National Radio Research Agency

Republic of Korea

www.rra.go.kr

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Republic of Korea



# Contents



**Vision**

Lead the future ICT by creating new radio values

**values**

- Change and Innovation
- Customer Satisfaction
- Performance Enhancement

**Mission**

- To develop and use efficiently spectrum resources
- To secure a safe electromagnetic environment
- To take the initiative in global standards for broadcasting, communications, and ICT
- To advance the conformity assessment system

**Slogan**

RRA, Leading Radiocommunication

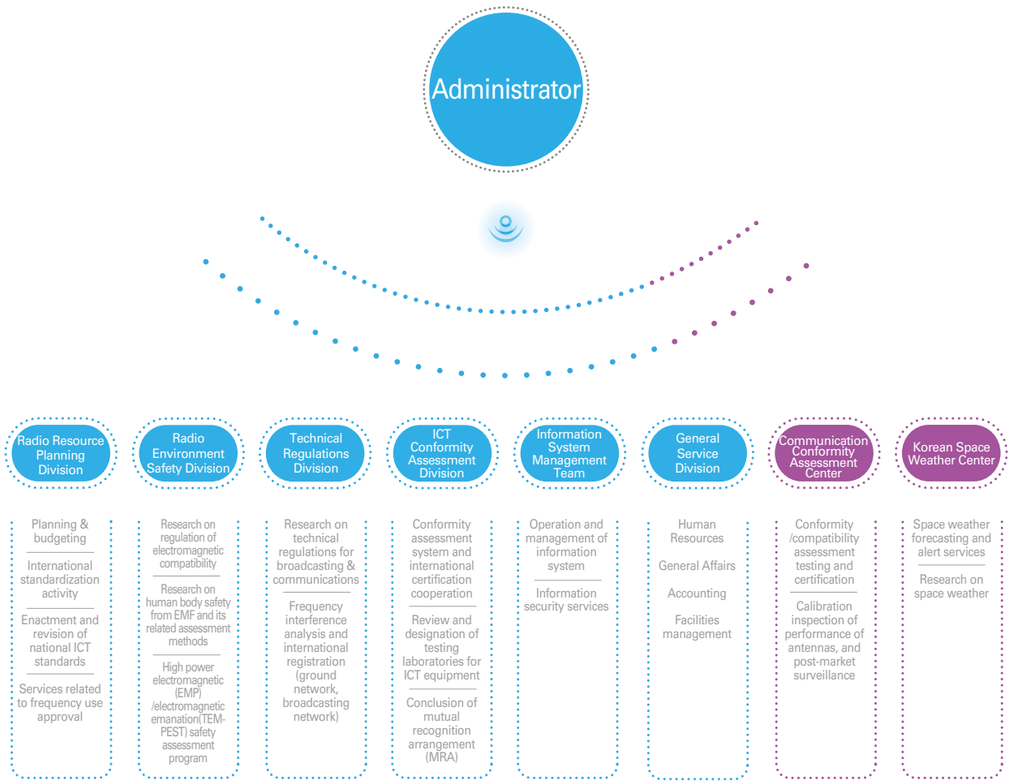
# History and Organization

- **Feb. 1966** Founded Radio Research Laboratory (Presidential Decree No. 2397).
- **Mar. 1967** Conducted ionospheric monitoring service.
- **Nov. 1968** Started type approval testing for radio equipment.
- **Jan. 1975** Conducted geomagnetic variation monitoring.
- **Jul. 1985** Started type approval for electronic communication equipment.
- **Nov. 1990** Started EMI inspection.
- **Dec. 1990** Introduced a research fellowship program.
- **Nov. 1992** Opened the Icheon branch institute (Presidential Decree No.13763).
- **Dec. 1995** Conducted solar radio monitoring service.
- **May 1999** Relocated from Anyang to Yongsan.
- **Dec. 2000** Began national standardization for ICT.
- **Dec. 2005** Established the Electromagnetic Waves Measurement Center.
- **Feb. 2008** Governmental reorganization (MIC→Korea Communications Commission).
- **May 2009** Opened the Information System Management Team.
- **Aug. 2009** Anyang Office consolidated into Yongsan Office.
- **Dec. 2009** Opened the Cyber Safety Center.
- **Dec. 2009** Opened the Radio Waves NURI Center.
- **Aug. 2011** Reorganized as National Radio Research Agency (RRA) and Established the Korean Space Weather Center.
- **Jun. 2012** Changed the name of Icheon Branch to Communication Conformity Assessment Center.
- **Mar. 2013** Governmental reorganization (KCC→Ministry of Science, ICT and Future Planning).
- **Jul. 2014** Relocated from Yongsan to Naju.
- **Jul. 2017** Governmental reorganization (MSIP→Ministry of Science and ICT).



## The National Radio Research Agency (RRA)

The National Radio Research Agency (RRA) was founded in 1966 to perform the research on efficient spectrum management and new radio communication technologies. RRA, which belongs to the Ministry of Science and ICT, performs research activities for the purpose of improving the efficient use of radio spectrum, securing a safe electromagnetic environment, and enhancing the competition in the fields of radio, information and communication technologies. RRA develops Korean ICT standards and participates in the international standards organizations and cooperates with them actively to develop the international standards in the field of communications and radio technology.




Real life applications
of radio waves

# Efficient use of radio spectrum resources

RRA studies efficient use of the spectrum such as development of new radio technologies to meet the rapidly increasing demand on spectrum. The agency also develops rainfall attenuation and radio wave propagation models which are more suitable for the domestic environment. Moreover, RRA notifies Korean frequency assignments of terrestrial, satellite and broadcasting stations to ITU for obtaining international right in use of frequency assignments and coordinates with foreign countries to resolve issues of international interferences. Equally important, it analyzes interference issues in use of broadcasting stations and in designation of radio stations of national defense, diplomatic purpose and international events.

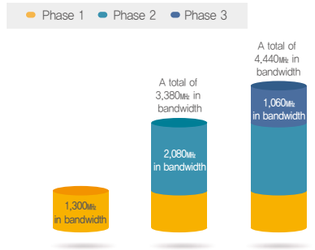
Radio Spectrum Allocations in Korea

Operation of SMIS System

Real-Life Applications of Radio Waves
(mobile phone, wireless LAN, Hi-Pass, bus arrival information system, RFID (transportation card), satellite, etc.)

## Research on efficient spectrum management

RRA studies the efficient use of spectrum resources such as deployment of new radio communication services in unused or low-used radio frequencies based on rising demands from industries including 5G.

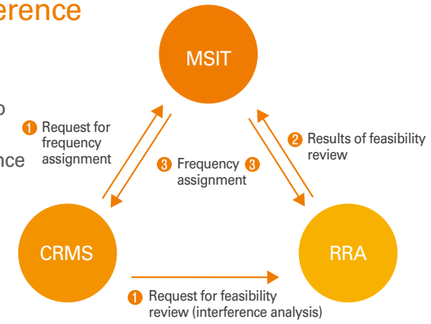



K-ICT Spectrum Plan

| Frequency Band | by 2018 | by 2021 | by 2026 |
|---|---|---|---|
| 1.4㎓ | – | 40 | – |
| 2.1㎓ | – | – | 60 |
| 2.3㎓ | – | 40 | – |
| 3.5㎓ | 300 | – | – |
| Above 24㎓ | 1,000+α (max. 3,000) | 2,000–α | 1,000 |

## Analysis on frequency interference

RRA reviews the frequency assignment for authorization of radio and broadcasting stations or approval of public frequencies to be used in order to ensure efficient use of limited resources. And it analyzes interference issues on availability or approval of public frequencies to be used.




## Laying the groundwork for securing spectrum resources

RRA develops the rainfall attenuation and radio propagation models that are suitable for the changing electromagnetic environment, such as urbanization, climate change, and increasing numbers of ICT devices. Moreover, the agency measures and analyzes the characteristics of propagation of unused spectrum resources and studies related technologies. These efforts will help to lay the groundwork for securing spectrum resources.

## Notifying frequency assignments of radio stations to ITU

RRA coordinates the frequency uses of radio stations in satellite, broadcasting, and terrestrial services with foreign countries and notifies them to International Telecommunication Union (ITU) to obtain international right of frequency uses and protect Korean radiocommunication networks from harmful interference.

(As of Aug. 2017)

| Broadcasting services | | |
|---|---|---|
| AM | | 145 |
| FM | | 449 |
| T-DMB | | 254 |
| TV | Analog | 212 |
| | Digital | 1,350 |

| Terrestrial services | | |
|---|---|---|
| Aeronautical | FD | 304 |
| Base | FB | 5,924 |
| Mobile | ML | 643 |
| Land | FL | 406 |
| Fixed | FX | 3,295 |

| Satellite services | | |
|---|---|---|
| Space Station | Non-geostationary | 21 |
| | Geostationary | 29 |
| Earth | | 560 |

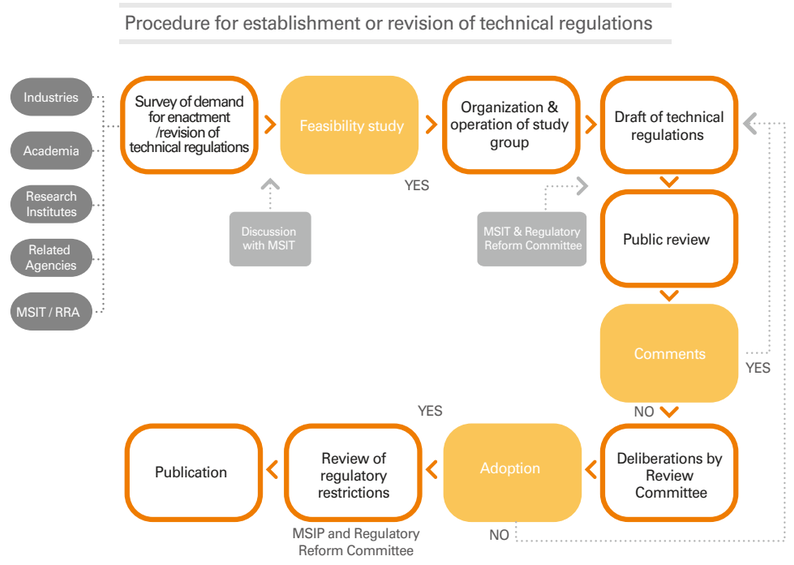
Low-power radio laboratory

# Research on technical regulations for broadcasting and communications services

In response to the environment where the line between communications and broadcasting is becoming increasingly blurred, and objects are communicating with one another, RRA conducts research on technical regulations for broadcasting and communications. Its research efforts will contribute to developing creative industries by helping them cope with market changes and adapt to new techniques and services.


## Research on technical regulations for broadcasting and communication services

RRA studies the relevant technical regulations which harmonize with the international standards such as ITU, IMO, and IEC, to allocate and allot new frequencies, to enact or revise relevant laws, and to introduce new techniques, products, and services.




# Initiative in global standards for ICT

The recent explosive growth of information devices like smart phones, tablet PCs, and wearable devices has necessitated standards for ICT. RRA establishes national ICT standards to facilitate safe and convenient use of various devices, and sets up standards for emergency communication in preparation for disasters, supporting underserved communities such as senior citizens and the disabled, with the aim of serving the public interest. Additionally, the agency supports international standardization activities of Korea ITU Research Committee and Experts Committee of National Standards to secure international competitiveness of Korean products and technologies.

## Procedure and status of Korean ICT standards

RRA establishes national standards to reflect the need and urgency of Korean ICT industry and services through a procedure involving public review and comments of all interested parties.

Procedure for establishment or revision of Korean ICT standards

Demand survey & road map → Draft of standards → Expert committee → Notification → Review committee → Standards council → Publication

National ICT Standards

(as of June 2017)

| | Reference Standards | | | | | Total |
|---|---|---|---|---|---|---|
| | ITU-R, T | ISO | IEC | JTC1 | Korean | |
| National ICT Standards | 107 | 89 | 121 | 651 | 570 | 1,538 |

## International standardization activities

RRA runs the Korea ITU Research Committee and the Experts Committee of National Standards to take the initiative in global standards. RRA strengthens its competency for international standardization activities in broadcasting, communications and IT sectors by building a strategic infrastructure such as securement of positions of chairmen, vice-chairmen, and office-bearers at ITU, ISO, IEC, APT, and other regional organizations.

Korean Contribution

(as of 2016)

| Sector | Conference participation | Contributions submitted | Contributions reflected |
|---|---|---|---|
| ITU-R | 48 | 73 | 71 |
| ITU-T | 27 | 170 | 167 |
| ITU-D | 7 | 11 | 11 |
| ISO/IEC JTC 1 | 45 | 60 | 60 |

### ITU (International Telecommunication Union)

ITU is the specialized agency under the umbrella of United Nations that develops and disseminates international recommendations in the fields of radio frequency, broadcasting, satellite orbit and telecommunication, and plays a role of coordination internationally.

http://www.itu.int

### APT (Asia Pacific Telecommunity)

APT is an international organization to promote cooperation in the field of broadcasting and communications standardization in the Asia-Pacific region.

http://www.itu.int

### ISO (International Organization for Standardization)

ISO is an intergovernmental organization (established in 1947) that covers the widest scope of standards development among the three public standardization organizations (ITU, ISO, IEC) in the world. It facilitates international exchange of goods and services and conducts standardization activities in terms of cooperation and development for science, technology and economy.

http://www.iso.org

### IEC (International Electrotechnical Commission)

IEC is an intergovernmental organization (established in 1906) for establishing international standards and conformity assessment standards for electrical and electronic fields, and conducts standardization activities for the purpose of facilitating international trade and maximizing market efficiency.

http://www.iec.ch

### JTC 1 (Joint Technical Committee 1)

JTC 1 is a technical committee jointly operated by ISO and IEC (established in 1987). It resolves the problem of standardization duplication in the IT field and promotes international standardization.

https://www.iso.org/isoiec-jtc-1.html

Electromagnetic wave strength laboratory

# Securing safe electromagnetic environment

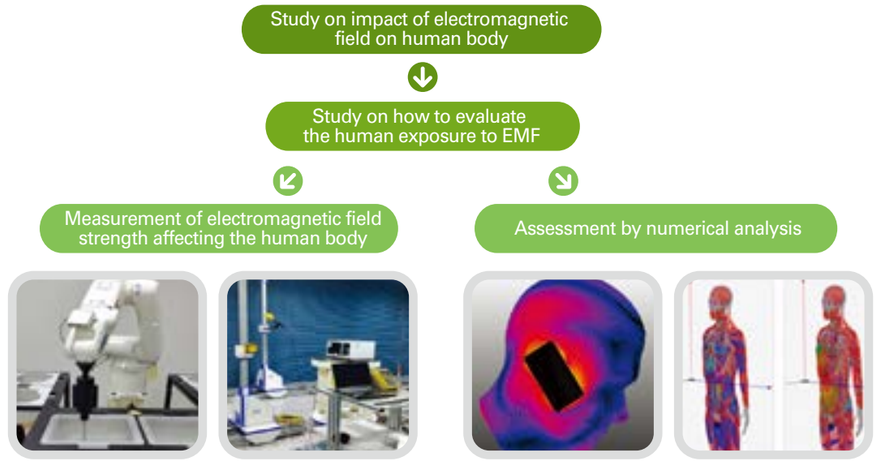
In response to this super-connected society, RRA conducts research on safety assessment criteria to minimize the influence of electromagnetic waves on human body, equipment and radio facilities and to cope with the threat of artificial high-power electromagnetic waves. Then it suggests reference levels of electromagnetic waves for equipment and human body and provides information on what is true or not regarding electromagnetic waves through various channels to communicate with the public.

## Research to develop technical regulations of electromagnetic compatibility

RRA develops technical regulations of electromagnetic interference (EMI) and electromagnetic susceptibility (EMS) to apply the regulations to electric and electronic products before their launch in the market. Thus, it contributes to preventing malfunctions of the products and to providing stable radio broadcasting and communication services from electromagnetic interference, which is caused by broadcasting or communications equipment, medical devices, vehicles, or electronic railroads facilities.

## Research to develop new assessment methods and standards on human body exposure to electromagnetic field

RRA develops standards for measurement of electromagnetic field strength and specific absorption rate (SAR) in order to secure a safe EMF environment. Recently, various wireless devices such as base stations, mobile phones, wearable devices, wireless power transmission equipment, and unintentional radio wave generators (such as home appliances) are the target products for the research activities to assess the amount of EMF exposure and develop new assessment methods.

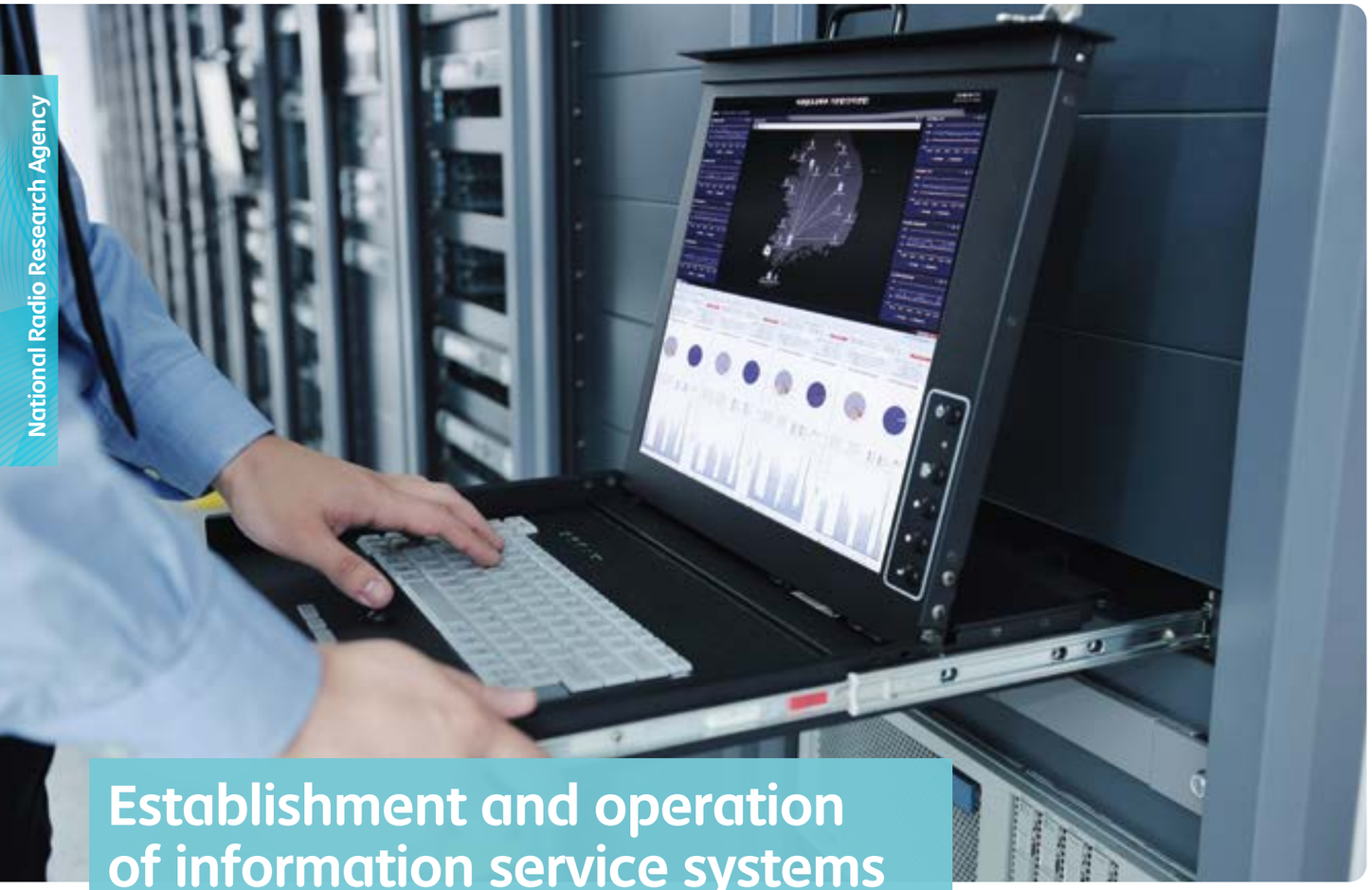



## Operation of programs for high power electromagnetic (EMP) and electromagnetic emanation (TEMPEST) safety assessment

RRA establishes protection performance standards and test methods to assess and secure the safety of indispensible national infrastructures from the high power electromagnetic waves radiating from nuclear and electronic bombs. These also help prevent the leakage of important information from the information equipment via electromagnetic waves. For this purpose, RRA operates programs for high power electromagnetic/electromagnetic emanation safety assessment to ensure the safety of private and public protective facilities.

## RF risk communications activities

RRA endeavors to provide correct information on electromagnetic waves and alleviate the concern of the public through interactive communications. The efforts include education programs on electromagnetic safety, forums to enhance risk communication in public, and a website (www.rra.go.kr/emf) with a title of "Electromagnetic waves in our daily life space."



# Establishment and operation of information service systems and infrastructure

RRA develops and operates an integrated information system for broadcasting and communications, radio environment information system, spectrum management intelligent system, and other information service systems, to technically support works of the Ministry of Science and ICT (MSIT) in the fields of radio waves, communications and broadcasting. By constructing a network infrastructure of the MSIT, it provides stable communication services.

## Establishment and stable operation of information service systems

RRA established the Integrated Broadcasting and Communication Information System that provides customer-oriented civil services and facilitates administrative services such as radio station licenses and spectrum fees with integrated information of communications and broadcasting services.  In addition, the agency is operating the radio environment information system, which provides the status of use of spectrum resources, such as information on electromagnetic field exposure and Wi-Fi usage. It also operates the Spectrum Management Intelligent System (SMIS) to study and analyze the radio interferences for broadcasting stations, mobile base stations and satellite networks.

Integrated Broadcasting and Communication Information System

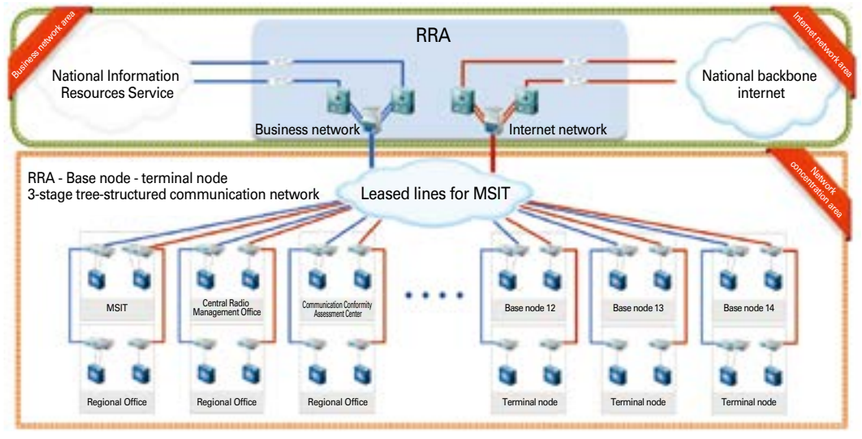
Radio Environment Information System

Spectrum Management Intelligent System

## Operation of network infrastructure for the Ministry of Science and ICT

RRA operates the network infrastructure for the MSIT consisting of 73 dedicated lines to provide stable and reliable communications services to 29 agencies, including MSIT, Central Radio Management Office, and Gwacheon National Science Museum.

Based on the Ministry of Science and ICT



# Conformity assessment system for broadcasting and communications equipments

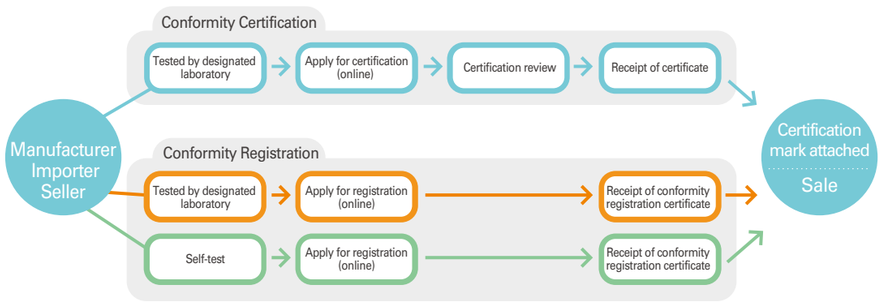
RRA operates a conformity assessment system that verifies that broadcasting or communications equipment conforms to domestic standards (technical regulations) before their sale, to protect the radio environment and users. The agency is also engaged in international cooperation activities, such as promotion of Mutual Recognition Arrangement (MRA) to strengthen the competitiveness of Korea's broadcasting and communications industry, and in research activities to advance national conformity assessment systems.

**Conformity assessment system for ICT equipment**

RRA executes a conformity assessment system for broadcasting and communications equipments according to Article 58-2, "Radio Waves Act." Certification is divided into three types: conformity certification, conformity registration, and interim certification. Those who want to manufacture, sell, or import ICT equipment should obtain the certification related to the corresponding equipment.

| | |
|---|---|
| Conformity Certification | Equipment which may harm the radio environment and broadcasting communications network or may give important electromagnetic interference, or may be affected by electromagnetic waves as much as normal motion is interfered. ex) Wireless telephones with an alarm automatic receiver, radar equipment for ship stations, radio equipment for LTE mobile communication, particular low-power radio equipment, etc. |
| Conformity Registration | Cases that broadcasting or communications equipment, not subject to conformity certification, is manufactured, sold, or imported. ex) Computing devices and peripherals, broadcasting set-top boxes, measuring instruments, industrial devices, connectors, etc. |
| Interim Certification | Cases that there are no conformity assessment standards for broadcasting or communications equipment, or conformity assessment is difficult for other reasons. |

Procedure for conformity assessment

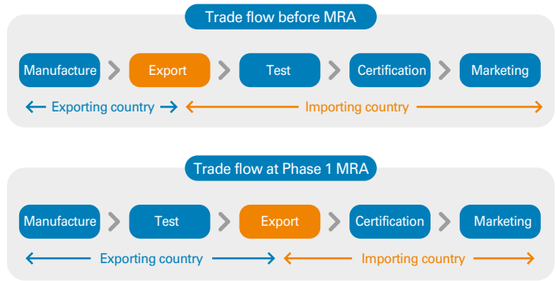



## Designation and management of testing labs

RRA designates testing laboratories by evaluating whether their testing facilities and labor forces conform to international standards (ISO/IEC 17025), in order to enhance the certification and testing capacity for broadcasting and communications equipments. At the same time, it makes efforts to reinforce the competitiveness of the laboratories by disclosing information on them online (scope of testing, testing equipment and any violation of laws, etc.).

## Promotion of a Government-to-Government MRA

RRA supports overseas expansion of Korean broadcasting and communications industries by reducing time and cost for certification and testing for broadcasting and ICT equipment. Thanks to the MRA, results of a conformity assessment of either party is to be recognized by the other party of the agreement.




**Korea's MRAs in Phase 1**

- With the US, Canada, the EU, Vietnam, Chile
- For more information on MRA, such as the equipment concerned, please visit the RRA website.

## Korea-ASEAN broadcasting and communications cooperation programs

RRA provided education and training programs for 10 ASEAN countries from 2011 to 2016 both on site and in Korea, with the aim of transferring Korea's advanced broadcasting and communications services and certification systems, which contributed to establishing a pro-Korean network in the region.

The Korea-ASEAN broadcasting and communication cooperation programs were participated in by Korea and 10 ASEAN countries (Malaysia, Indonesia, Thailand, Cambodia, Brunei, the Philippines, Vietnam, Myanmar, Singapore, Laos) in accordance with the FTA effectuated in December 2005.

Education in an ASEAN country

Education in Korea

Open Area Test site

# Conformity assessment and post-market surveillance for broadcasting and communications equipments

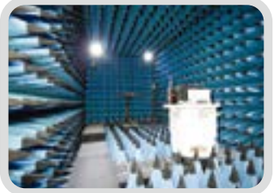
Communications Conformity Assessment Center

The Communication Conformity Assessment Center (CCAC), located in Icheon, Gyeonggi-do, provides a range of conformity assessment services including conformity certification, conformity registration, and interim certification, in accordance with the conformity assessment system for broadcasting and communications equipments, as well as post-market surveillance service including market monitoring and testing of collected products. Additionally, the center performs a task of calibration inspection on performance of antennas and measuring instruments required for conformity assessment and post-market surveillance.

## Conformity assessment for broadcasting and communications equipments

CCAC provides the conformity assessment service for broadcasting and communications equipment, including conformity certification, conformity registration and interim certification. The assessment service includes conformity assessment of maritime and aeronautical wireless equipments that affect human safety as well as conformity assessment of equipment or material that is difficult for private laboratories to test.

Wired telecom and RF test lab



EIRP chamber

Electromagnetic anechoic chamber

## Post-market surveillance for broadcasting and communications equipments

CCAC conducts an inspection to confirm that the certified equipment or material has been manufactured, imported or sold in compliance with the standards in place at the time when they obtained the certification, and also carries out post-market surveillance testing and takes administrative measures in the event of violation of law.

## Calibration inspection on performance of antennas and measuring instruments required for conformity assessment

CCAC runs a world-class open area test site for national standards and conducts calibration inspection on performance of measuring instruments and antennas of designated testing laboratories for conformity assessment. By accurately measuring the performance of antennas and other instruments, CCAC provides high reliability.

## Service for radio environment measuring, and technical support for SMEs

CCAC provides the conformity assessment service for testing sites for electromagnetic compatibility assessment, and offers technical support for small and medium-sized enterprises (SMEs) with regard to technologies required to develop new products, such as antenna and EMC measuring.

# Space weather observation, and forecast and alert service

Sudden change in space weather, like solar flare and coronal mass ejection (CME), may have a severe impact on various social infrastructures, such as communications, satellites, aviation, and power grids. The Korean Space Weather Center (KSWC) provides forecast and alert services that give valuable information on solar activity and its potential impact on industries through its accurate observation and fast analysis of solar activity, so that the damages caused by space weather can be minimized.


Forecasting Center

## Space weather forecast and alert service

Damages by space weather events have been around us since a long time ago. For example, power grids were damaged in Quebec, Canada in 1989 due to a geomagnetic storm. In 2010, Galaxy 15, one of the U.S. communication satellites, was out of order due to a severe space weather event, which resulted in communication disruption for 8 months. In order to minimize economic and social damages by space weather events, RRA established the Korean Space Weather Center (KSWC). Since then, KSWC has been accurately monitoring and fast analyzing solar activities for 24 hours a day and predicting possible impacts and providing space weather forecast and alert services for industrial sectors such as broadcasting and communications, satellites, aviation, and power grids.

**For information on the space weather forecast and alert service, visit the KSWC website**

http://spaceweather.rra.go.kr.

## Strengthening domestic and oversea cooperation network on space weather

KSWC is responsible for managing space weather risk. The responsibilities include mitigating the space weather risk by cooperating with government agencies and allocating roles to appropriate fields of academia and industry as well as strengthening preventive measures. Equally important, the center has developed accurate prediction models and built an international cooperation network with such organizations as NOAA and NICT for improvement in its forecast and alert service. These efforts have enabled the center to effectively manage space weather events like solar flare.

**KSWC joining in International Space Environment Service (ISES)**

KSWC became the 14th regional warning center (RWC) of International Space Weather Service (ISES) in November, 2011. As a RWC member of ISES representing Korea, KSWC is on official duty defined by ISES, including collecting space weather observation data, exchanging observation data and analyzed information with warning centers of other countries, providing space weather forecast and alert services in Korea.


# National Radio Research Agency is Always with You

We are committed to ensuring good broadcasting and communications services benefit all the people safely.
For more information, such as reports of research projects and civil complaints regarding certification for broadcasting or communications equipment, please visit the RAA's website

www.rra.go.kr

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