTION ITEM 2020-1 SC 1 and TC 5 to work with the NGO Helena
(<https://helena.org/>) regarding the possible impacts of high-altitude
electromagnetic pulse (HEMP) on Smart Grids
(<https://helena.org/projects/shield>). Helena takes on societal problems and
funds projects to solve these problems.

Bill Radasky has made multiple contacts but has still not yet heard back.
Committee decision is to close this item **[Closed 2022]**.

7. Reports:

Bill Radasky updated the group on SEPA. The Smart Electric Power Alliance is an association of utilities and manufacturers. One of their missions is to examine EMC issues in the smart grid and produce white papers on conformity assessment for equipment to qualify for smart grids. See Bill's briefing which will be given on Wednesday.

ACTION ITEM 2022-1: Jerry Ramie volunteered to provide link to SEPA white papers on Smart Grid. See attachment for this information.

Dave Thomas reported from the Monday "Low Frequency EMI and Modeling of Conducted Interference in Systems with Multiple Converters" workshop. Robert Smolenski has found issues with electric vehicle charging units that use the CAN bus protocol, but none with those that use PLC technology. This may be due to the CAN bus being incorrectly implemented. Frank Leferink's group from the University of Twente had previously reported issues with PLCs for smart meters due to motor drive conducted emissions.

Dave Thomas reported that although PLC can move up in frequency towards 500 kHz to avoid issues with power electronic conducted emissions some domestic products such as "smart" washing machines use the 40-80 kHz band for communications to increase the transmission distance.

8. The group discussed the possibility of having either a joint (with another TC) or separate SC-1 tutorial dealing with Smart Grid topics at the 2023 EMC Symposium.

9. Coordination of EMC TCs with SC 1:

Reminder for IEEE EMC Society TCs to coordinate with SC 1 when they have any Smart Grid issues. This coordination has not always been effective, but some TCs have members who have attended the annual SC 1 meeting including TC 2, TC 4, TC 5 and TC 7. We remind the TC officers of the need for coordination at the annual TAC meetings.

10. The group discussed the initiative started by the former chair (Don Heirman) to produce a one-page position paper on EMC standards for the smart grid. There were no volunteers to work on the paper and no decision was made on how to proceed with this initiative.

11. Any Other Business:

No.

12. The next in-person SC 1 committee meeting will be at the 2023 IEEE EMC Symposium in Grand Rapids, Michigan U.S.A.
13. **ACTION ITEM 2022-2:** Dave Thomas will consider organizing an in-person SC 1 committee meeting at EMC Europe 2022 - International Symposium and Exhibition on Electromagnetic Compatibility (September 5-8, 2022, Gothenburg).
14. The terms of the current officers expire 31 December 2023. An election for new officers will be conducted at the 2023 in-person committee meeting. The current officers are: Mike McInerney, Chair; Bill Radasky, Vice Chair; Dave Thomas, Secretary.
15. Adjournment:

The meeting was adjourned at 18:37 PDT.

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Attachment

ACTION ITEM 2022-1: Jerry Ramie volunteered to provide link to SEPA white papers on Smart Grid.

<https://sepapower.org/knowledge/emc-assessment-testing-and-mitigation/>

Jerry also provided "continuation" content (i.e., future work) for the four EMC immunity Standards he worked on in the Power & Energy Society:

IEEE-P1613 - (immunity of communications networking equip.) about to go for approval and balloting, committee comments will be addressed next week. It has everything we asked for.

Future work: All the 5+3 gaps are addressed in this P1613 draft, but it calls out IEC Standards tests instead of the typical IEEE-C37.90-.1, C37.90.2 and C37.90.3. This was requested by PSRC (the parent committee) because the IEEE family of Standards I've just listed was incomplete and would not be done in time. In a couple of years, we need to open this document up and replace the IEC tests with the updated C37.90.x tests. It will be very similar to what's there now.

IEEE-PC37.90.1 - (SWC + EFT) Still in drafting by several teams, the decision to include the 100 kHz rep. rate for EFT was made as we wanted. We're not expecting problems. This will take about a year to complete the draft.

Future work: We expect that IEC 61850-3 and IEC 60255-26 will call out five waveforms for DOW (damped oscillatory wave) testing instead of just one in their next versions. If this occurs as we expect, we will need to add additional waveforms to this document during its next revision. We also need to pull out the EFT section of this document and make it a separate Standard so it's easier to manage. The two tests are completely unrelated.

IEEE-PC37.90.2 - (radiated RF immunity) We didn't make many changes in this document, just cleaned up the diagrams and inserted Use Cases that justify the higher-than-IEC test levels of 20V/m CW (35V/m peak) The IEC tests these products at 10V/m CW (18V/m peak) Our Use Cases (by Ed hare) clearly show those levels are inadequate. We also inserted a more complete list of dwell frequencies than the previous version.

Future work: We may extend the frequency range above 6GHz during the next revision if we see this coming in IEC 61850-3 or IEC 60255-26.

IEEE-PC37.90.3 - (ESD) We cleaned up the diagrams and test levels and made some incremental improvements in the Acceptance Criteria. This document now reflects the content of the Basic ESD testing Standard IEC 61000-4-2. We added Informative content suggesting that readers use IEEE-C63.16 for testing and reporting and added a Use Case for testing the immunity of USB ports if users are inserting USB peripherals into running utility control equipment. (as they often do in uncontrolled areas)

Future work: We may look at increasing the testing levels or modifying the Acceptance Criteria after comparing it against the upcoming editions of IEC 61850-3 and IEC 60255-26.