



INTERNATIONAL COMMITTEE *on* ELECTROMAGNETIC SAFETY

Sub-Committee 1 Minutes December 2020 (Approved)

IEEE/ICES TC95 Subcommittee 1 Techniques, Procedures, Instrumentation and Computation 2000 – 2200 UTC: 17 December 2020 Via WebEx conference

0. Registration of attendees

Subcommittee 1 on Techniques, Procedures, Instrumentation and Computation meeting convened from 19:45 UTC on 17 December 2020 via WebEx. Attendees were welcomed and their attendance registered on the SC1 membership list.

1. Call to order

At 20:00 UTC the meeting was called to order by SC-1 Co-Chair, Peter Zollman. All attendees were again welcomed, especially those who were attending at unsociable times of their day. The motion to open the meeting was called by David Maxson with Asher Sheppard seconding and was approved.

2. Approval of agenda

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

3. Approval of the August 2020 SC-1 meeting minutes

With no amendments, the August 2020 SC1 meeting minutes were accepted on a motion from Asher Shepard and seconded from Kevin Fischer.

4. Update of SC-1 membership

The SC1 Co-Chair (Zollman) called the SC1 membership on hand and recorded in the sign-in sheet. He asked if anyone was aware of any errors or omissions - with no comments made. 42 people were in attendance (Attachment 2).

5. Call for Patents

In the meeting announcement and the draft Agenda circulated prior to the meeting, the SC1 members had been asked to state if they had any essential patent claims. No such claim has been recorded. SC1 Co-Chair (Zollman) asked if anyone now in the meeting had any such claims. Again no one made any claim.

6. PC95.3¹ progress

SC1 Co Chair (Zollman) gave a presentation on the progress and timeline for the development and approval of PC95.3 revision.

¹ PC95.3™/Draft, Draft Recommended Practice for Measurements and Computations of Electric, Magnetic, and Electromagnetic Fields With Respect to Human Exposure to Such Fields, 0 Hz to 300 GHz



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The review and balloting stages were outlined. The second round of SA balloting is underway, and this should lead to publication by the middle of 2021. (Attachment 3)

7. Presentations

a. SC1 –What’s Next? (Butcher)

SC1 Co-Chair (Butcher) gave a presentation asking the question: How can we expand the state of the art? He indicated there is continuing demand for RF exposure assessment and outlined particular sections from PC95.3 Appendix I - Items for further study. (Attachment 4)

b. Several Decades of Spatial Averaging Experience (Tell)

Ric Tell presented an experienced practitioner’s perspective on spatial averaging touching on variations and uncertainty based on different field strength, time varying signals, reflections, and observer interactions.

He presented a commentary on his experiences over the years with the hope that, maybe, some of it might spark individual thought about the vagaries that others may have observed with spatial averaging and what they have done about it. The talk was not a "how to" kind of presentation; rather, the purpose was intended to instigate further discussion on the topic in which the experiences of others can add to, and improve, our measurement work. The talk centered on the matter of how the body of the observer can distort the RF fields being measured. A key question, posed by Tell in the closing, is: *How do you report your measurement data such that its uncertainty is properly indicated?* Tell hopes that this might be the stimulus for more SC1 members to share the problems that they have dealt with in their own measurements. SC1 members include the folks in the field doing the work and it is our responsibility to do the best that we can. Tell observed that the more input the subject attracts, the more likely we are to come to a consensus on how to do it correctly. (Attachment 5)

c. Discussions on presentations

There followed a general discussion. There was a suggestion that regulatory issues could be solved by the use of spatial peak assessment over spatial averaging. However, it was observed that this does not solve the issue. E.g., how to establish the length of the observation needed in order to determine the (regulatory) peak? What is the timescale of the signal variation?

For spatial averaging of time-variant signals, it had been noted that a sequential point observation would have a different measured value both through the spatial field variation and due to the source signal changing amplitude. It was proposed that 2 measurements, 1 fixed in space to capture the time variation while the other measuring the spatial average with both time-stamped to allow correction of the spatial averaged results. It was observed that such two measurements approach has been done and works well.



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It was observed that another variable relates to the use of selective / narrowband instruments in a varying field and difference in results based on sweep time, a difference between narrowband and broadband measurements of up to 3 dB.

For evaluating sources with modern complex communication protocols, it was suggested to look at modern spectrum analyzers commonly used for EMI with FFT bandwidth covering the signal as a broadband power measurement facility. It was noted that the limited bandwidths of such equipment would not support looking at the full range of wireless communications of 600 MHz to 3 GHz at one time.

It was noted that operators' inability to provide short term data (15 second time frame) is another complication. How much "slop" or uncertainty is there in current measurements?

It was observed that on beam steering installations it is not certain that you can get the beams to overlap at the same time and it is therefore uncertain how that affects assessment. Also, for sweeping beams it was questioned how to figure out if they are aligned or which configuration of beams is the "maximum." It was suggested that you may never be able to get the beams to align. It was proposed using measurement from a synchronization signal to extrapolate to the traffic beam. It was asked, how do you assess these installations against the 3.5 GHz power flux density limit regulated to ensure satellite interference? With respect to the assessment of modern cell sites it was proposed to study the effect of multiple user devices / types of devices with poor signal, varying data loads, etc.

It was suggested to work with manufactures to help develop common language and example of how multiple beams affect exposure. It was noted that product compliance assessment is covered in SC34 which might have some answers. It was also suggested engaging with test equipment manufacturers noting that they have to implement the latest complex test protocols for over the air testing. Possible presentation(s) from them?

It was suggested to review and update IEEE 145-1993 - Definitions of Terms for Antennas. Does someone have a more updated reference that includes beam lexicon?

8. Any other business

No new business was discussed

9. Time and Place of Next Meeting:

Next meeting will be via WebEx in the spring of 2021 prior to a June TC95 meeting. SC1 date to be determined. If SC1 members are willing to present on a suitable topic, and there is sufficient interest, the Co-chairs are prepared to organize additional Webex meetings prior to then.

10. Adjourn

Kevin Fischer made the motion to adjourn and David Maxson seconded. The Co-Chairs Zollman/Butcher adjourned the SC-1 meeting at 21:45 UTC.



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Attachment 1

IEEE/ICES TC95 Subcommittee 1 Techniques, Procedures, and Instrumentation Agenda: 17 December² 2020 Meeting Via WebEx

	Los Angeles	New York	London	Amsterdam	Jerusalem	Beijing	Tokyo	Sydney	Auckland
Start Time	Thu 12:00	Thu 15:00	Thu 20:00	Thu 21:00	Thu 22:00	Fri 04:00	Fri 05:00	Fri 07:00 *	Fri 09:00 *
Start Date	17 December 2020					18 December 2020			
Duration	~1.5 Hrs								
Meeting open	Meeting registration starts 15 minutes prior to scheduled start time.								

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|---|----------------|
| 0. Register of attendees (WebEx) from start minus 15 min | Zollman |
| 1. Introduction & Call to Order | Zollman |
| 2. Modifications and approval of agenda | Zollman |
| 3. Approval of SC-1 Minutes (Aug 2020 meeting) | Zollman |
| 4. Update of SC-1 Membership | Zollman |
| 5. Call for Patents³ | Zollman |
| 6. PC95.3 progress | Zollman |
| 7. Presentations | |
| a) Introduction to next steps | Butcher |
| b) Several Decades of Spatial Averaging Experience | Tell |
| 8. Any other business | Butcher |
| 9. Time and Place of Next Meeting | Butcher |
| 10. Adjourn | Butcher |

² 18 December for Far East, Australasia, and New Zealand

³ *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: <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/patents.pdf> 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 speak to the committee chair today.*



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Attachment 2

SC1 17 December 2020 Attendee list

Last name	First name	Affiliation	Member SC1	Member IEEE-SA	Patent claim
Ben Saada	Aymen	Innov'Com Lab, Higher School, Tunis	Y	N	N
Bushberg	Jerrold	UC Davis	Y	Y	N
Butcher	Matt	Sublight Engineering PLLC	Y	Y	N
Chou	Chung-Kwang	C-K. Chou Consulting	Y	Y	N
Colville	Frank	US Army PHC	Y	Y	N
Çömlekçi	Selçuk	Suleyman Demirel University	Y	N	N
Duvdevany	Amnon	Israel Institute for Occupational Safety and Hygiene	Y	N	N
Fisher	Kevin	Smith and Fisher, LLC	Y	Y	N
Fisher	Kyle	Smith and Fisher, LLC	Y	Y	N
Futch	James	Fla. Dept. Health, Radiation Control	Y	N	N
Gallamoza	Romeo	US Army	Y	N	N
Gledhill	Martin	EMF services	Y	N	N
Graf	Kevin	FCC	Y	Y	N
Haes	Donald	Comcast	Y	Y	N
Harrington	Tim	FCC	Y	Y	N
Johnson	Robert	Global RF Solutions	Y	Y	N
Kantner	Kim	AT&T Services, Inc	Y	N	N
Karabetsos	Efthymios	Greek Atomic Energy Commission	Y	Y	N
Kihlstrom	Cory	Verizon Wireless	Y	N	N
Krebs	Paul	Verizon	Y	Y	N
Liu	Daniel	ARPANSA, Australia	Y	N	N
Maxson	David	Isotrope	Y	Y	N



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Last name	First name	Affiliation	Member SC1	Member IEEE-SA	Patent claim
Mikulski	Timothy	US Army	Y	N	N
Moule	Brett	Kordia Solutions	Y	N	N
Pan	Yi	ISED (Canada)	Y	N	N
Roder	Patricia	IEEE SA	Y	Y	N
Šarolić	Antonio	FESB, University of Split (Croatia)	Y	N	N
Sheppard	Asher	Asher Sheppard Consulting	Y	N	N
Sliney	David	Johns Hopkins Univ	Y	N	N
Tell	Ric	Richard Tell Associates, Inc.	Y	Y	N
Thansandote	Artnarong	Individual (retired)	Y	Y	N
Tong	Zijun	NEMA	Y	N	N
Vecchi	Giuseppe	HP	Y	N	N
Visser	Auke	Royal Netherlands Navy	Y	N	N
Weller	Bob	IEEE-BTS	Y	Y	N
Wessel	Marvin	Global RF Solutions	Y	Y	N
Zhao	Xun	DND/QETE	Y	Y	N
Zollman	Peter	PZC (Consultant)	Y	Y	N
Coons	Greg	FCC	O	N	N
Chrysanthou	Chrysanthos	FCC	O	N	N
Edwards,	Johnathan	FCC	O	N	N
Maruthi	Sathya	FCC	O	N	N