



Status of Radio Spectrum Managements in Korea

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**ETRI(Korea Electronics and Telecommunications Research Institute)
located in the middle of S. Korea (distance 120 km from Seoul)
about 2,000 peoples work in all IT field(Radio Telecomms, etc)
(for more details <http://www.etri.re.kr>)**





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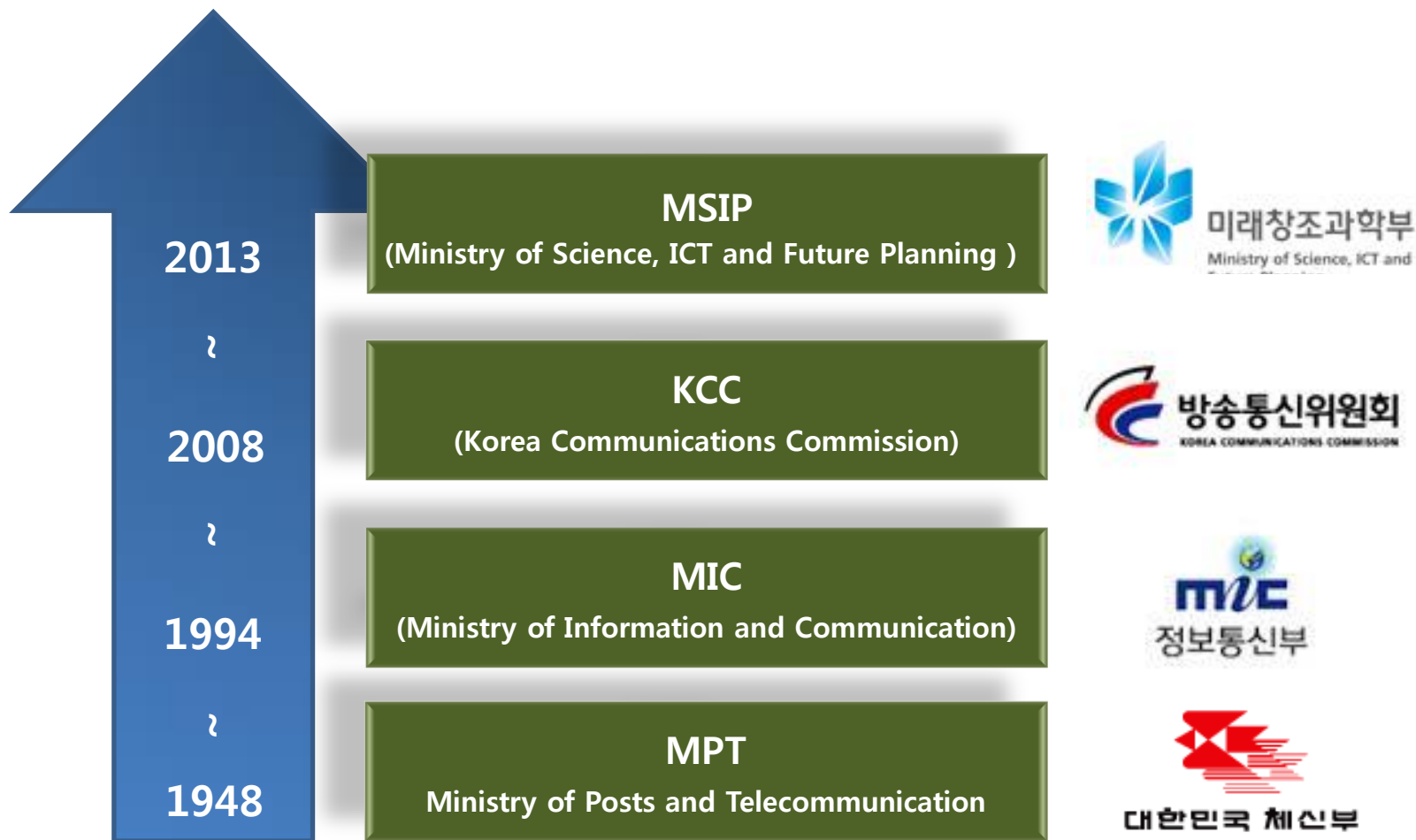
- I. Brief History of Spectrum Management in Korea
- II. Introduction of Handheld Radio Monitoring System
- III. Introduction of Transportable Radio Monitoring System

I. Brief History of Spectrum Management in Korea





History of Spectrum Management in Korea



Vice Minister I

Office of Planning and Coordination

Office of Future Leading R&D Policy

Deputy Minister for Science & Technology Coordination

Science and Technology Policy Bureau

R&D Coordination Bureau

Performance Evaluation Bureau

Vice Minister II

Office of Broadcasting and Communications Convergence Policy

Telecommunications Policy Bureau

ICT Industry Bureau

IT Strategy Bureau

Convergence Policy Bureau

Broadcasting Promotion Policy Bureau

Radio Policy Bureau

Affiliated Institutions

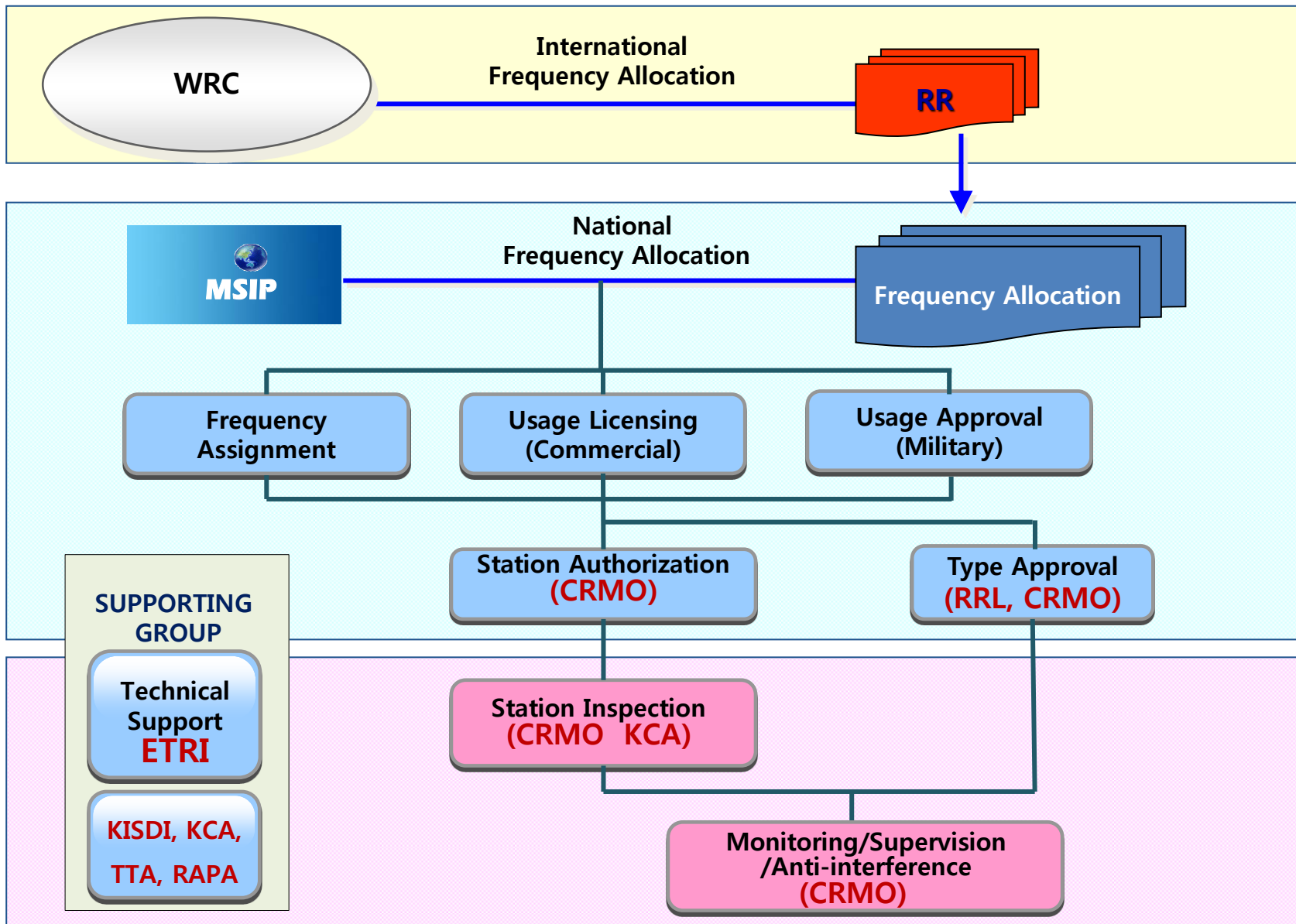
CRMO

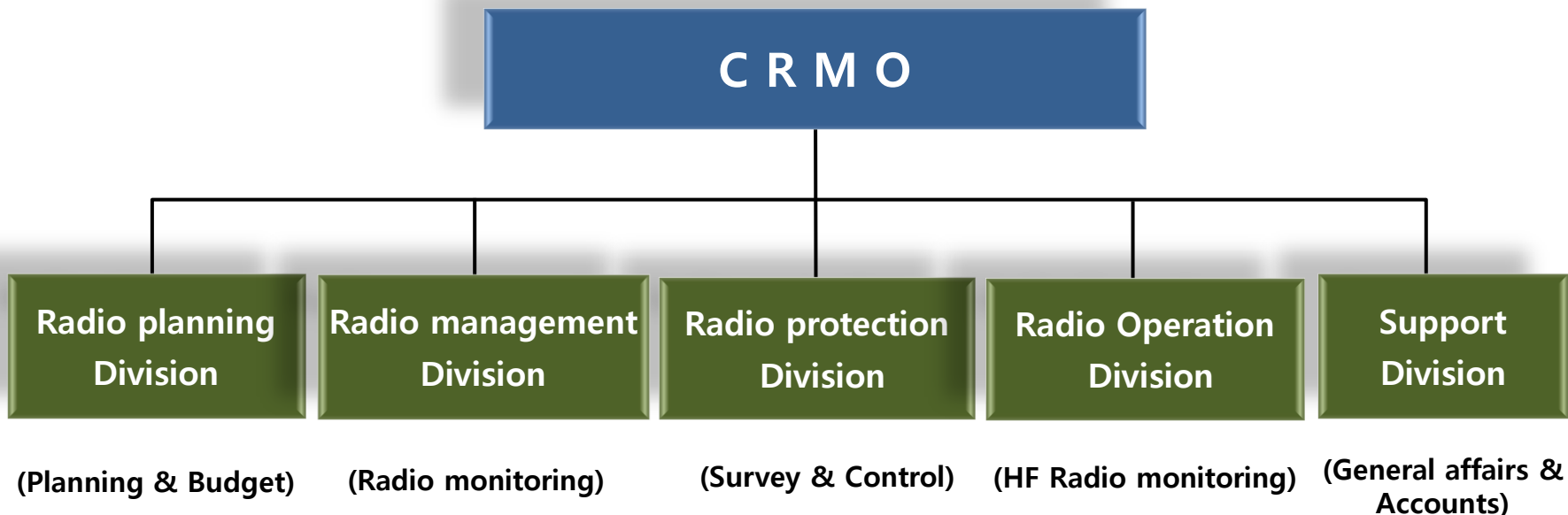
RRA

Radio Policy Planning Division

Radio and Broadcasting management Division

Spectrum Policy Division





Regional Branches

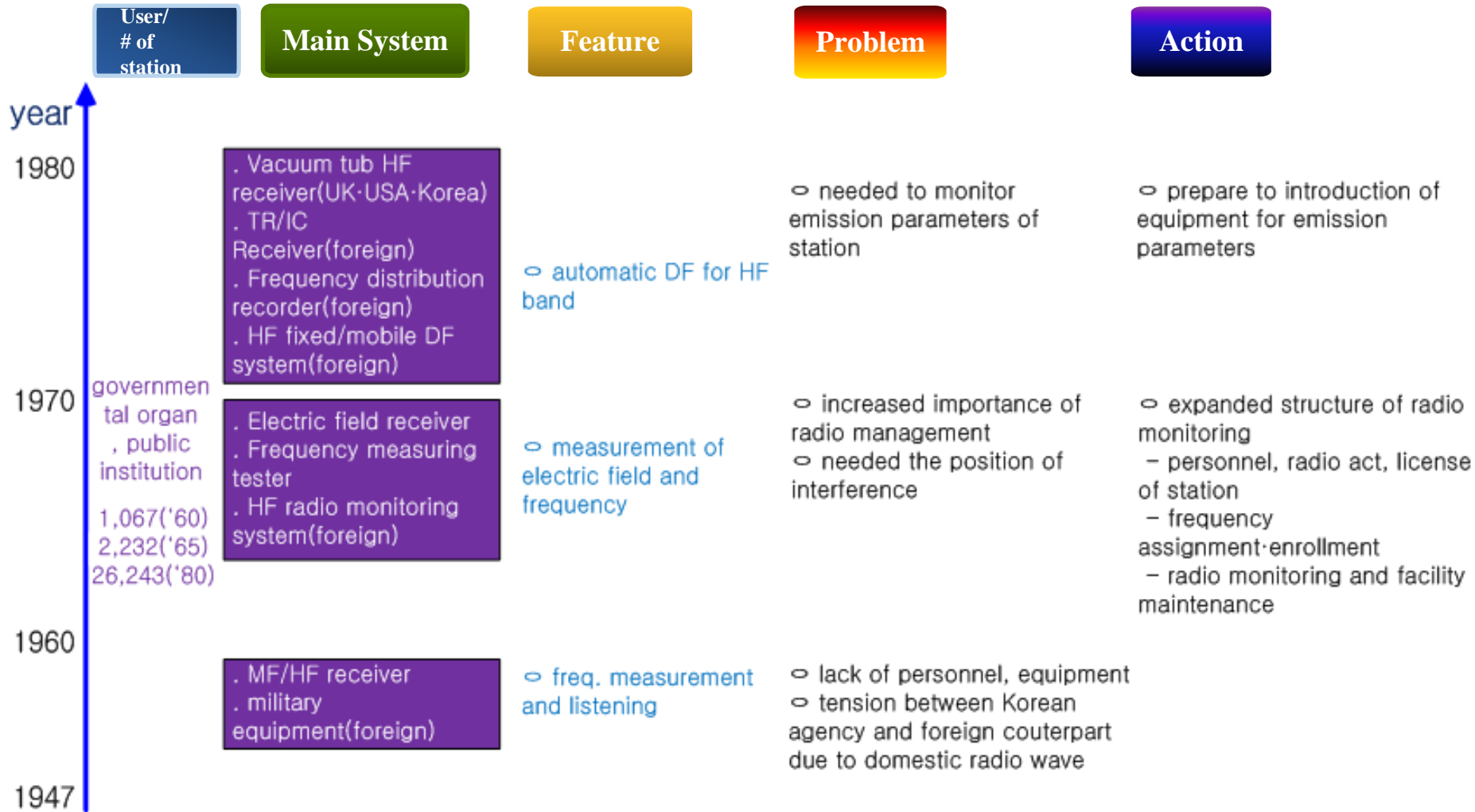
Satellite
Radio
Monitoring
Centre

Regional Offices (10) : Seoul, Busan, Kwanju,
Kangneung, Daejeon, Jeju, Ulsan,
Daegu, Jeonju, Cheongju



History of Radio Monitoring in Korea

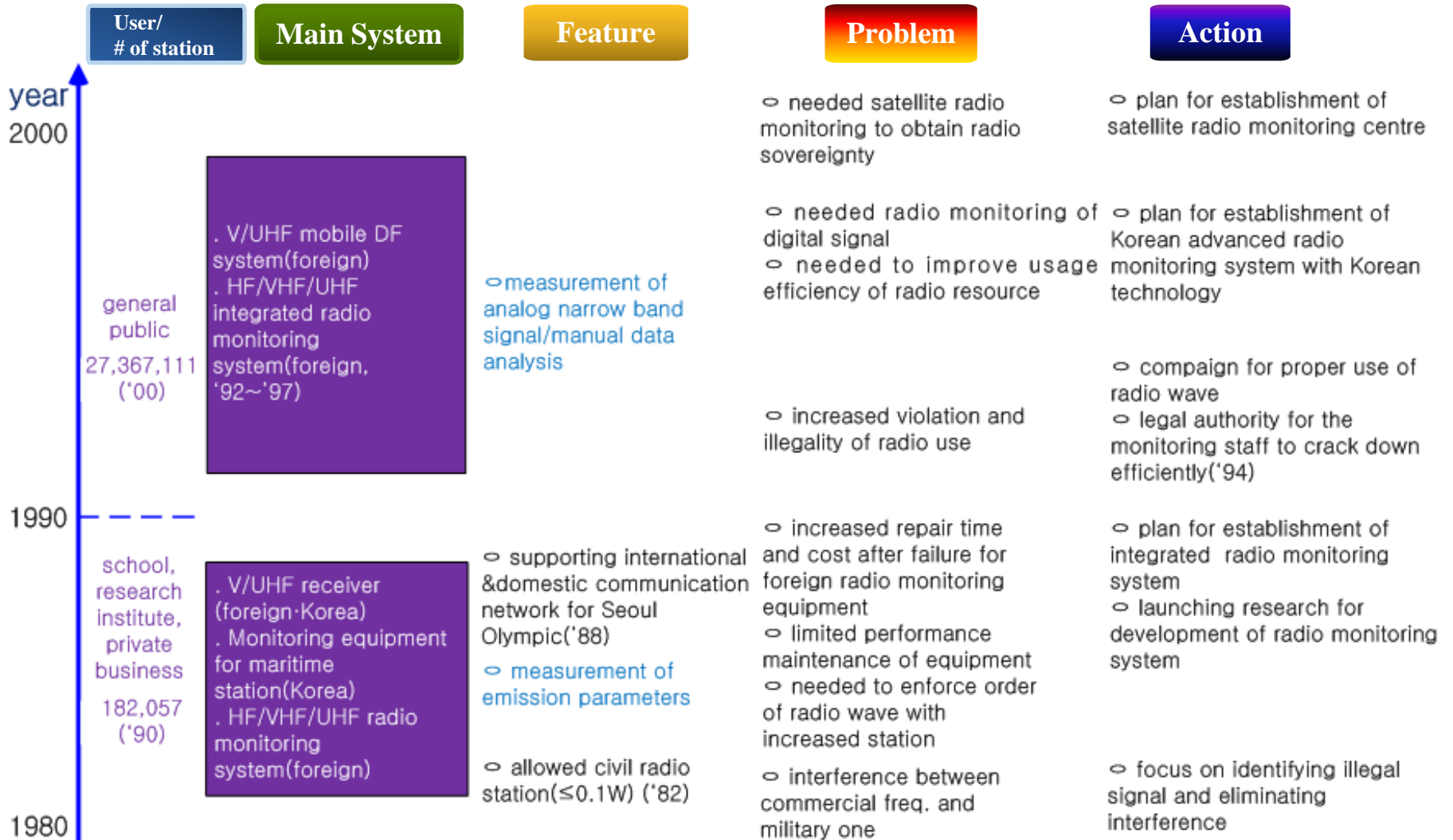
Phase I





History of Radio Monitoring in Korea

Phase II



Phase III

	User/ # of station	Main System	Feature	Problem	Action
year 2012	Person, thing 53,810,131 ('11)	<ul style="list-style-type: none"> . HF/VHF/UHF advanced radio monitoring system(Korea, '05~) . Satellite radio monitoring system 	<ul style="list-style-type: none"> o measurement of high frequency, wideband, low power, digital signal/automatic data analysis 	<ul style="list-style-type: none"> o needed to deal with high frequency, wideband, low power, digital signals o needed to improve usage of radio wave 	<ul style="list-style-type: none"> o development of Korean transportable radio monitoring system('11~'12) o development of Korean mobile/handheld radio monitoring system('05~'10) o survey of spectrum utilisation ('06)
2000			<ul style="list-style-type: none"> o double shift to work 24/7 only during the day time('04) 		



II. Introduction of Handheld Radio Monitoring System



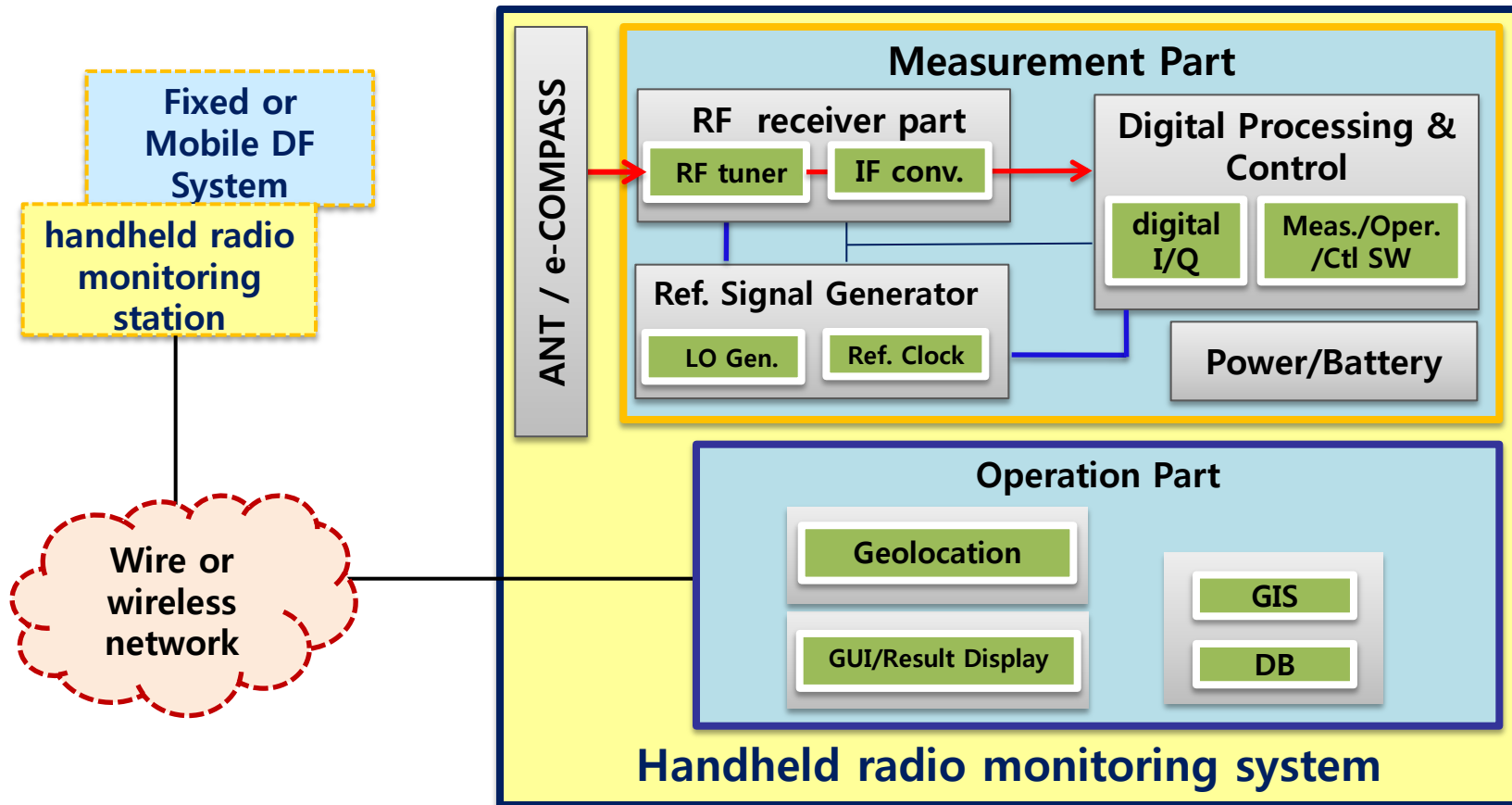
Background

- Proximity monitoring of signals with a high freq. and a low power
- Spectrum sharing in ISM band to maximize spectrum usage
- Key role of USN(Ubiquitous Sensor Network) and Digital Home industry

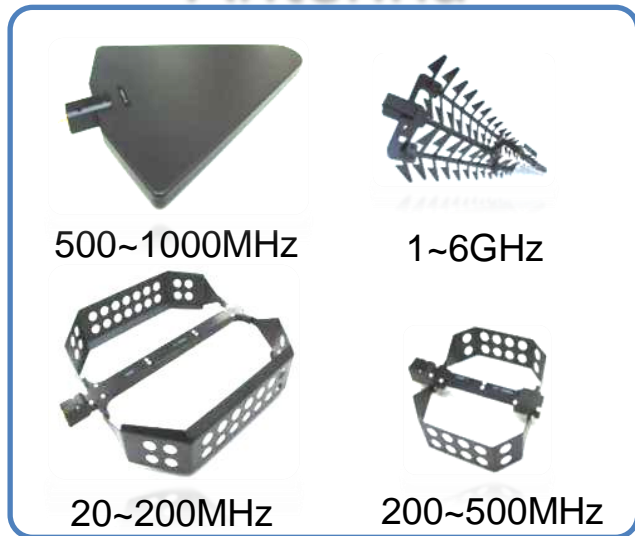


● Features

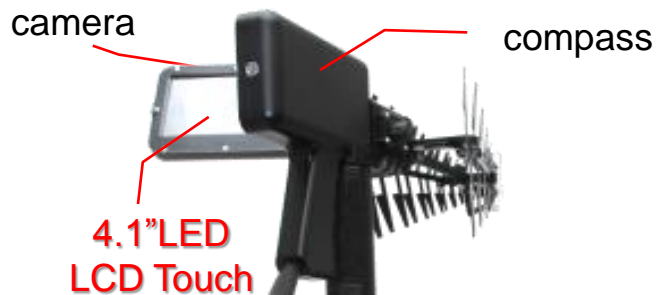
- Main Functions : Portable Direction Finding, Emission Parameters Meas. & Demodulation, Wideband Spectrum Measurement
- Connection with Mobile & Fixed Monitoring Systems
- Target Frequency : 20MHz ~ 6GHz with IF BW of 10MHz
- Power Consume : less than 25W which can operate more than 3 hours
* @Sleep Mode : less than 2W



Antenna



Antenna Part



Receiver Part





- Frequency range : 20 ~ 6,000 MHz
- IF bandwidth : 10 MHz
- Frequency Accuracy : 0.1ppm
- Sensitivity(@DANL*) : <-160dBm/Hz (@3GHz)
- Operating time : 3.5 hr**
- Size : 270(W) x 196(D) x 84.8(H) mm
- Weight : 3.7 kg(Li-ion Battery Included)
- Display : 7 " /4.1 " LED touch (16Mega color, 800 × 480)
- Built-in Device : GPS, e-compass, Wi-Fi, camera (2Mega)

* DANL : Displayed Average Noise Level

** Operating condition



- **Emission parameters measurement with wideband scan**
- **Spurious measurement**
 - ↳ Spurious emissions & harmonics
- **Illegal frequency detection**
- **DF(Direction Finding) homing and Geolocation**
 - ↳ DF polar, DF azimuth vs. level
 - ↳ DF accumulative azimuth vs. level
 - ↳ Geographic map display
- **Operation mode**
 - ↳ Fixed frequency mode
 - ↳ Memory & frequency scan mode
 - ↳ Wideband detection mode



● Multi-Functional Radio Monitoring

- ↗ Emission parameters measurement with wideband scan
- ↗ Spurious measurement, Illegal frequency detection
- ↗ Direction finding

● Operation with Editable Data Base

- ↗ Stand-alone operation only with auxiliary monitor
- ↗ Quick search for authorized frequency with licensing data base

● Smart Navigator for Emitter

- ↗ Built-in GPS, compass and electric map (option)
- ↗ Geolocation via remote control for fixed & mobile station

● Easy-to-Use GUI and Easy Accessible Wireless Environment

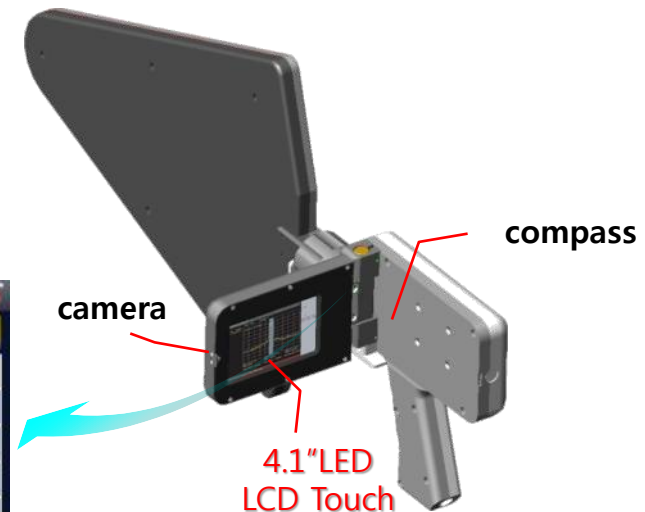
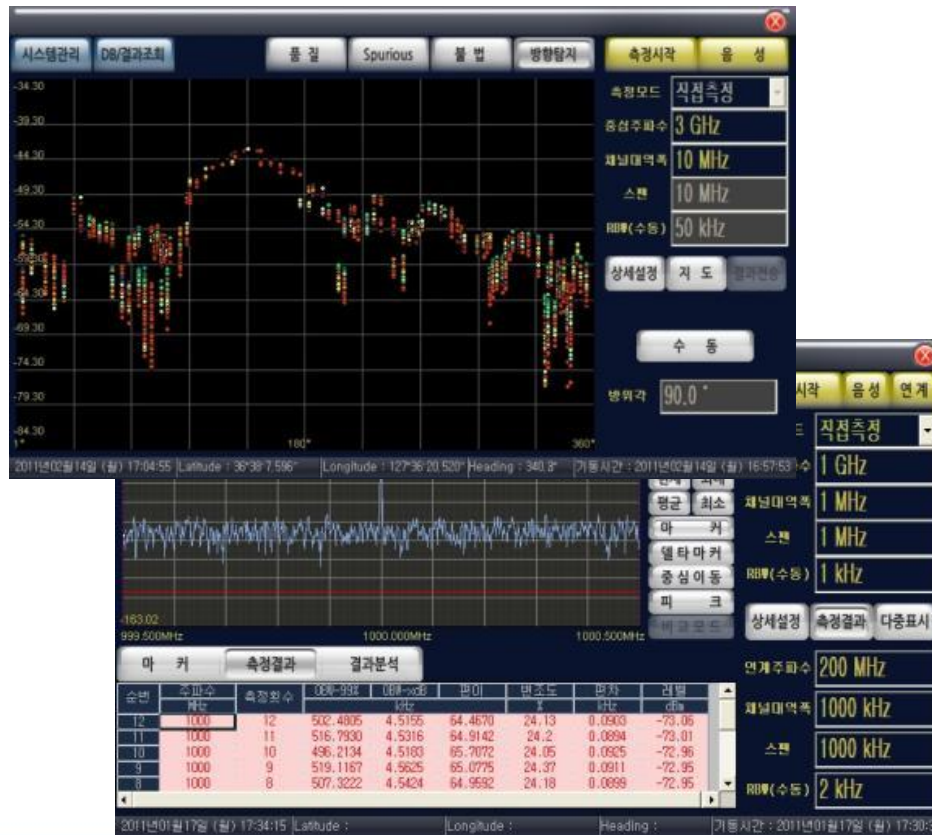
- ↗ Full touch LED LCD Dual display
- ↗ Built-in WiFi & supporting a variety of wireless modem

● Others

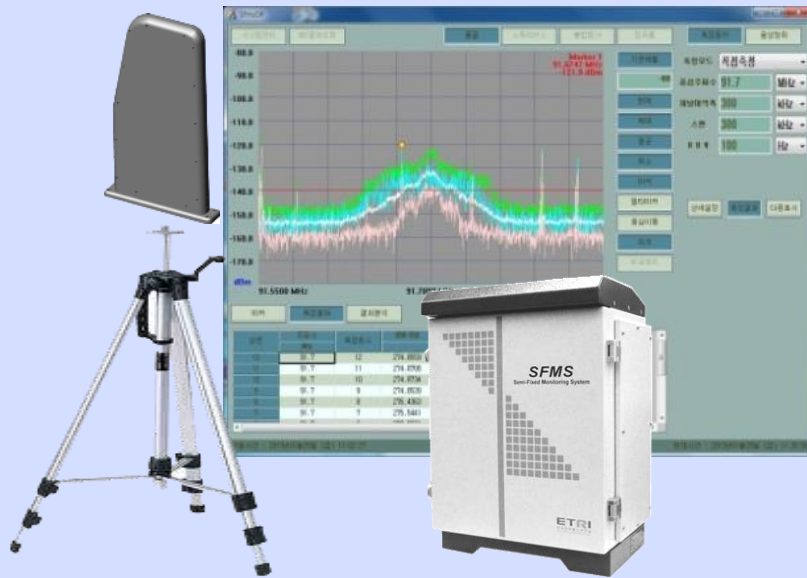
- ↗ Flexible HW platform via USB 2.0 port
- ↗ Supporting power saving mode, swappable battery

- **User Friendly Operation**

- Easy operation with auxiliary monitor(4.1 ") in line with the direction of measurement
- Radio monitoring and DF though auxiliary touch LED LCD monitor
- built-in camera

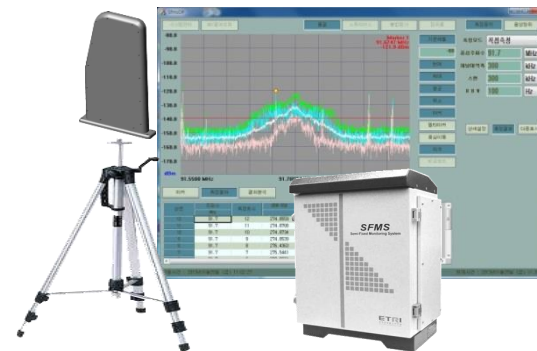
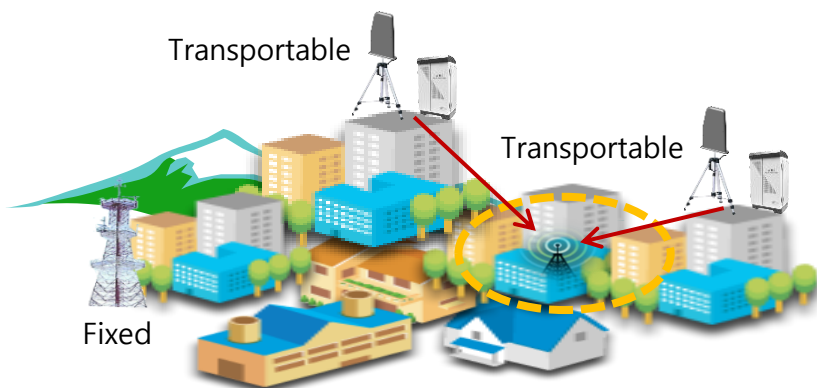


III. Introduction of Transportable Radio Monitoring System



Background

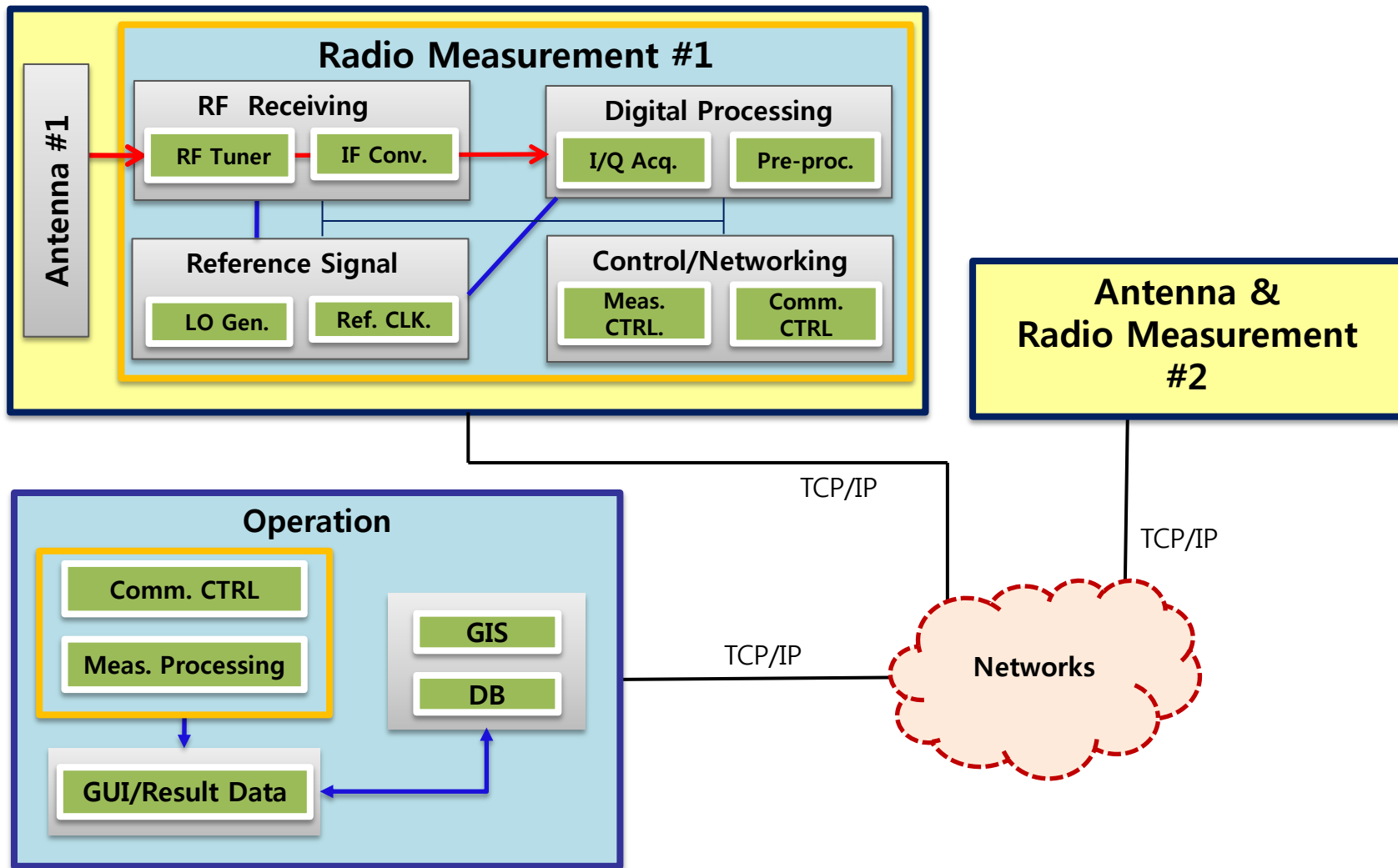
- Need of proximity monitoring all the time to respond the trends of signals with a high freq. and a low power

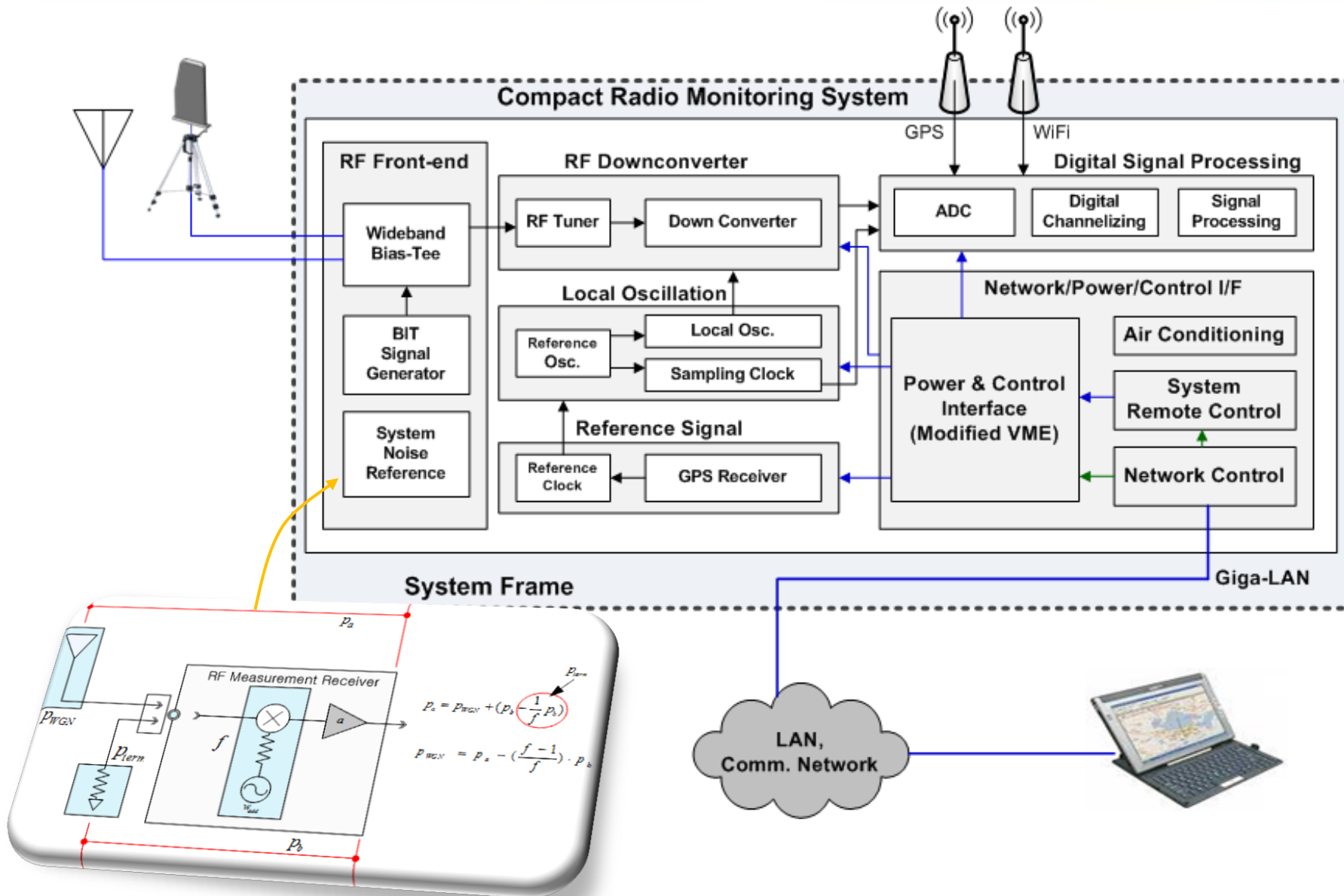


TRANSPORTABLE MONITORING SYSTEM

Features

- 24/7 monitoring near the target located at the shadow area and dense area
- Install at the top of a building and tower with a small scale
- Main functions : Emission parameters meas., illegal signal search, spectrum occupancy, Environmental Noise Measurement
- Target Frequency : 20MHz ~ 6GHz with max IF BW of 25







20MHz~6GHz
Omni-Directional

**Antenna
Part**



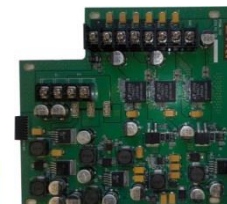
Front



Side



Bottom



**Measurement
System**

Items	Existed Fixed Monitoring System ['05 ~]	Transportable Monitoring System ['13~]
Frequency Range	20 MHz ~ 3 GHz	20 MHz ~ 6 GHz
IF BW	10 MHz	25 MHz
Measure Channel	4 Channels	1 Channel
Specification	<ul style="list-style-type: none"> - Large, High Power Consume - Fixed Setup on a metal Tower - In-door Installed Receivers - Radio Quality, Illegal Radiation - Freq. Occupancy Measure - Installed with Direction Finder 	<ul style="list-style-type: none"> - Small, Light, Low Power Consume - Flexible Deploy on the Rooftop etc. - Out-door Installed Receiver - Increased Receiving sensitivity - Radio Noise Analysis - GPS Disciplined Frequency Reference

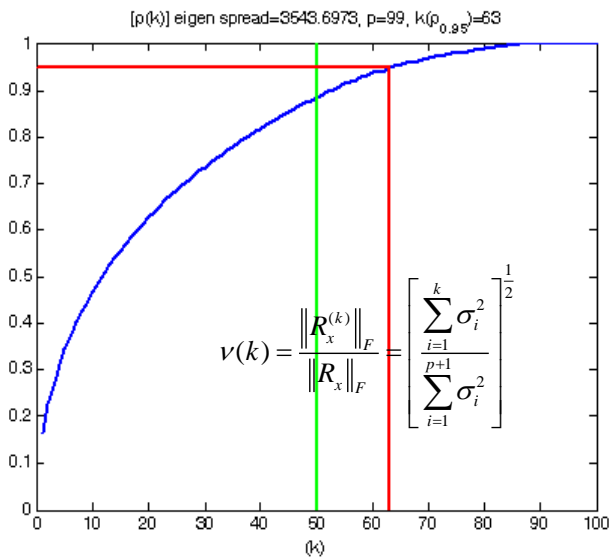


- Frequency range : 20 ~ 6,000 MHz
- IF bandwidth : 25 MHz
- Frequency Resolution : 1 Hz
- Frequency Accuracy : 0.1 ppm (0.03ppm@GPS)
- 3rd IIP3* : > 12 dBm typ.
- Noise Figure : < 14 dB typ.
- Phase Noise : < 95 dBc/Hz @ 10 kHz
- Sensitivity(@DANL*) : < -160 dBm/Hz typ.
- Size : < 360(H)x300(W)x200(D) mm
- Weight : < 10 kg

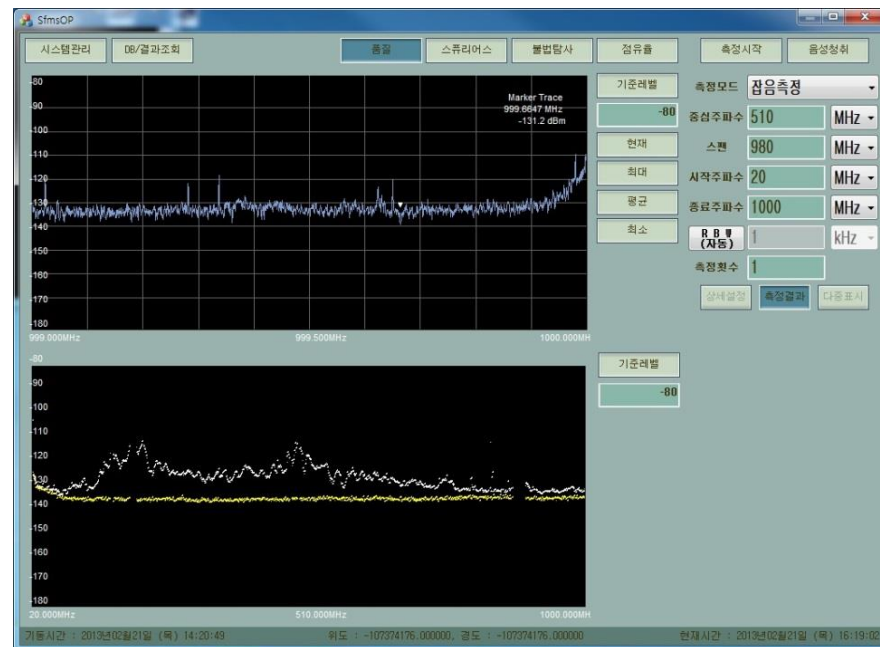
* IIP3 : Input 3rd Order Intercept Point

Radio Noise Measurements & Analysis

- Reference Values to Spectrum Engineering & Monitoring Activities
- Rec. ITU-R SM.1753 - Method for measurements of radio noise
- Measurement Threshold Level



Eigen Value Analysis



Capture of Measurement Example

Importance of Spectrum Monitoring

- It is encouraging to use SRD device and develop sharing technology in order to enhance efficiency in the management of radio resources.
- In order to prevent a side effect of deregulation which promotes frequency utilization, it is important to strengthen monitoring after licensing.
- A radio monitoring allows us to promote and spread the industry related to radio wave.

Radio Monitoring in Korea

- Korean radio monitoring systems have been deployed successfully with recent IT technology for the last 7 years. Now we have a total solution compliant with international recommendations.
- As a result, the number of violation stations and illegal stations has been decreased since 2005 with a successful operation of Korean monitoring system.

Дуже дякую

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