

Agenda Item:

Source: NTT DoCoMo, Sharp

Title: Information on US Safety and EMC Regulatory Requirements

Document for: Information

This contribution provides informal information on the above topic, for the information of the RAN4 participants.

1. SAR and Safety

The governing regulations are put out by the IEEE, and the documents mentioned here can be ordered for PDF computer access from the IEEE website (<http://standards.ieee.org/catalog/content.html>).

The ANSI essentially endorses the IEEE requirements, and the FCC in its PCS rulemaking references that ANSI/IEEE C95.1-1992 compliance is required. However, FCC rules state that PCS devices which transmit radiated power under 100 mw and whose antenna is at least 2.5 cm from the human head are not required to undergo SAR testing. While the FCC has not enacted IMT-2000 rules (IMT-2000 in the USA is currently envisioned to be deployed within the PCS bands), it can be expected that the FCC will come up with a similar exception to SAR testing.

ANSI/IEEE standards -

IEEE C95.1-1991 (ANSI 1992) IEEE standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. Re-affirmed in 1997, Supplement issued in 1998.

IEEE C95.3-1991 (ANSI 1992) IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic fields- RF and Microwave (Reaffirmed 1997).

C95.1 identifies Maximum Permitted Exposures for which the device must be tested unless it meets an Exclusion criterion

MPE levels required to be shown to be met, via SAR testing are shown in the attachment.
The Exclusion criteria are also shown.

2. EMC Requirements in the USA.

The FCC establishes EMC requirements for the USA, and these are different from the Europe ERC or the IEC requirements.

The requirements are defined in the Code of Federal Regulations (CFR) 47, and are available on-line at the FCC website <http://www.fcc.gov/oet/info/rules> (etc.).

The EMC requirements are contained in Part 15 of the rules, and in each Part which contains the general rules for that service (Cellular Service is in part 22, and PCS Service is in part 24)

For Example, The emission limits in the Licensed PCS rules in 24.238 states that on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power level by at least 43 plus 10log10 decibels, or 80 dB, whichever is lesser attenuation.

ATTACHMENT - SUMMARY OF ANSI/IEEE C95.1-1992

The Electric and Magnetic Energy (EME) to the human effect is regulated by FCC Rule and Regulation and is standardised in the ANSI C95.1 advisory standard, developed by the IEEE. The latest version, IEEE C95.1 - 1991, "IEEE Standards with respect to Human Exposure to Radio Frequency Electromagnetic Field, 3KHz to 300GHz", was the work of the several experts from the medical experts and RF specialists and has just been released. The main concern is that portable phones stay below the "incident power density" and the body or head's "Specific Absorption Rate (SAR)" specified.

In the C95.1 standard, RF devices are excluded from the Maximum Permissible Exposure (MPE) requirements levels if they meet the following criteria -

For frequency between 450 MHz and 1500 MHz, if the devices meet the following limits :-

	Freq band	Max. Pwr to antenna	Min. antenna spacing to user
Worker	Cellular (900 MHz)	3.5 watts	2.5 cm
General Public	Cellular (900 MHz)	0.7 watts	2.5 cm

Please note, the radiating body MUST BE 2.5 cm away from the body.

If the above Exclusion conditions are not met, then the device vendor MUST SHOW that following have been met :

	Power Density, uW/cm sq	SAR watts/Kg	Peak watts/Kg	Time Avg minutes
Worker	f (MHz) / 0.3	0.4	8.0	6
General Public	f (MHz) / 1.5	0.08	1.6	30

The C95.1 will also affect the PCS phones, but the MPE Exclusion limits are specified only upto 1500 MHz. However, the FCC has allowed an Exclusion limit for Licensed PCS operation, that does not require SAR testing, if the Radiated Transmitter power is under 100 mw, and the antenna is at least 2.5 cm away from the human body. Otherwise, the MPE SAR requirements have to be met, and SAR testing has to be performed according to the standard.