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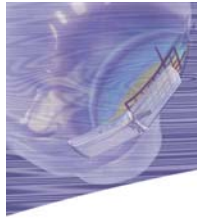


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Specific Absorption Rate (SAR) International Standards

Presented by Stuart Nicol

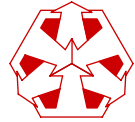
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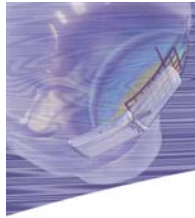
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RF Exposure and Measurement Standards

- IEEE (USA & International)
- ICNRP, NCRP (International)
- IEC (International)
- CENELEC (Europe)
- HC, IC, RABC, Spectrum Sciences Institute (Canada)
- Australia/New Zealand Standards(Australia)
- MIC (Korea)
- ARIB (Japan)
- IDA (Singapore)
- Other “derivative” country standards (China, Taiwan, Russia, Mexico, Brazil...)



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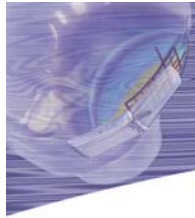
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Regions for Discussion

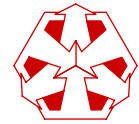
- United States of America
- Canada
- Europe



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IEEE *Published* Experimental Measurement Methodology Standards

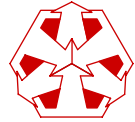
- IEEE 1528 “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques” (APREL Laboratories have 4 staff members recoded in the standard as technical contributors)
- IEEE 1528.1 “Recommended Practice for Determining the Peak Spatial Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communication Devices: Experimental Techniques.”



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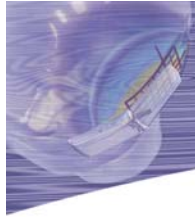
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IEC *Published* Experimental Measurement Methodology Standards

- IEC-62209 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures” Part 1: “Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 300 MHz to 3 GHz)”
- IEC-62209 “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures” Part 2 *Draft*: “Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity of the ear (frequency range of 30 MHz to 6 GHz)”



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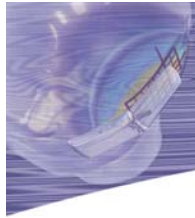
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FCC Experimental Measurement Methodology Standards

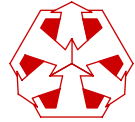
- OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields”.
- OET Laboratory Division FCC (December 2007) SAR Evaluation Considerations for Laptop Computers with Antennas Built –in on Display Screens
- OET Laboratory Division FCC (May 2007 Revised) SAR Measurement Procedures for 802.11abg Transmitters
- OET Laboratory Division FCC (October 2006) SAR Measurement Procedures for 3-6GHz



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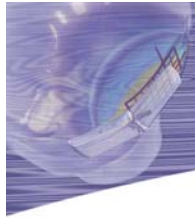
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Industry/Health Canada Experimental Measurement Methodology Standards

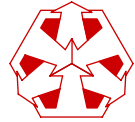
- RSS-102 Radio Frequency Exposure
Compliance of Radiocommunication Apparatus
(All Frequency Bands)
- Limits of Human Exposure to Radiofrequency
Electromagnetic Fields in the Frequency Range
from 3 KHZ to 300 GHZ - Safety Code 6



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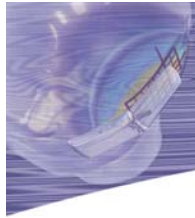
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European Experimental Measurement Methodology Standards

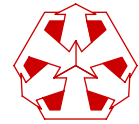
- R&TTE Directive The Radio Equipment and Telecommunications Terminal Equipment Regulations 2000
- CENELEC EN 50383 Basic Standard for the Calculation and Measurement of Electromagnetic Field Strength and SAR Related to Human Exposure from Radio Base Stations and Fixed Terminal Stations for Wireless Telecommunications Systems (110 MHz - 40 GHz)



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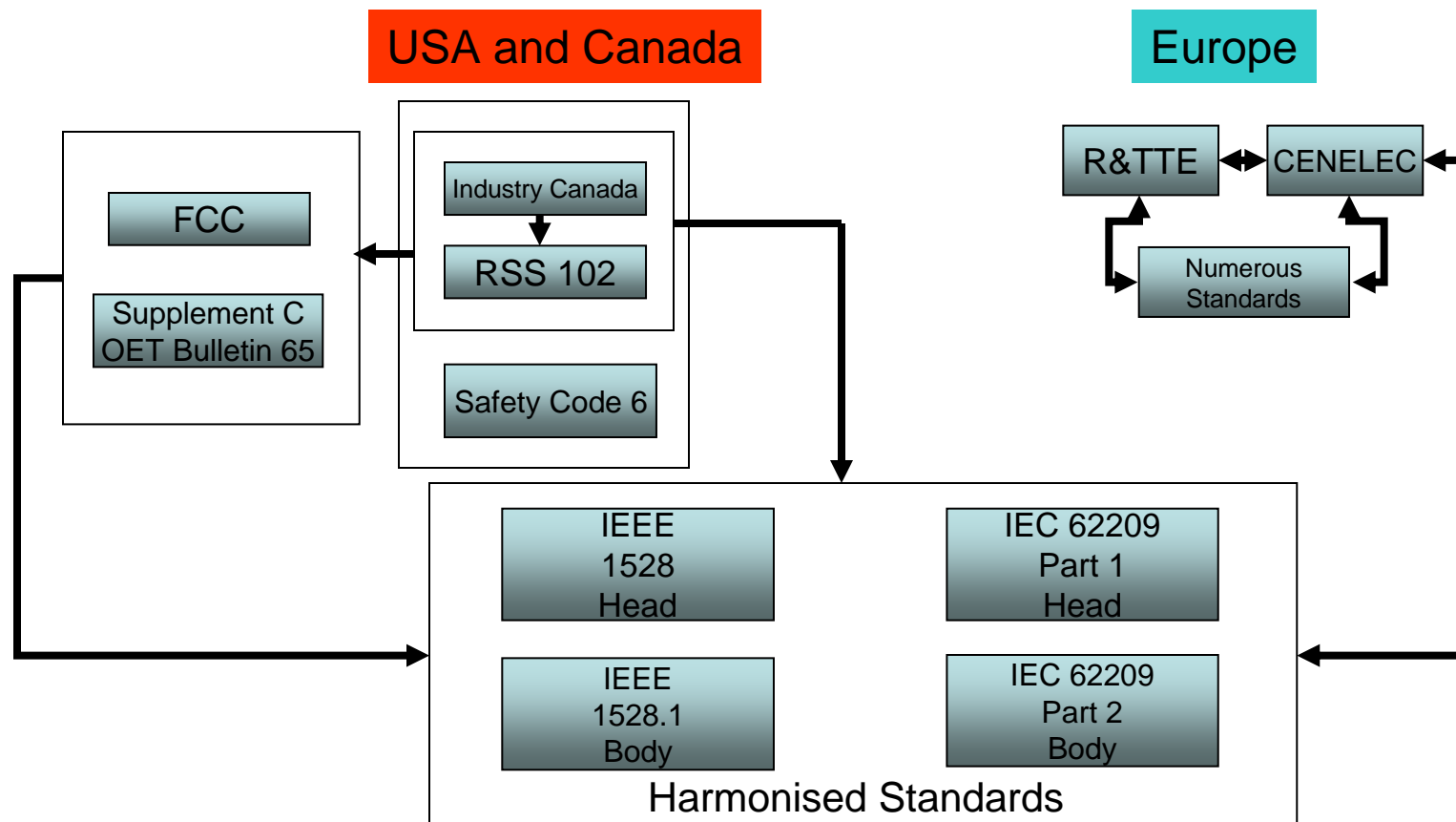
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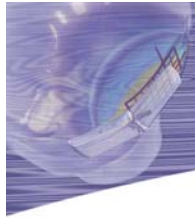
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International Standards Relationships

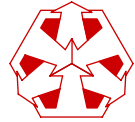




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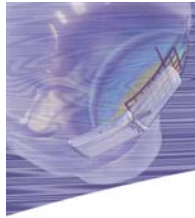
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IEC & IEEE Standards Harmonization

- Why harmonize?
 - Both standards groups accept that the methodologies are sound and that most committee members contribute to both IEEE and IEC standard development. The intent is to speed up publication and release.
- What are the implications?
 - Still areas within both standards which local regulators e.g. FCC do not accept or require additional methodologies for example WiMAX, UMTS 4g etc
- How does/will this affect government regulators?
 - The FCC will release and publish their own methodologies for SAR testing which are developed outside of the standards groups. This can cause confusion and lead to delays in receiving approval. One of the major areas which the FCC are impacting the approval process is through the PBA (permit but ask).



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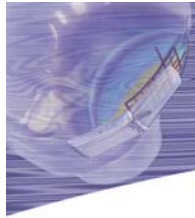
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Device Types Covered Under New Standards

- Device types (technologies)
 - Cellular Telephones, PDA's, Laptop's, Implantable, Body Worn, Telemetry
- Manufacturers or integrators expect data from third parties (suppliers) ODM's antenna manufacturers
 - This is safety
 - High SAR high concern



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What are the SAR Limits?

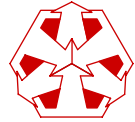
- SAR Limits are defined by the local governmental agencies and are not global (one limit applies to all countries)
- Limits are put into place to ensure that the general uncontrolled population are protected
- Limits only apply to the user and do not apply to bystanders



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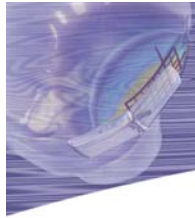
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FCC and Industry Canada Limits

- The FCC have set a limit of 1.6 W/kg into a 1 gram average
- Industry Canada have set a limit of 1.6 W/kg into a 1 gram average
- Both the FCC and Industry Canada will not be changing the limit to harmonise with Europe



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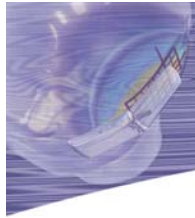
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European (CENELEC) Limits

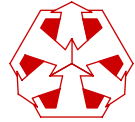
- For all member states in Europe including those who are not members (Switzerland and Norway) the limit is 2.0 W/kg into a 10g average



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Ongoing Approval Issues

- RF exposure requirements have changed the game for approvals of devices and now with the FCC PBA process SAR testing requirements have expanded
- Duty cycles, accessories are now required to be tested
- Exclusions, apparent exclusions, and erring on the side of caution are now unacceptable due to the FCC PBA
- UWB, WiMAX limb worn devices, etc?