

WHO, Geneva, Switzerland  
Wednesday 4<sup>th</sup> and Thursday 5<sup>th</sup> June, 2014

## **National Report (Republic of Korea)**

### **1. Introduction**

This report introduces the regulatory status, the status of risk communications, the status of the research activities and the recent EMF policies in Korea.

### **2. EMF regulations and standards**

The Republic of Korea has regulations for human protection from the harm of radio facilities since 1961. However the EMF exposure limits were established in 2001 and enforced since April 2002. Due to the public opinion, the more stringent limits were adopted among ICNIRP and IEEE standards. Regulations for the EMFs from the stationary installations (base stations, broadcasting transmitters, etc.) have been mandated from June 2007.

#### **2.1 National Acts in Korea**

All the radio facilities shall be installed in accordance with the safety guidelines to ensure that they shall not harm human body or damage other facility (Article 47 of Radio Wave Act). The MSIP (Ministry of Science, ICT & Future Planning) shall establish the EMF limits to protect human body, the measurement method of specific absorption rate (SAR) and electromagnetic field, and the devices and installations for the application of the EMF exposure limits (Clause 1 of Article 47-2 of Radio Wave Acts).

The manufacturer, the importer and the installer of radio facilities shall ensure that the radio facilities comply with the EMF limits and if necessary install an additional safety facility (Clause 2 of Article 47-2 of Radio Wave Acts). The owner of a radio station shall report the evaluation result of the EMF level radiated from the radio station to MSIP (Clause 3 of Article 47-2 of Radio Wave Acts). The MSIP may order the manufacturer, the importer and the installer of radio facilities to install a safety facility, to restrict the operation or to stop the operation of the radio facilities, if they are not comply with the EMF human exposure limits. (Clause 6 of Article 47-2 of Radio Wave Acts)

#### **2.2 EMF exposure limits**

The EMF exposure limits of SAR in Korea are referred to the international standards developed by IEEE (FCC guideline). However, only the limit of local SAR for head had been mandated until Dec. 2012. The SAR limits for workers and for body, limbs and whole-body average were newly adopted and effective from January 2013. The limits of electromagnetic field level are referred to the international standards developed by ICNIRP. The new ELF EMF guideline adopted by ICNIRP in 2010 is not adopted yet in Korea.

### 2.3 Devices regulated and installations mandated for EMF measurement (MSIP Notification No.2013-118 and MSIP Notification No.2013-119)

The portable hand held devices of Cellular, PCS and IMT-2000 systems are mandated for SAR measurements. All portable devices used within 20 cm from human body were regulated for SAR evaluation from January 2013. However the devices radiating the EMF power lower than 20 mW e.r.p are exempted. All the devices, equipments and facilities that are radiating EMF energy are subject to the measurement of electromagnetic field level, except the radio installations of: mobile stations, emergency stations, stations located at the area where general public is hardly access, (e.g. stations on mountains, islands and etc.), low power stations such as license exempted wireless microphones, radio controllers, radio pagers, etc.

The assessment result for the electromagnetic field level shall be reported for the following broadcasting stations and the base stations before putting into service or during the periodic inspection (5-year terms) (Clause 65 of Presidential Decree of Radio Wave Act)

Radio station	Aggregated antenna power	Location
Base station of Cellular, PCS, IMT-2000 and WiBro systems	> 30 W for the system	Residential, commercial, industrial area, and area under government control
Base station of Radio Pager, TRS, Mobile data communication and LBS systems	> 60 W for the system	
Broadcasting stations	> 60 W for the system	

(Exemption) Radio stations of which the aggregated antenna power is below 500 W and the antenna is installed on a building or on the tower of height higher than 10m

### 2.4 EMF Rating and Labelling Policy (MSIP Notification No.2013-29)

The regulation for EMF rating and labelling will be enforced by MSIP from August 1, 2014. The operators of radio stations should affix the labels for EMF strength rating in an appropriate place. For portable devices used in direct contact with the user's ear, those who manufacture or import such devices should affix the labels for SAR rating, and/or display the highest SAR values appropriately. (Clause 1 of Article 47-2 of Radio Wave Acts)

Criterion of EMF strength rating for radio stations

Class	Criterion
Class 1	EMF strength $\leq$ 50% of the general public exposure limit
Class 2	50% of the general public exposure limit < EMF strength $\leq$ the general public exposure limit
Caution	the general public exposure limit < EMF strength $\leq$ the occupational exposure limit
Warning	the occupational exposure limit < EMF strength value

Criterion of SAR ration for portable devices

Class	Criterion
Class 1	SAR value $\leq$ 0.8 W/kg, 1g average
Class 2	0.8 W/kg < SAR value $\leq$ 1.6 W/kg, 1g average

### 2.5 Measurement standards and EMF guidelines in Korea

Standards for electromagnetic field (EMF) rating, labelling methods, facilities and equipments subject to EMF labelling (MISP Notification No.2013-29)

Guidelines for limiting exposure to electromagnetic fields (MISP Notification No.2013-118)  
Devices and installations regulated for SAR and electromagnetic field strength (MSIP Notification No.2013-119)  
Measurement method of electromagnetic field strength (RRA Notification No.2012-21)  
Measurement method of specific absorption rate in head and body (RRA Notification No.2012-23)  
Technical details on SAR measurement method (RRA Notification No.2012-43)

### **3. Public Concerns and Risk Communications**

In spite of our efforts for risk communications for several years, the public concern about EMF is still very high in Korea. 50-100 public appeals against the radiation of electromagnetic energy from base stations have been submitted to government offices and operators in a year. Government officers and operators are taking care of the complaints very actively by adjusting the radio parameters of such base stations. Regarding power lines and substations, about 110 complaints have been filed to KEPCO (Korea Electric Power Corporation) and KEPCO is also actively taking care of such complaints.

EMF web sites for interactive and bilateral communication ([www.emf.or.kr](http://www.emf.or.kr), [www.emf60hz.com](http://www.emf60hz.com), [www.emfsafe.kr](http://www.emfsafe.kr)) are providing all the EMF related information gathered. The KEPCO's ELF-EMF web site ([www.emfsafe.kr](http://www.emfsafe.kr)) provides "Cyber ELF EMF measurement service" from March 2009. The KEPCO opened a center in May 2009, for the public information dissemination for ELF EMF as the way of risk communication. The other EMF web site ([www.emf.go.kr](http://www.emf.go.kr)) operated by RRA will be open at the end of this year.

From 2004, two kinds of Newsletters, one for EMF measurement standards and the other one for biological effects, exposure limits and policies are published biannually. Guidebooks and CDs which include the information relating to the EMF exposure have been published every other year. A specialized journal has been published once a year for the professionals.

Workshop on bio-electromagnetics (titled "Bio EM Workshop") has been held once a year since 1999. In this year, the workshop will be held at The-K Seoul hotel on August 28.

Every other year, a survey on "Perception for EMF exposure and its hazard" for general public or experts is performed. The results of this survey are reflected to determine the short or long-term research agenda and the EMF policy.

From 2012, the information on the SAR values of each mobile-phone model was opened to the public through the RRA website ([www.rra.go.kr](http://www.rra.go.kr)). Every year from 2011, the guidelines on the safe use of home appliances and mobile phones have been published.

### **4. Researches on the biological effects of EMF**

Two new projects "A Study on the EMF exposure control in smart society" and "A Study on health effects and protection of EMF" have been launched in 2013 with total 2.055 billion KRW funded by MSIP (Ministry of Science, ICT & Future Planning). Two research institutes and several universities as well as an academic society (KIEES, Korean Institute of Electromagnetic Engineering and Science) are joined for the project.

Main research topics in RF frequency band are as follows:

#### **(1) A Study on Health Effects and Protection of EMF**

- Evaluation of human exposure level from equipments used near human body such as wireless power transfer devices, Development of 3D head model (6/15 age and adult)

for simulating exposure assessment, EMF measurement in occupational exposure environment, Development of personal dosimeter, Development and maintenance of RF exposure system for in-vivo study, performed by ETRI (Electronics and Telecommunications Research Institute)

- Prospective epidemiology research on the relation between mobile-phone use and cerebropathia (or brain nervous disease) of adults, performed by Korea University
- Cohort study on the relation between mobile-phone use and behavioral cognitive development of pregnant women and children, performed by Dankook University
- Biological effects of combined RF-EMF exposure: In vivo study, performed by Ewha Woman's University
- Biological effects of combined RF-EMF exposure: In vitro study, performed by KIRAM (Korea Institute of Radiological & Medical Sciences))
- Alzheimer's disease effects of RF exposure: In vivo study, performed by Ajou University

## (2) A Study on the EMF Exposure Control in Smart Society

- Exposure assessment for Mobi-Kids Study, performed by ETRI
- Assessment of the potential carcinogenic effects of childhood and adolescent exposure to radio frequency (RF) from mobile telephones on the central nervous system for Mobi-Kids Study, performed by Dankook University

Another project in ELF frequency band performed in the period of Oct. 2008 – September 2013 finished successfully with the budget of 8 billion KRW funded by MKE (Ministry of Knowledge Economy). KERI (Korea Electro-technology Research Institute), KEPRI (Korea Electric Power Research Institute), EESRI (Electrical Engineering & Science Research Institute), Seoul National University, KIRM (Korea Institute of Radiological & Medical Sciences) and KIEE (Korean Institute of Electrical Engineers) were involved in this project. Main research topics were as follows:

- ELF-EMF policy and research in Korea
- Development of cost-effective, practical ELF-EMF reduction technology
- Investigation of biological effects of ELF EMF
- Promotion of peoples' understanding on EMF

A new project "Research of Pattern Analysis related to Environmental EMF" has been launched in 2013 with total 1.34 billion KRW funded by MOTIE (Ministry of Trade, Industry and Energy). Ulsan university, KERI (Korea Electro-technology Research Institute) and KIEE (The Korean Institute of Electrical Engineers) are joined for this project. Main research topics are as follows:

- Development of estimation methodology for individual exposure to magnetic field generated by transmission lines
- Case-Control study to evaluate relationship between stomach and liver cancer and magnetic field generated by transmission lines
- Retrospective Cohort study to evaluate relationship between stomach and liver cancer and magnetic field generated by transmission lines

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