ASC C63® Overview

Long Island EMC Chapter
January 25, 2010

Don Heirman, Chair ASC C63®

Overview of ASC C63® (EMC)

- **Scope**
  - Development of definitions and methods of measurement of electromagnetic noise and signal strengths (radiated and conducted), determination of levels of signal strength, levels of unwanted sources, limiting ratio of noise (and/or unwanted sources) to signal and development of methods of control of, and guideline for, influence, coupling and immunity.

Note: Where subjects deal with overlap with those of other national committees, appropriate liaison will be established.

ASC C63® Membership

- American Council of Independent Laboratories (ACIL)
- Alcatel-Lucent
- Alliance for Telecommunications Industry Solutions (ATIS)
- American Radio Relay League (ARRL)
- AT&T (formerly Cingular Wireless)
- Bureau Veritas
- Cisco Systems
- Dell Inc.
- ETS-Lindgren

Membership Continued

- Federal Communications Commission (FCC)
- Food and Drug Administration (FDA)
- Information Technology Industry Council (ITIC)
- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE EMC Society
- Motorola
- National Institute of Standards and Technology (NIST)
- Northwest EMC
- PCTEST Engineering Laboratory
- Polycom
- Research in Motion (RIM)
- Samsung Telecommunications America
- Society of Automotive Engineers (SAE)

Membership Continued

- Sony-Ericsson Mobile Communications
- Telecomm. Industry Association (TIA)
- Telecomm. Certification Body Council (TCBC)
- TUV-America
- Underwriters Laboratories
- U. S. Department of Defense—Joint Spectrum Center
- U. S. Department of the Navy--SPAWAR
- Three individuals
- Three members emeritus

C63 Operation

- **Meets 2-3 times a year (started in late 1950's)**
- **Agenda:**
  - **Review work in subcommittees**
  - **Approve new projects**
  - **Hear reports from member organizations**
  - **Approves Subcommittee and C63 members**
- **Approves ballot formation**
- **Approves draft standards**
- **Endorses education and training proposals**
- **Maintains Steering committee for strategy issues**
- **Chair: Don Heirman at d.heirman@ieee.org**

Who uses ASC C63® Standards?

- Manufacturer internal testing groups
- Independent testing organizations
- Federal Communications Commission
- Industry affected by or using standard
- Members of US National Committee of the IEC in Technical Advisory Groups as they input to IEC committees for possible harmonization
- Others

Advantages to Regulators

- Receives industry participation in EMC standardization to meet their needs
- Regulators (e.g. FCC):
  - Can participate in standards process
  - Get broad input via ANSI public review process
  - Can cite standard as a reference without repeating in rules or have to do all the work internally
  - Where there are voids, agency can (and does) write bulletins and testing procedures with possible adoption/adaptation by ASC C63®
  - Can rely on proven reputation of ASC C63®

ASC C63® Committees

- **SC1 (Measurement Techniques and Developments)**
- SC2 (EMC Definitions)
- SC3 (International Standardization)
- SC5 (Immunity)
- SC6 (Laboratory Accreditation)
- SC7 (Unlicensed Personal Comm. Service)
- **SC8 (Medical)**

Subcommittee One (Techniques and Developments)

- **Support of core C63 documents**
  - C63.2: Emission measurement instrumentation
  - C63.4: Emission measurements
  - C63.5: Antenna calibration
  - C63.6: Site validation error budget
  - C63.7: Open area test site construction
  - C63.10: Unlicensed transmitter testing
  - C63.12: Guidelines for setting limits
  - C63.15: Guidelines for immunity
  - C63.16: ESD measurements
  - C63.23: Measurement Uncertainty
  - C63.25: Time domain test site validation
  - C63.26: Licensed transmitter testing
- See IEEE EMC Collection “on-line” at www.standards.ieee.org and click on “catalogue”

Subcommittee 1

- Measurements below 30 MHz
  - Part of C63.10 and C63.26 work
  - Primary concern is performing measurements at different test distances
  - Long term applicability to other standards
  - Progress to date:
    - Good consensus so far on lambda/2pi breakpoint for 40dB/20dB per decade falloff
    - Good consensus for inductive devices having a 60 dB per decade falloff
    - Measurements along one axis away from large devices insufficient

Subcommittee 1

(Measurements)

- **C63.5 (antenna calibration) proposed modifications**
  - **No antenna calibrations can be done on emission sites**
  - **Calibration site requirements will be highlighted**
  - **Frequency spacing for broadband antennas is defined**
  - **Other technical details:**
    - **Time Domain gating as optional method for above 1 GHz antennas**
    - **Allows site comparison method is equivalent to C63.5 method**
    - **Additional reference antennas allowed; dipoles only added**
    - **Free space correction factors for 50 ohm dipole antennas added**
    - **Expanded uncertainty sections for SSM and RAM methods**

Subcommittee 1

C63.10 (Unlicensed transmitter testing) Maintenance

- Subclause 5.2 – clarification of test sites above 1 GHz
- Rewrite of subclauses 6.3-6.6 to reduce redundancy and clarify maximization of emissions, alternative procedures for small devices above 1 GHz
- Subclause 6.4 – clarification of extrapolation factor for emissions below 30 MHz
- New subclause 7.11 – antenna array testing
- New subclause 7.12 – MIMO (Procedure for combining multiple outputs (MO))
- New subclause 7.13 – FM transmitter testing
- New informative Annex G – measurement guidelines above 1 GHz
- New informative Annex H – measurement guidelines for broadband emissions
- New informative Annex I – ERP/EIRP guidelines

Additional topics being considered:

Band-edge measurements

Test method for determining compliance of inductive loop device

Subcommittee 1

C63.26 on licensed transmitter testing

The following areas are being discussed:

- **Instrumentation**
- **RF Power Output**
- **Modulations characteristics**
- **Occupied bandwidth**
- **Conducted spurious emissions**
- **Radiated spurious emissions**
- **Frequency stability tests**
- **Additional sections for specific devices**
- **Signal substitution techniques**

Subcommittee 1

Plans for C63.25 on Time Domain site validation

To provide requirements for radiated emissions test sites including:

Below 1 GHz - open area tests, and semi-anechoic rooms

- **Requirements (performance and construction) will come from C63.4.**

Above 1 GHz - partially absorber lined open area test sites and semi-anechoic rooms

- **Reference S-VSWR and a Time Domain Reflectometry method.**

Comparison on emission test site validation between TDR (time domain reflectomety) and S-VSWR (Site-Voltage Standing Wave Ratio) techniques

Subcommittee 1

- **Draft C63.23 - Guide for Electromagnetic Compatibility—Calculations and Application of Measurement Uncertainty**
- **Document adds Type A contributors by introducing ANOVA and repeated measurements for contributors where it is practical.**
  - **Type A evaluations of uncertainty are those obtained by using statistical methods where multiple observations of the same event are recorded. These observed values are used to calculate the standard deviation of the results. The standard deviation is then used to obtain the contribution of the process under observation to the uncertainty budget.**
  - **ANOVA - Analysis of variance**
    - **ANOVA is a general technique that can be used to test the hypothesis that the means among two or more groups are equal, under the assumption that the sampled populations are normally distributed**
- **Possible contribution to IEC/CISPR-TC77 work on Uncertainty**

Subcommittee 2 (EMC Definitions)

- C63.14: EMC definitions
- Responsible for user needs of both industry and military
- Replaced MIL STD 463
- Inputs are from C63 standards
- Subcommittee Chair: Marcus Shellman on marcus.shellman@jsc.mil

Subcommittee 3 (International Standards)

- No publications
- Provides US Technical Advisory Group for CISPR (International special committee on radio interference) matters
- Addresses CISPR activity affecting US
- Discusses issues from other international EMC committees such as IEC TC77 (Immunity and powerline emissions) and its Subcommittees
- Subcommittee Chair: Poul Andersen on anderpoul@comcast.net

Subcommittee 5 (Immunity testing)

- Investigate and prepare standards for measurement of immunity of electrical/electronic equipment
- C63.25: on-site test of the immunity of electronic and electrical devices
  - Document is based on C63.18: on site testing of immunity of medical devices
- C63.15--General immunity tests
- Subcommittee Chair: Ed Hare on ehare@arrl.org

Subcommittee 6 (Lab Accreditation)

- Provides resource for laboratory competency and assessment activity
  - WG2: Exploring how to delete dates from scope of accreditation
  - WG3: C63.11: Proficiency testing program using ISO/IEC 17043
  - WG4: Specifying test equipment traceability and calibration requirements
- Subcommittee chair: Victor Kuczynski on victor kuczynski@ieee.org

Subcommittee 7

(Unlicensed Pers. Com. Services --UPCS)

- Provides spectrum etiquettes, e.g. “listen before talk”, and related standards for new or amended measurement techniques and associated instrumentation, measurement methods, and operational limits or protocols supporting dynamic spectrum access.
- Working Group:
  - Revision of C63.17--UPCS
- Subcommittee chair: Stephen Berger on stephen.berger@ieee.org

Subcommittee 8 (Medical)

- Supports EMC application for medical devices (non-implantable)
- Maintains C63.18 (on site medical immunity tests) & C63.19 (Hearing Aid Immunity)
- Two Working Groups:
  - Revision of C63.18
  - Maintenance of C63.19
- Receives updates on IEC, FDA, and Association for the Advancement of Medical Instrumentation (AAMI) activity
- Subcommittee Chair: Bob DeLisi, UL on bob.delisi@us.ul.com

Subcommittee 8 (Medical)

- Revision of C63.19
  - Project initiated in 2008 in response to FCC request to extend the standard to the 700 MHz band
  - Committee submitted draft revision to ballot on August 4, 2010
  - Initial ballot closed with 90% approval but >300 comments
  - 1st recirculation closed with >95% approval & additional comments
  - 2nd recirculation ballot started December 10, 2010 and closed December 23, 2010; approval confirmed; ANSI approval requested

Primary Changes – Revision 4

- Frequency expanded to 698 MHz – 6 GHz
- Can test all waveforms
  (The AWF (articulation weighting factor) is replaced by an MIF (modulation interference factor)
- Adds a low-power, no-test threshold
- For Hearing Aids, adds a limit table for GTEM immunity test method to bring two methods into closer correlation

FCC's role

- Relies on industry participation in EMC standardization to meet their needs
  - FCC participates in process
  - Likes ANSI public review of standards
  - Identifies, by reference, a variety of EMC standards
  - Where there are voids, FCC writes bulletins and testing procedures with possible adoption/adaptation by C63®

ANSI ASC C63®

- Questions?

- Contact:
  - Don Heirman at d.heirman@ieee.org

Web site: www.c63.org

C63® publication process

- Follows procedures prescribed by the American National Standards Institute
- *"Approval of standards requires a letter ballot with approval by at least a majority of the balloting group and at least two-thirds of those voting, excluding abstentions*"
- C63® secretary sends ANSI description of method by which the Std can be obtained from IEEE
- ANSI publishes that description in their **Standards Action**
- There may be delay in description notice publication, depending upon the date ANSI receives the notice

C63® publication process

- Public 45 day review process starts if electronic version of document submitted
- Public review document should be more or less final edited version
- If there are no *un-resolved negative votes* in Committee ballot and *no un-resolved negative comments* from Public Review, ANSI Board of Standards Review (BSR) has delegated approval to ANSI staff, which process takes only a few days.
- If there are *unresolved negatives,* then BSR reviews, and there may be a significant time delay

C63® publication process

- Comments to the public review comments if any must be prepared and responded to by C63®
- Assuming that no technical changes are to be made and hence no recirculation balloting and no second Public Review yet again, and assuming ANSI approval, it goes to IEEE editors for publishing

C63® publication process

- Editing may take up to 6 months unless C63® pays a premium to get it down to less than 3 months (which we may do for this important document)
- Hence the edited version has to be prepared by the WG to be virtually ready for publishing when it is sent to the final editing at the IEEE to expedite publication

C63® publication process

- If there are technical changes, then a recirc is prepared and another ballot is sent out to the balloting group, and another Public Review is required
- Recirc ballot will take at least a month to prepare and then the 45 days for balloting
- Those who voted affirmative in the first place on the draft for public review may indeed change their vote to negative if do not like changes

C63® publication process

- If C63® rejects negative public review or C63® ballot comments, BSR has to review if they accept that decision
- That of course takes time and is why we try not to have any unresolved negative ballots in the first place

C63® publication process

- Comments on recirculated drafts can only be made on those items that were changed in the recirculation copy
- Comments on other portions of the standard are not accepted even if the balloters continues to raise their objection and comments from earlier ballots
- Each successfully completed recirc ballot means that the draft that was approved is the "latest draft of the document" for any further action whether it is yet another recirc or final published version
- In a recirculation ballot, the vote of a balloting group member not returning that ballot reverts back to its vote on the most recent ballot returned

C63® publication process

- C63® can have a draft of the edited version available for sale by the IEEE before publication if need be to get it out to the users quicker. That draft would be the edited version that has been used in the public review assuming that there are no recirculation needed coming out of the public review