



INTERNATIONAL
COMMITTEE *on*
ELECTROMAGNETIC
SAFETY

Sub-Committee 1 Minutes August 2020
IEEE/ICES TC95 Subcommittee 1
Techniques, Procedures, Instrumentation and Computation
2030 – 2230 h UTC: 19 August 2020
Via WebEx conference

0. Registration of attendees

Subcommittee 1 on Techniques, Procedures, Instrumentation and Computation meeting convened from 20:15 UTC on 19 Aug 2020 via WebEx. Attendees were welcomed, their attendance, status, and patent claims check recorded - 37 people were in attendance (Attachment 1).

1. Introduction & Call to Order

Zollman

At 20:30 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 Co-chair stated that this meeting has been set up in response to the feedback from previous meetings that it would be good to have more than two meetings a year in order to help the group engagement and to support the presentation and discussion of technical topics within the scope of SC1 and to provide useful background for the scoping of future SC-1 deliverables.

The Co-chair indicated that there are a few people in attendance that are not (yet?) signed up members of ICES or registered for SC-1 but who had asked the Co-chairs if they could attend as observers. He asked if there were any objections from SC-1 members – none were recorded.

2. Modifications and approval of agenda

Zollman

Apart from re-numbering the agenda headings after item 2, the draft SC-1 agenda was proposed and accepted by the committee on a motion from Butcher and seconded from Jerry Bushberg and was approved.

3. Approval of SC-1 Minutes (May 2020 meeting)

Zollman

Amend to include J. Bushberg as attending the meeting. Subject to that addition, the minutes were accepted on a motion from Kihlstrom and seconded by Krebs.

4. Update of SC-1 Membership

Zollman

SC1 Co-chair stated that the SC1 status was recorded in the sign-in sheet displayed during individual registration prior to the meeting. He asked if anyone was aware of any errors or omissions. None were reported.

5. Call for Patents¹

Zollman

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.

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: <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.



INTERNATIONAL
COMMITTEE *on*
ELECTROMAGNETIC
SAFETY

The SC1 chair (Zollman) asked if anyone now in the meeting had any such claims. Again no one made any claim (Attachment 1).

6. PC95.3² progress

Zollman

The Co-chair (Zollman) summarized progress on PC95.3. The PC95.3 SC1 ballot, 1 June to 1 July 2020 was completed as planned. The editorial working group (EWG) reviewed over 200 comments and by 24 July the working draft was amended. According to IEEE-SA guidance, abstain, no response (including resign) do not count in the determination of approval. The 38 Approve and 0 Reject votes therefore means 100% approval. The ballot report (Attachment 2) records the review details.

Zollman noted that the PC95.3 TC95 ballot is underway and closing on August 28. 42 people signed up to vote. As of close of play 18 August, 18 votes have been recorded. Zollman asked the remaining balloters to respond by August 28 to ensure that the vote is quorate.

Subject to a positive TC95 vote, the EWG will again act as review group on comments received.

The SC-1 Co-chairs continue to work closely with other ICES officers and IEEE-SA representatives to progress the revised PC95.3 through to publication (well) in advance of the end of 2021 deadline. The chair was then passed to Butcher for the final agenda items.

7. Time and Place of Next Meeting

Butcher

It was agreed that, subject to having contributions, SC1 should next meet in in early November 2020. In the absence of material, this might be deferred until January 2021.

The following subjects were proposed:

- Wessel suggested narrow band v broad band measurement comparison
- Tell suggested spatial averaging

8. 5G EMF exposure assessment

Butcher

a. Life Jim, but not as we know it - exposure measurements of 5G base stations
Martin Gledhill – EMF Services, IEEE-ICES SC1 PC95.3 EWG member

The advent of 5G base stations brings new challenges for measurement, especially if the purpose of the measurements is to determine whether exposures from a site comply with limits. The nature and variety of transmission characteristics means that extrapolation techniques used for preceding generations of technology cannot be applied. Statistical analyses and measurements have shown that time-average exposures are well below the theoretical maxima, and limits on time-average transmissions in any direction can be programmed into the base station software. IEC 62232 and others have proposed extrapolation methods for 5G, but these are generally indirect and do not provide the same certainty as we have now. IEC 62232 also suggests other approaches which may better reflect real-life situations but whose use for compliance assessment

² 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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COMMITTEE *on*
ELECTROMAGNETIC
SAFETY

could also require great care. Rethinking measurement equipment so that it incorporates elements of the mobile phone could also be explored.

b. Realistic exposures from 5G Networks – A look at exposure scenarios and testing in live 5G Networks

Mike Wood, Chair of IEC-TC106 & Steve Iskra – Telstra

With the efficiency of 5G networks and implementation of new advanced beam steering antennas, realistic exposures will be quite different to previous technologies. Telstra has been testing 5G for 5 years and this presentation examines various exposure scenarios applicable for 5G networks and shows the results of Telstra's EME testing on live 5G networks in Australia, and the various test methods associated with realistic exposures. To provide more accurate and realistic assessments of 5G EME levels for compliance and environmental situations, traditional methods need to be reassessed.

Telstra is applying realistic (actual) exposure assessments for 5G base station compliance (as per IEC 62232) that takes into account power reductions from a pure 'theoretical maximum / worst case assessment' that doesn't actually exist. The compliance assessment takes into account Time Domain Duplex (TDD), Beam steering (spatial distribution of users), and network utilization. Telstra's 5G network has monitoring applied to ensure that EME assessment limits are not exceeded. This approach is consistent with previous technologies where antenna tilts may be limited, or power settings adjusted for metro / rural or inbuilding designs, so the approach is not new.

For Environmental EME assessments, Telstra is looking at the range of exposures likely to occur in a mature network and assessing methods that can be easily implemented by RF assessors and test laboratories.

c. Update on IEC 62232 and 5G measurements

Des Ward

Des Ward – Vodafone TPG Telecom, Co-Convener of IEC TC-106 MT3

IEC Maintenance Team 3 (of Technical Committee TC-106) is the committee responsible for the methods for the assessment of electric, magnetic, & electromagnetic fields associated with human exposure - base stations. The team are the custodians of base station method standard (IEC 62232) for the Determination of RF field strength, power density and SAR base stations. Along with its sister document comprising of practical case studies (IEC TR 62669). The Ed3 of IEC 62232 document will incorporate:

- An extended frequency range up to 300GHz and an update of power density measurements in lab conditions for equipment above 6 GHz
- Compliance assessments based on practical maximum and, realistic assessments of beam-forming antennas, and 5G including millimetre wave
- Monitoring tools and validation, extrapolation protocols.
- Clarification of compliance criteria for exposure to multiple sources



INTERNATIONAL
COMMITTEE *on*
ELECTROMAGNETIC
SAFETY

- Update of simplified assessment for dish antennas used in radio relays or microwave links.

Currently, the team is working through significant National Committee comments with a view to releasing a new version of IEC 62232 Ed3 by the end of 2021

At the conclusion of the presentation a lively discussion forum ensued with comments and questions until the meeting time was exhausted.

It was agreed that this meeting was appreciated and similar meetings covering similar topics of interest would be welcome.

8. Any other business

Butcher

None

10. Adjourn

Butcher

The meeting was adjourned at the conclusion of discussion, at 00:15 UTC, 20 August 2020.

(Minutes drafted by Zollman and Butcher)

Attachment 1: Attendee list

Attachment 2: Approved Agenda

Attachment 3: PC95.3 SC1 ballot review report

Attachment 4: Life Jim... presentation - Gledhill

Attachment 5: Realistic exposures... presentation - Wood

Attachment 6: Update on IEC 62232... presentation - Ward



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Attachment 1 – SC1 19 August 2020 Attendee list

Last name	First name	Affiliation	Member SC1	Member IEEE-SA	Patent claim
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
Doczkat	Martin	FCC	Y	Y	N
DeFrank	John	US Army	Y	Y	N
Duvdevany	Amnon	Israel Institute for Occupational Safety and Hygiene	Y	N	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
Glembo	Tyler	Intel	Y	Y	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
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
Mathur	Rajat	Hammett & Edison, Inc.	Y	Y	N
Miaullis	Aaron Paul	US Air force	Y	N	N
Moule	Brett	Kordia Solutions	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
Weller	Bob	IEEE-BTS	Y	Y	N
Wessel	Marvin	Global RF Solutions	Y	Y	N
Zollman	Peter	PZC (Consultant)	Y	Y	N
Coons	Greg	FCC	O	N	N
Edwards,	Johnathan	FCC	O	N	N
Le	Johnny	FCC	O	N	N
Maruthi	Sathya	FCC	O	N	N
Olij	Neil	Hammett & Edison, Inc.	O	N	N
Tarditi	Alfonso	FCC	O	N	N
Ward	Des	Vodafone (Australia)	O	N	N
Wood	Mike	Telstra	O	N	N
Iskra	Steve	Telstra	O	N	N