



Sub-Committee 1 Minutes June 2023

IEEE/ICES TC95 Subcommittee 1 Techniques, Procedures, Instrumentation and Computation 10:00 – 12:00 BST: 16 June 2023 Vodafone HQ, Newbury, UK & via Teams web conference

0. Registration of attendees

Subcommittee 1 (SC-1) on Techniques, Procedures, Instrumentation and Computation meeting convened from 10:00 local on 16 June 2023 in Vodafone HQ meeting room 1015 in Newbury, UK, and Via Teams web conference. Pre-registered attendees were welcomed, and attendance checked using the sign-in sheet, chat function of Teams, and email notification.

1. Call to order

At 10:00 BST the meeting was called to order by SC-1 Co-Chair, (Butcher). All attendees were welcomed again, especially those attending at unsociable times of their day.

SC-1 Co-Chair, (Butcher) clarified that following the publication of C95.3 in May 2021, SC-1 is currently a forum for sharing experience, best practice and establishing collaborative activities relating to EMF assessments and is complementary to the other ICES sub-committees.

2. Approval of agenda

The draft SC-1 agenda was proposed and accepted by the committee on a motion from Maxson with Chou seconding and was approved. (Attachment 1)

3. Approval of the Jan 2023 SC-1 meeting minutes / matters arising

The Jan 2023 SC1 meeting minutes were accepted unamended on a motion from Maxson and seconded by Visser.

Jan 2023 SC-1 action: The action to set up a webinar dedicated to the topic of spatial averaging was not progressed since the primary contributors, the Australian/South African team, indicated that they wished to progress their studies further (see Ludick presentation below).

4. Update of SC-1 membership

The SC-1 Co-Chair (Butcher) called the SC-1 membership on hand to provide their contact information in the chat function of Teams, send an email as indicated in the agenda or via the sign-in sheet at the meeting. 31 people participated in the meeting (Attachment 2).

Butcher reported that, based on the current operating procedures, there are 65 SC-1 “Members” and 28 “Observers”.

5. Call for Patents

In the meeting announcement and the draft Agenda circulated prior to the meeting, the SC-1 members had been asked to state if they had any essential patent claims. No such claim has been recorded. SC-1 Co-Chair (Butcher) asked if anyone now in the meeting had any such claims. Again no one made any claim.

6. Copyright Policy

In accordance with IEEE_SA procedures, the SC-1 Co-Chair (Butcher) reminded the attendees of the IEEE_SA copyright policy linked from a footnote in the meeting agenda.

7. Presentations

a) Amateur radio EMF compliance assessment – 10 to 50 MHz (Zollman) (Attachment 3)

Following on from his June 2022 SC1 presentation, Zollman presented recent modelling work in support of EMF compliance assessment for radio amateur stations that use rotary antennas in the 10 MHz to 50 MHz amateur bands. The objective is to establish simple compliance assessment guidance that does not require a high level of technical competence and is widely applicable to radio amateur stations.

Zollman observed that the amateur license rules in the UK and the USA have been updated recently with increased requirements for amateurs to be able to show compliance with their national EMF regulations. A small international group of volunteers are cooperating to prepare guidance material for their respective national radio amateurs and a common technical basis helps to harmonize the guidance.

The traditional approach of showing individual case studies for a given station configuration is not all that helpful when each amateur station has individual characteristics that make that specific example invalid. Zollman has sought to resolve this problem by modelling a selected wide range of scenarios and post processing to give antenna-agnostic EMF compliance assessment guidance on the minimum height above ground that can be demonstrated to be sufficient to demonstrate compliance for any location at ground level.

Zollman has developed a “compliance plot” presentation based on the NEC-modelled electric and magnetic field strength data over a dense grid of sample points. The peak and spatial-average field strengths over relevant body heights are determined and then for each point these are compared with the relevant compliance limit parameter and the power determined that would just result in the compliance limit. For each point, the lowest compliant power from the set of compliance constraints is then assigned to that point in space as the compliant power. Each such point refers to the position where a person may stand and so gives a direct presentation of the maximum power to that antenna that can be shown to be compliant at any given location. By plotting contours of constant power, the exclusion zone is then presented for any desired transmit power.

Zollman then showed how these data can be further processed to give a single maximum compliant power (for a given antenna and antenna height above ground) anywhere at ground level. He then showed that by repeating this analyses at incremental antenna heights, a simple compliance plot showing how the antenna height and compliant transmit power relate for anywhere at ground level. He then showed that this process can be repeated for a wide range of antenna types used by radio amateurs such that if the most restrictive case is chosen, then the height-compliance power derived would be sufficient to demonstrate compliance at ground level for any antenna within a broad range of specifications.

This whole process is then repeated for each amateur band and each regulatory compliance basis. Once these data are available, simple guidance can be developed that no longer requires detailed knowledge and analysis. Simply from antenna height, operating band, transmit power and relevant regulatory limits it can be possible to demonstrate compliance. Zollman illustrated the usefulness of this approach showing a case where a currently available compliance assessment tool based on ITU-T K.52 would indicate the need for an exclusion zone at ground level with associated access or operational management issues, whereas the new data would demonstrate EMF compliance at ground level without any need for additional measures.

The presentation showed an approach to use advanced modelling of 000’s of cases and appropriate data processing to develop simple relevant compliance guidance for radio amateurs. As an important step and visual aid, the compliance plot format enables flexible compliance information to be extracted from field strength data.

Zollman acknowledged the input from the other members of the volunteer team and especially Ric Tell and Ian White who helped develop the presentation.

In the subsequent discussion it was noted that this could be a useful example of how to provide guidance for regulators. It was also noted that it is important for standards committees to help readers understand the standard being developed; the IEC has been working on including “quick start” guidance in standards.

b) Review of June 2023 IEC TC106 MT3 meeting (Butcher)
(Attachment 4)

Butcher reported that IEC TC106 MT3 met in Wroclaw Poland in the week before SC1. MT3 reviewed a proposal for an IEC 62232 Edition 3.1 to resolve some issues that were noted post FDIS and not captured in the published Version 3 of that standard. The main focus of the MT3 meeting was on edits to TR 62669 Edition 3 which is in the CD phase. The aim is to publish TR 62669 in early 2025. Highlights included mmWave, NR FR1 and Emerging Laboratory Measurement campaigns.

An attendee opined that there was little information on the ITU activities in this area and in discussion it was suggested that it would be useful to have such information. Jafar Keshvari (ICES Chair) offered to provide such information and updates.

June 2023 SC1 action: Jafar Keshvari (ICES Chair) to provide a short update at the next SC1 meeting on ITU activities WRT EMF assessment methods.

In response to a question from the floor, Butcher indicated that the IEC TC106 MT3 group has made lots of progress on the “Actual Maximum Approach” for 5G base stations.

c) Update on Australia / S. Africa spatial averaging study (Ludick)
(Attachment 5)

Ludick presented a progress update of the spatial averaging research conducted with Dr Vitas Anderson under the auspices of the Standards Australia TE-07 working group. In this presentation two main progress updates for the study were presented, viz. a sounder approach for obtaining better material parameter estimates of the homogenous phantom used for the SEP simulations, as well as new results for a colinear omni-directional antenna operating over a wider frequency range (70 MHz to 1 GHz).

Additionally, the effect of applying a different number of spatially averaged points to a narrow-beam source at a higher frequency (3 GHz in the test case) was shown. This clearly highlights the importance of considering more adaptive schemes in future research.

In the following discussion, Ludick and Anderson indicated that they would aim to be ready for a dedicated SC1 spatial averaging webinar sometime in the next 6 months.

June 2023 SC1 action: Subject to the progress of the Australian/South African spatial averaging study, SC-1 Co-Chairs to organize a webinar on spatial averaging.

8. Any other business

No other business was discussed.



9. Time and Place of Next Meeting

Next meeting will be in person, currently scheduled for San Antonio, TX, and via WebEx in Jan 2024 prior to the next scheduled TC95 meeting. SC-1 date to be determined depending on the decision of AdCom. In the meantime, if SC-1 participants are willing to present on a suitable topic, the Co-chairs are prepared to organize additional Webex meetings prior to then.

10. Adjourn

On a motion from Maxson, with Zollman seconding, the meeting adjourned at 12:17 local.

**IEEE/ICES TC95 Subcommittee 1
Techniques, Procedures, and Instrumentation
Draft Agenda: 16 Jun 2023 Meeting**

Vodafone, Newbury, UK & via Web (Joining info see Agenda 2nd page)

	Los Angeles	New York	London (BST)	Amsterdam	Jerusalem	Beijing	Tokyo	Sydney	Auckland
Start Time	Fri 02:00	Fri 05:00	Fri 10:00	Fri 11:00	Fri 12:00	Fri 17:00	Fri 18:00	Fri 19:00	Fri 21:00
Start Date	Friday 16 June 2023								
Duration	Approximately 2 Hrs								
<p>Attendance: Face-to-Face: Please register prior to meeting and fill in the attendance sheet at start of meeting</p> <p> Web: Please register prior to meeting and, when joining meeting please enter your Name, Affiliation, Country in chat message or send email to c95.3@sublight.net Subject: Present at TC95-SC1 Jun '23, and your Name, Affiliation, Country</p>									

1. Introduction & Call to Order
2. Modifications and approval of agenda
3. Approval of SC-1 Minutes (Jan 2023 meeting) and matters arising
4. Update of SC-1 Membership
5. Call for Patents¹
6. Copyright Policy²
7. Presentations
 - a) Amateur radio EMF compliance assessment – 10 to 50 MHz (Zollman)
 - b) Review of June 2023 IEC TC106 MT3 mtg (Butcher)
 - c) Update on Australia / S. Africa spatial averaging study (Ludick)
8. Any other business
9. Time and Place of Next Meeting
10. Adjourn

¹ Participants have a duty to inform the IEEE of holders of essential patent claims if they or their affiliations hold such claims. Check the web link on the agenda for more details. If anyone in this meeting is personally aware of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please notify the committee chair today. The IEEE SA patent policy is explained at the following link:

<https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf>

² It is the policy of the IEEE to own the copyright to the technical contributions it publishes on behalf of the interests of the IEEE, its authors, and their employers, and to facilitate the appropriate reuse of this material by others. The IEEE copyright policy is explained at the following link:

<https://www.ieee.org/publications/rights/copyright-policy.html>

Attachment 2

Participants in SC-1 16 June 2023 meeting

31 Attendees (based on attendance sheet, chat reports, and email notifications):

Attendance in person:

- Bill Bailey
- Matt Butcher, Sublight Engineering (TC95 SC1 Co Chair)
- C-K Chou, (TC95 Chair)
- Amnon Duvdevany, Israel Institute for Occupational Safety and Hygiene
- Sami Gabriel, Vodafone, UK
- Roel Escobar, USAF AFMC 711 HPW/RHDR
- Petter Gärdin, Sweden
- Martin Gledhill, EMF Services
- Jafar Keshvari (ICES Chair)
- Danie Ludik, Stellenbosch University, SA
- David Maxson, Isotope LLC, (ICES Vice-Chair)
- Tim Mikulski, US Army
- Auke Visser, Royal Netherlands Navy
- Xun Zhao, DND Canada
- Peter Zollman, PZC, UK (TC95 SC1 Co Chair)

Attendance (online):

- Robert Acacio, FCC
- Vitas Anderson, Two Fields Consulting, Australia
- Aymen Ben Saada, Higher School of Communication of Tunis, Tunisia.
- Kent Chamberlin: University of New Hampshire
- Romeo Gallamoza, Defense Health Agency DCPH-A
- Kevin Graf, FCC
- Don Haes, Consultant, NH-USA (TC95 SC2 Vice Chair)
- Rajat Mathur, FCC
- Brett Moule, Ventia Australia
- Luc Savard - DND, Canada
- Pete Sprenger, US Navy, Naval Medical Research Unit San Antonio
- Ric Tell, Richard Tell Associates, Inc.
- Nigel Turner, Link Microtek UK
- Art Thansandote, Health Canada (Retired)
- Don Wijayasinghe ARPANSA
- Ben Wilson, Link Microtek