

Status of Radio Spectrum Managements in Korea

2013. 07. 10. ~ 2013. 07. 12

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ETRI

(Electronics & Telecomms Research Institute)

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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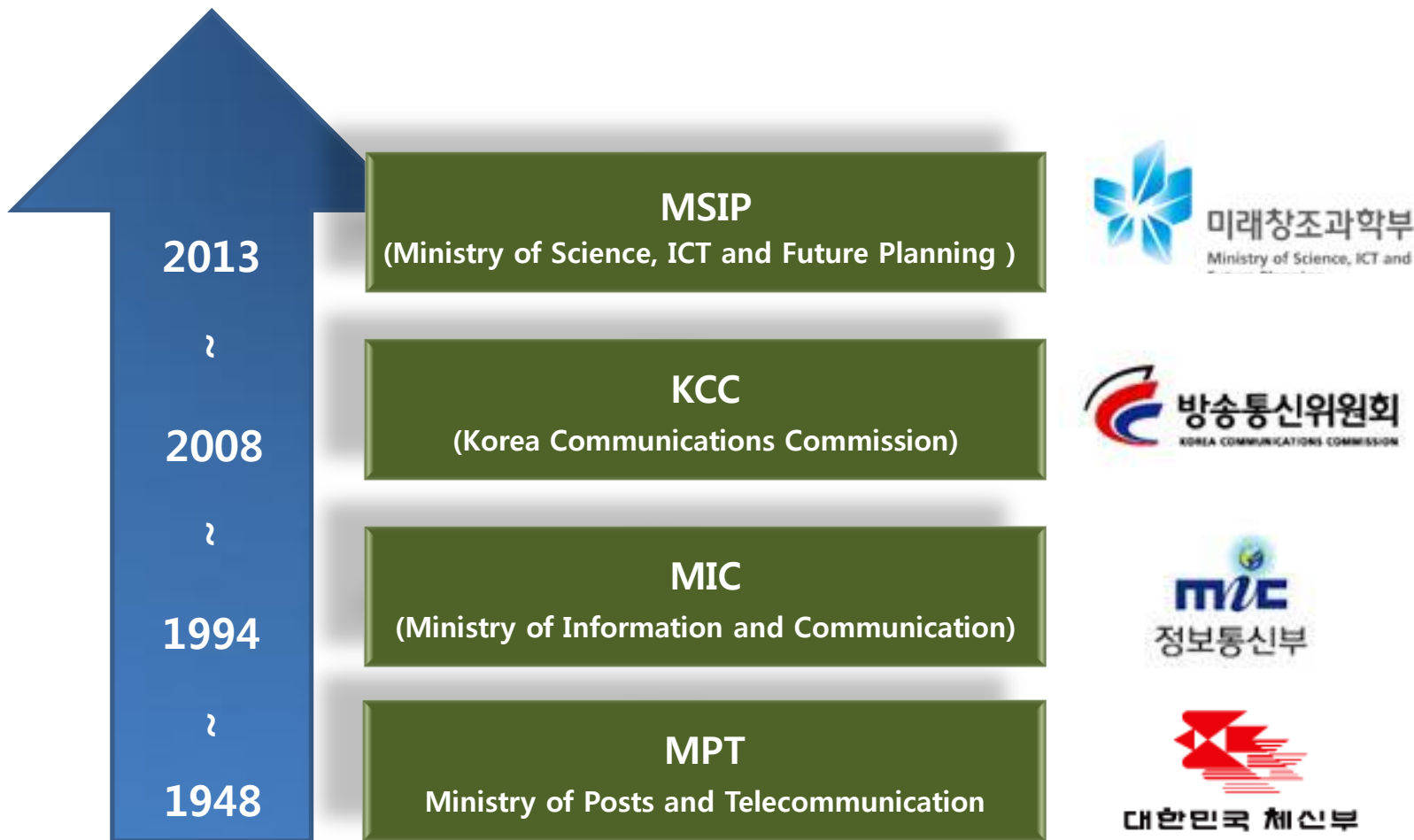
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- II. Introduction of Handheld Radio Monitoring System
- III. Introduction of Transportable Radio Monitoring System

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

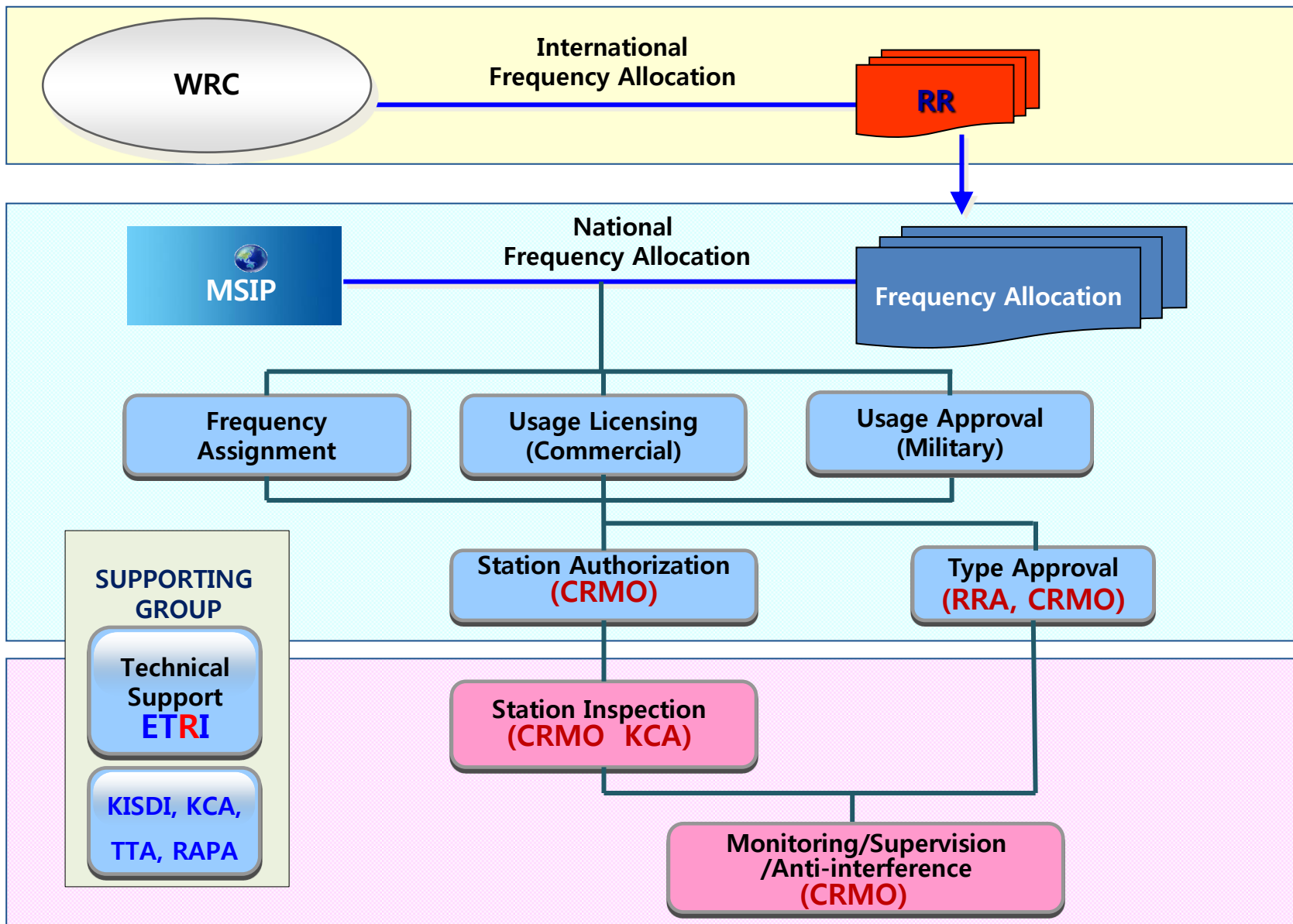
RRA

Radio Policy Planning Division

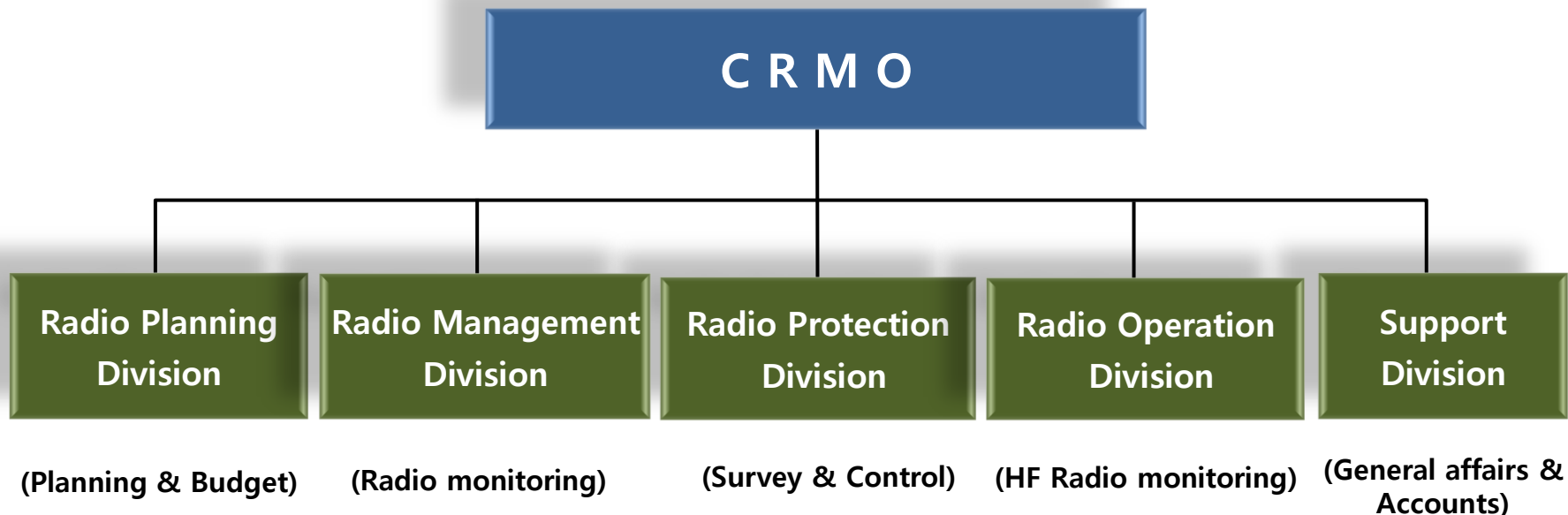
Radio and Broadcasting management Division

Spectrum Policy Division

* MSIP (<http://www.msip.go.kr>), CRMO (<http://www.crmo.go.kr>), RRA (<http://www.rra.go.kr>)



* KISDI (www.kisdi.re.kr), KCA (www.kca.kr), TTA (www.tta.or.kr), RAPA (www.rapa.or.kr)



Regional Branches

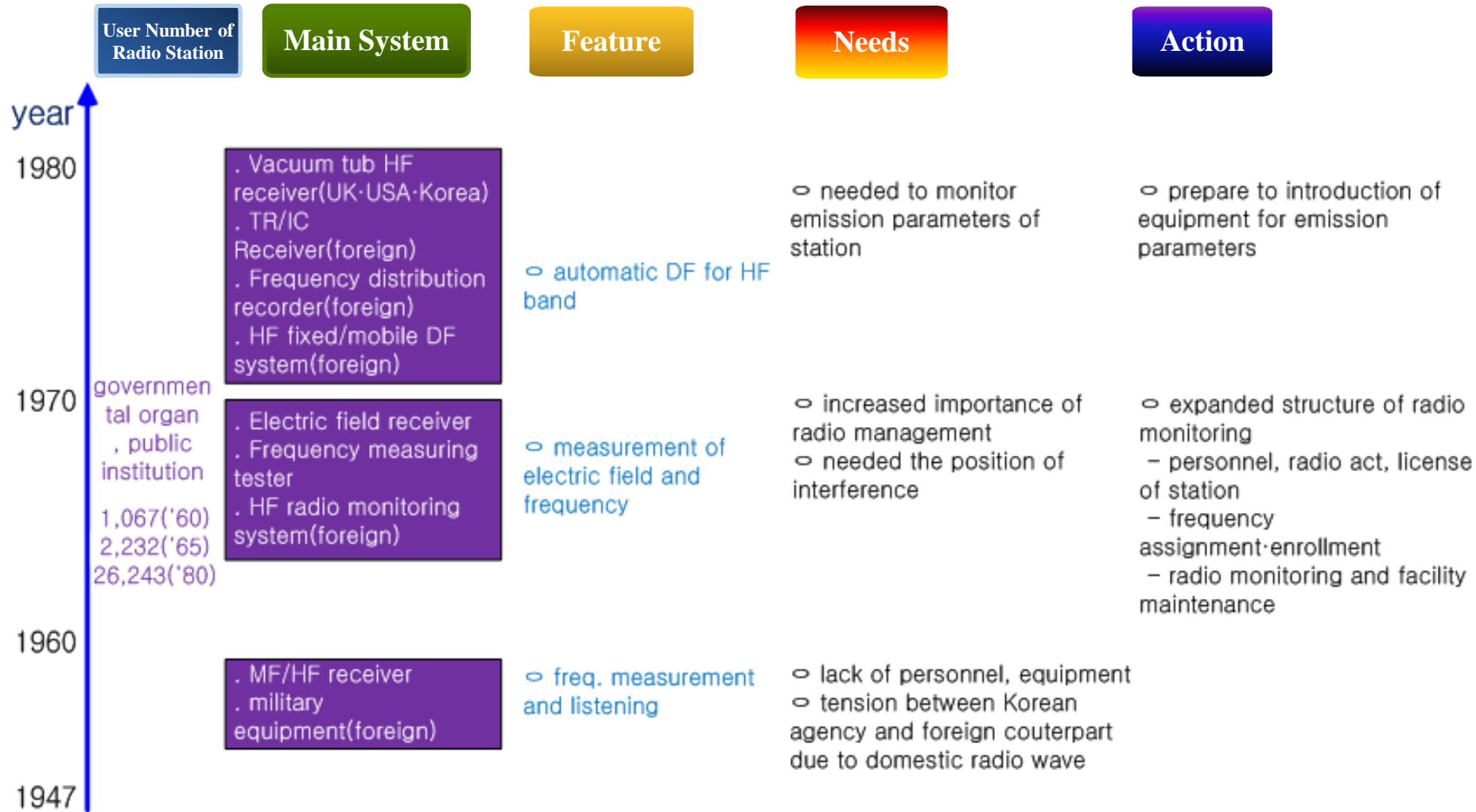
Satellite
Radio
Monitoring
Centre

Regional Offices (10) : Seoul, BuSan, KwangJu,
KangNeung, DaeJeon, JeJu, UISan,
DaeGu, Jeonu, Cheongu



History of Radio Monitoring in Korea

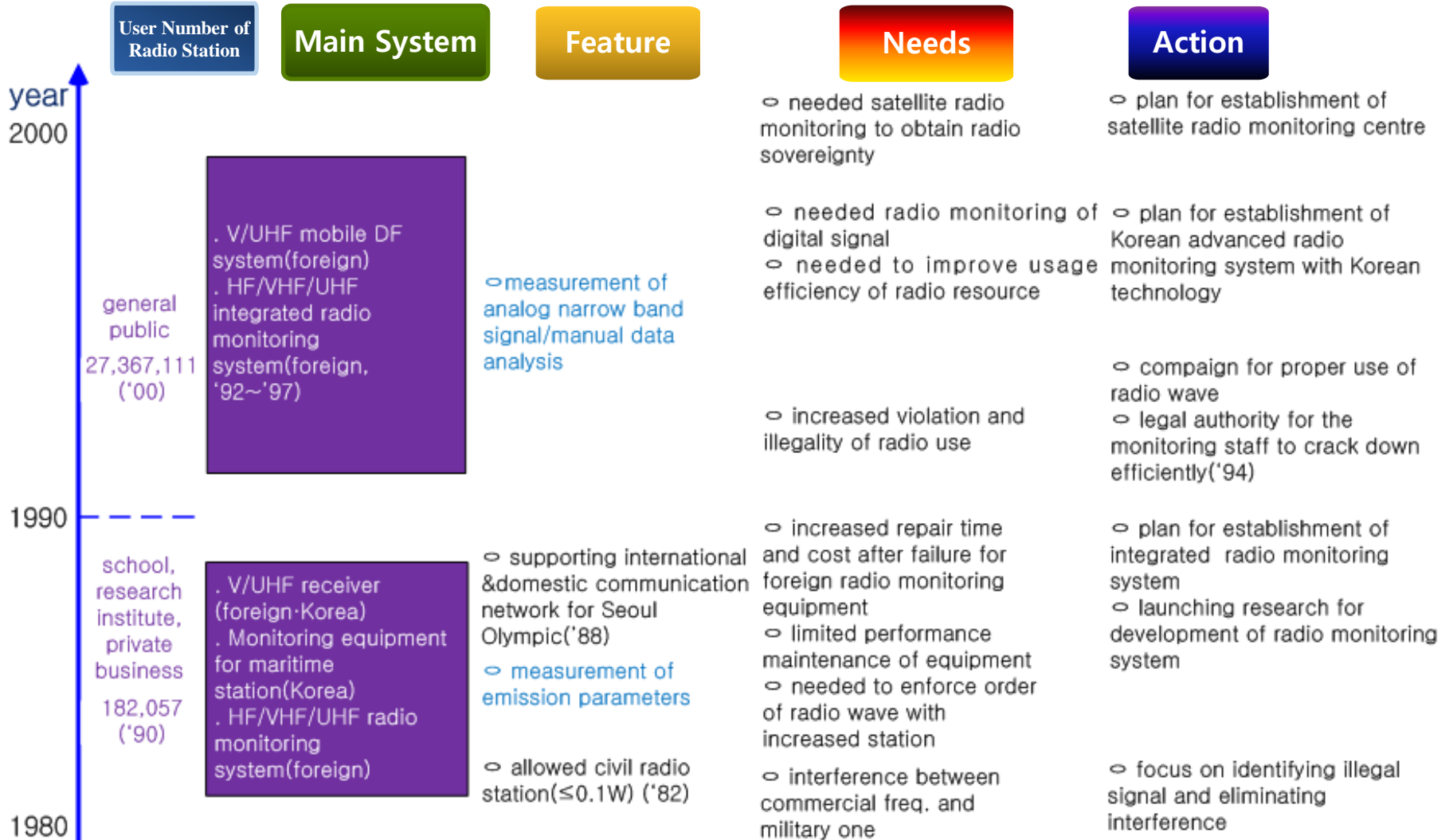
Phase I





History of Radio Monitoring in Korea

Phase II



Phase III

| | User Number of Radio Station | Main System | Feature | Needs | Action |
|---|------------------------------|---|---|---|--|
| year 2012 Person, thing 53,810,131 ('11) | | . HF/VHF/UHF advanced radio monitoring system(Korea, '05~) . Satellite radio monitoring system | ○ measurement of high frequency, wideband, low power, digital signal/automatic data analysis ○ double shift to work 24/7 only during the day time('04) | ○ needed to deal with high frequency, wideband, low power, digital signals ○ needed to improve usage of radio wave | ○ development of Korean transportable radio monitoring system('11~'12) ○ development of Korean mobile/handheld radio monitoring system('05~'10) ○ survey of spectrum utilisation ('06) |
| 2000 | | | | | |



II. Introduction of Handheld Radio Monitoring System



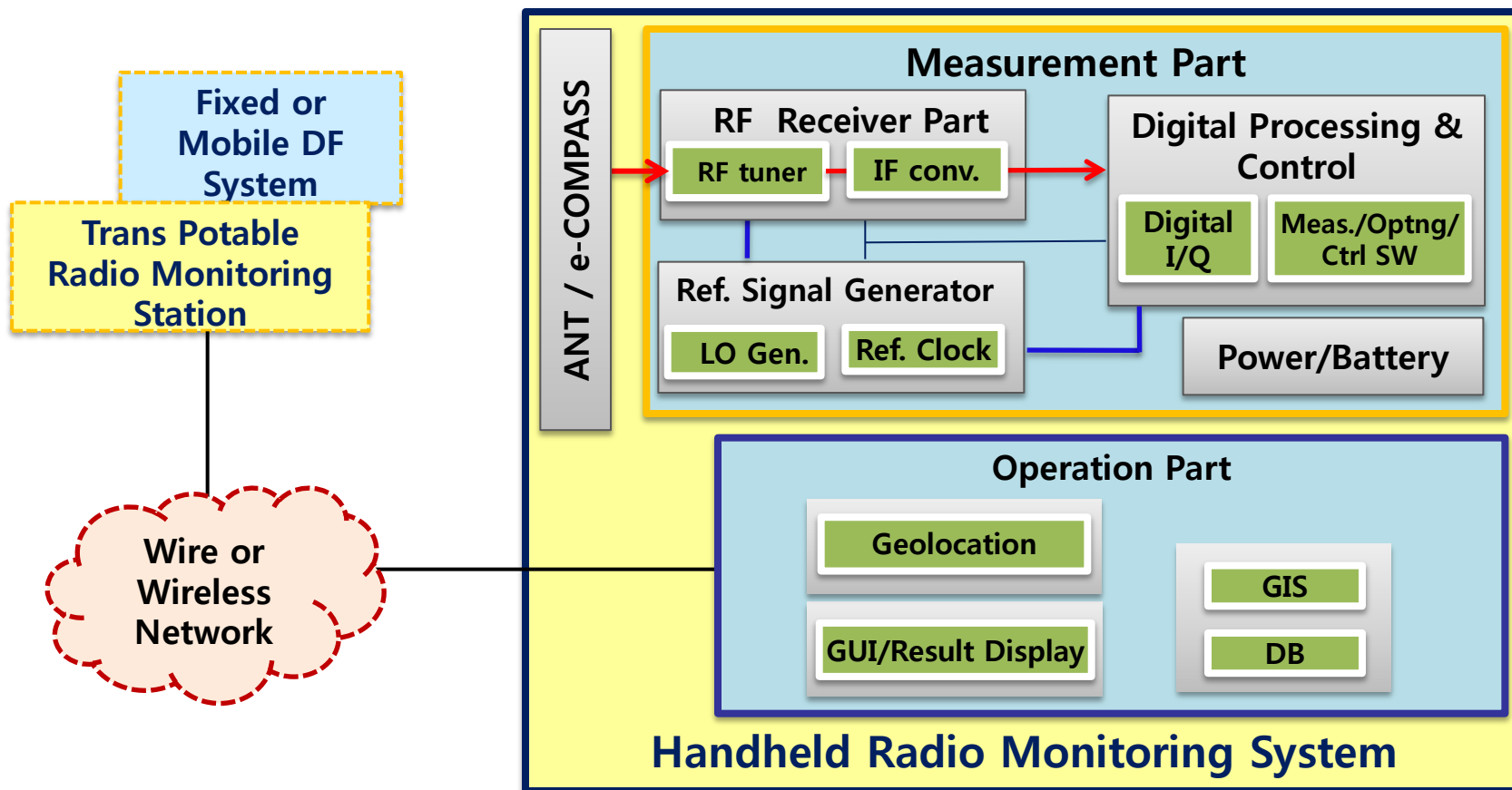
Background

- Proximity Monitoring of Signals with a High Freq. and a Low Tx Power
- Spectrum Sharing in ISM Band to Maximize Spectrum Usage
- Key Role of USN(Ubiquitous Sensor Network) and Digital Home Industry



● Features

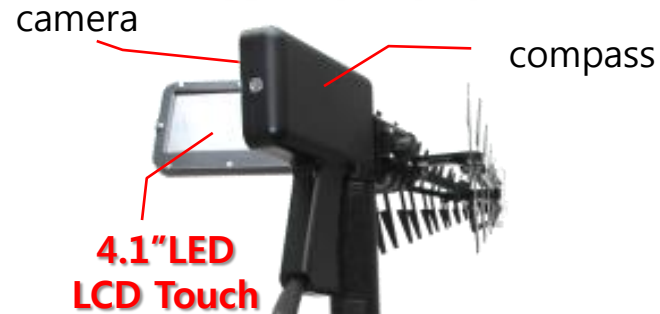
- Main Functions : Portable Direction Finding, Emission Parameters Meas. & Demodulation, Wideband Spectrum Measurement
- Connection with Mobile & Fixed Monitoring Systems on CRMO
- Target Frequency : 20 MHz ~ 6.0 GHz with IF BW of 10MHz
- Power Consume : less than 25W which can operate more than 3 hours
* @Sleep Mode : less than 2W



4 Antennas



Antenna Part



Receiver Part





- **Frequency Range** : **20 MHz ~ 6.0 GHz**
- **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 with CRMO DB**
- **DF(Direction Finding) Homing and Geolocation @ Google Map**
 - ↳ 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 Radio 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 Access Environment

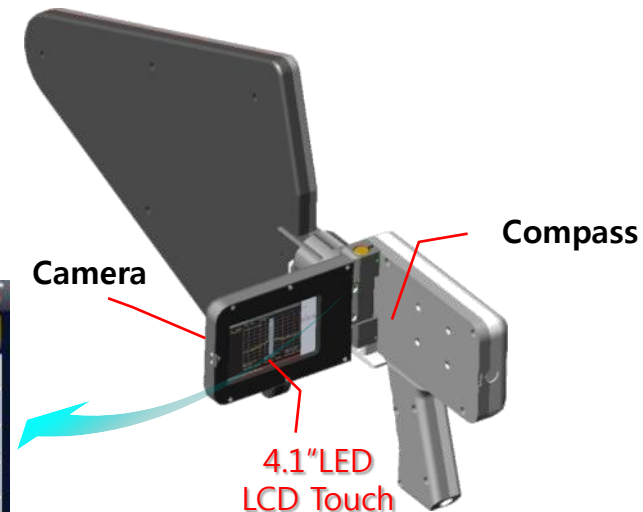
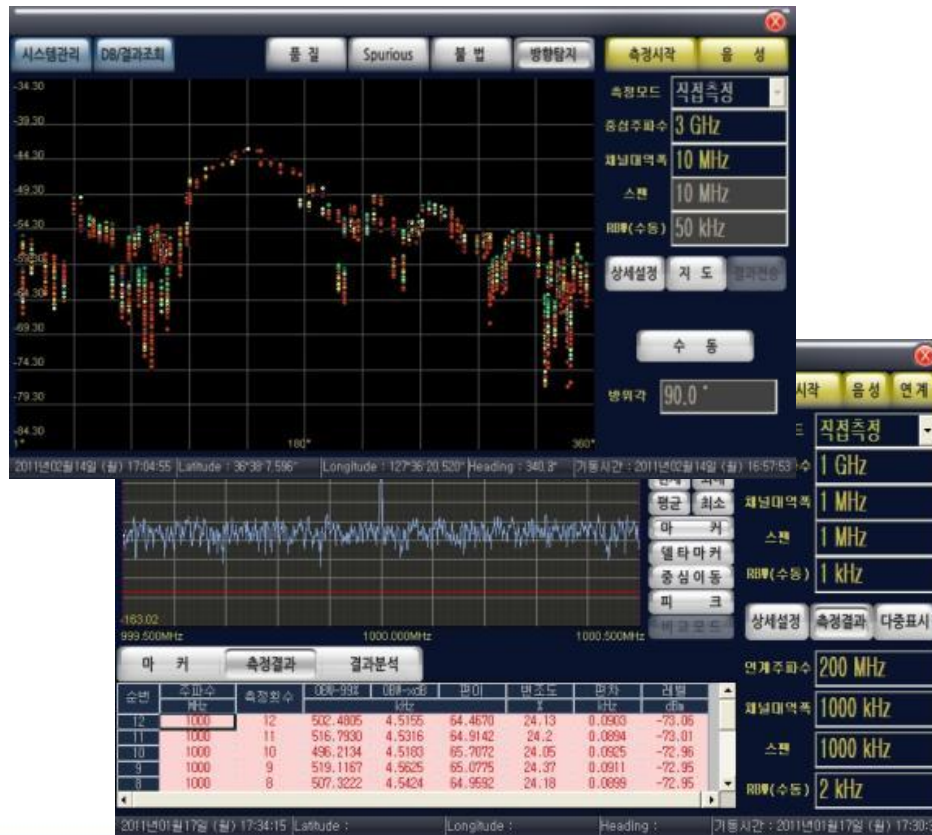
- ↗ Full touch LED LCD Dual display
- ↗ Using Built-in WiFi & supporting a Variety of **Wireless Modem**

● Others

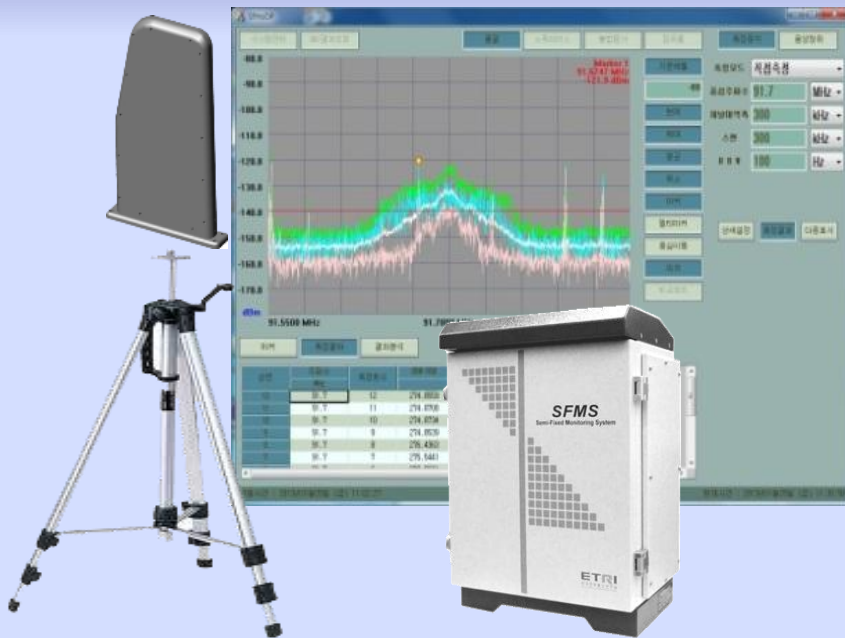
- ↗ Flexible HW Platform via **USB 2.0** Port
- ↗ Supporting Power Saving Mode, swappable battery

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

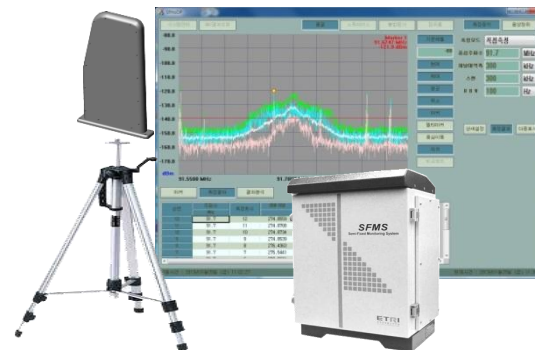
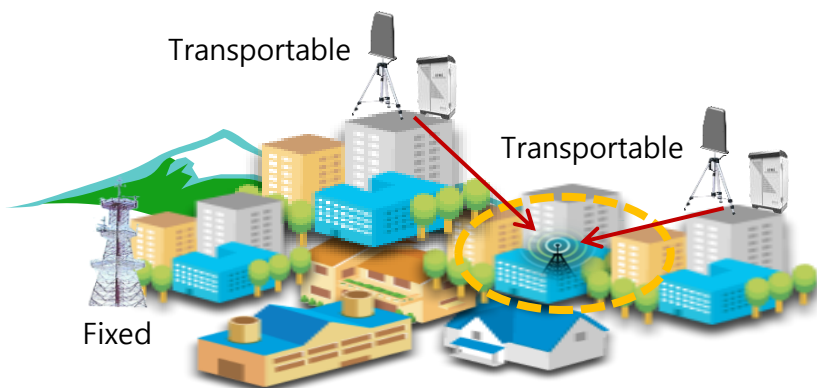


III. Introduction of Transportable Radio Monitoring System



Background

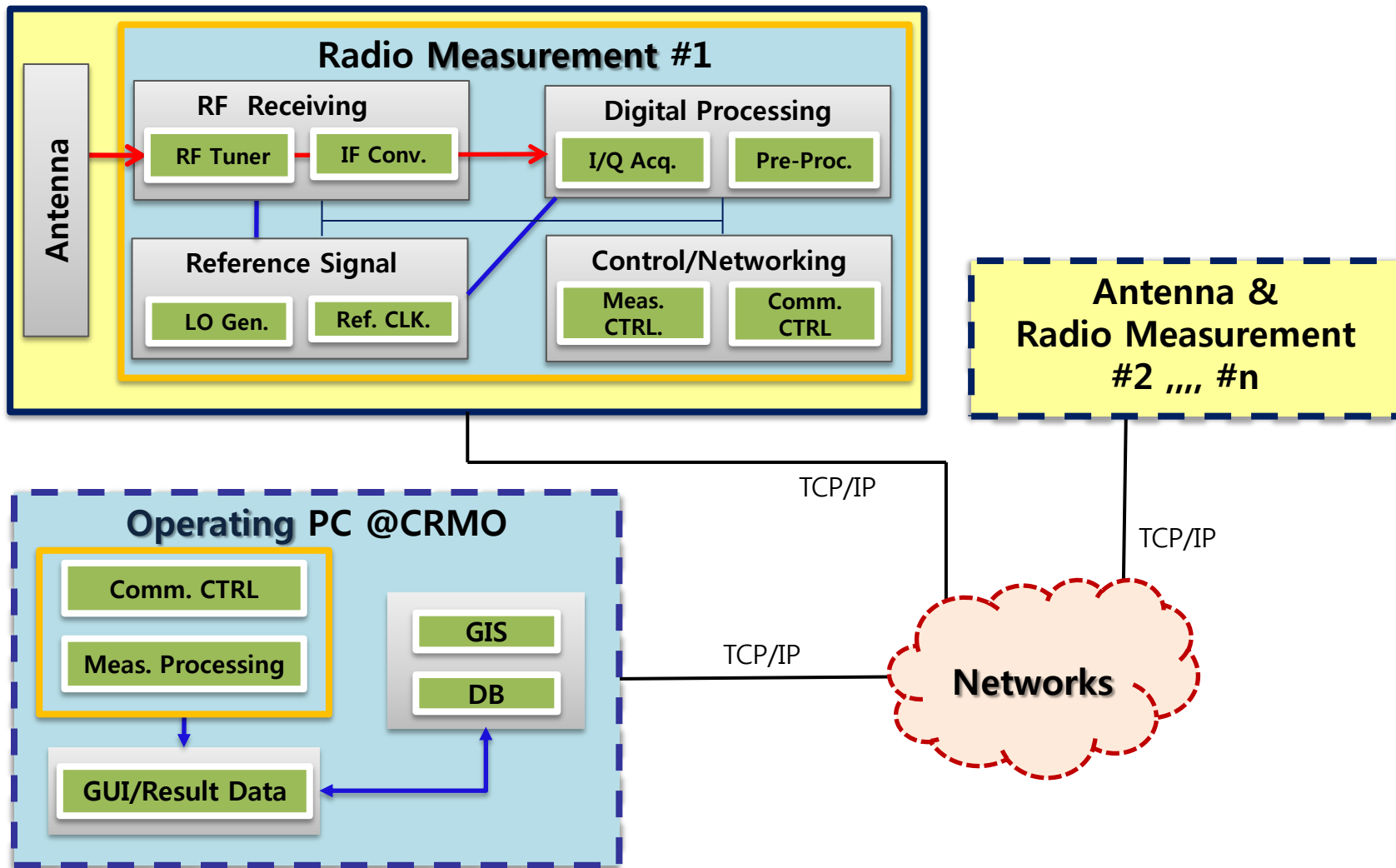
- Need of Proximity Monitoring **All the Time** to Respond the Trends of Signals with a High Freq. and a Low Power

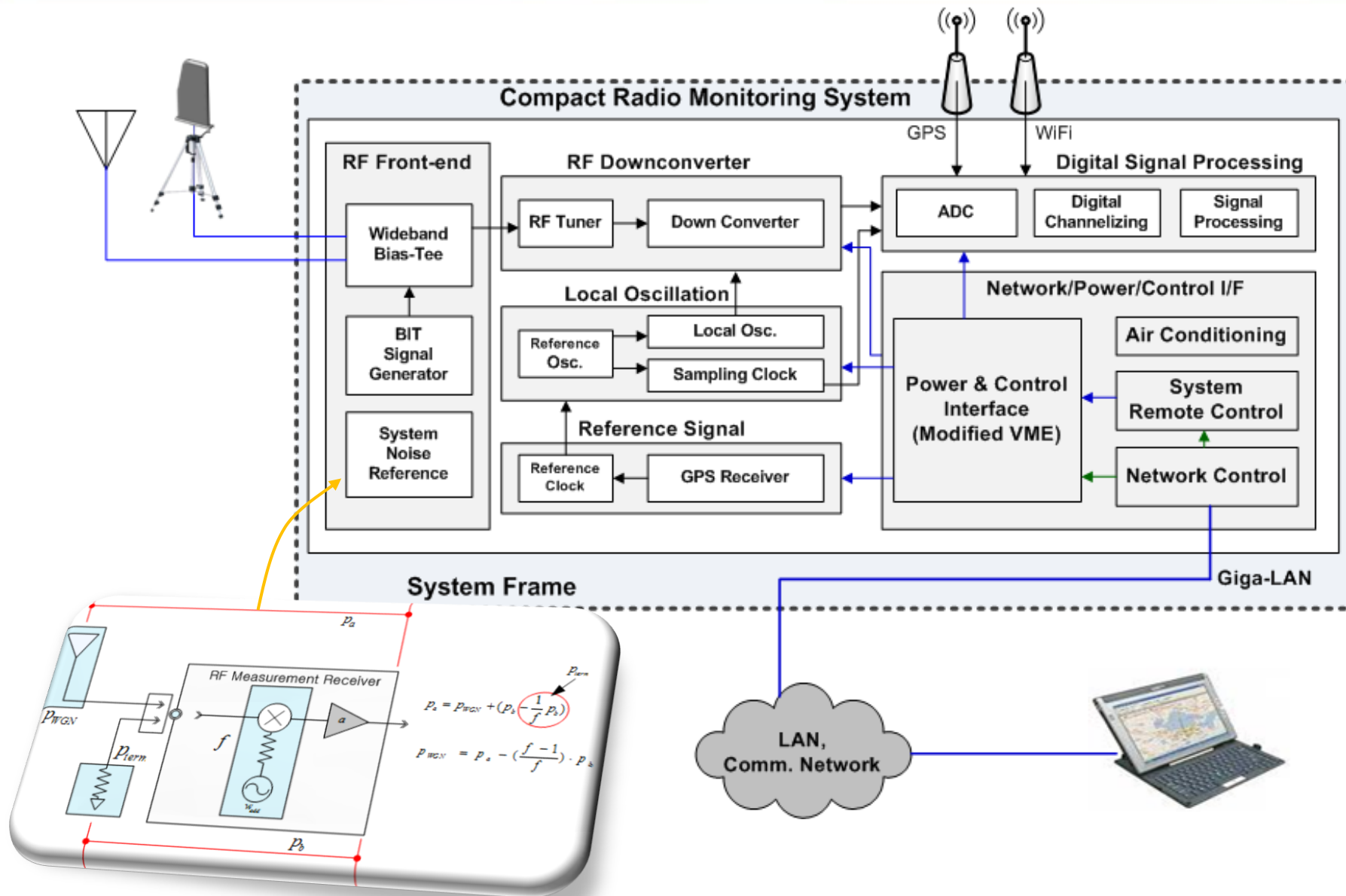


TRANSPORTABLE MONITORING SYSTEM

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 System
- Main Functions : Emission Parameters Meas., Illegal Signal Search, **Spectrum Occupancy**, Environmental **Noise Measurement**
- Target Frequency : 20MHz ~ 6.0 GHz with **Max IF BW of 25 MHz**







20MHz~6GHz
Omni-Directional
*Optional Extra ANT

Antenna Part



Front

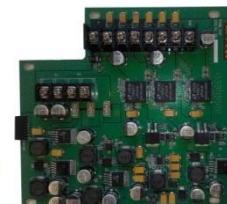
Measurement System



Side



Bottom



| Items | Fixed Monitoring System ('05 ~) | Transportable Monitoring System ('13 ~) |
|-----------------|--|---|
| Frequency Range | 20 MHz ~ 3.0 GHz | 20 MHz ~ 6.0 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 |

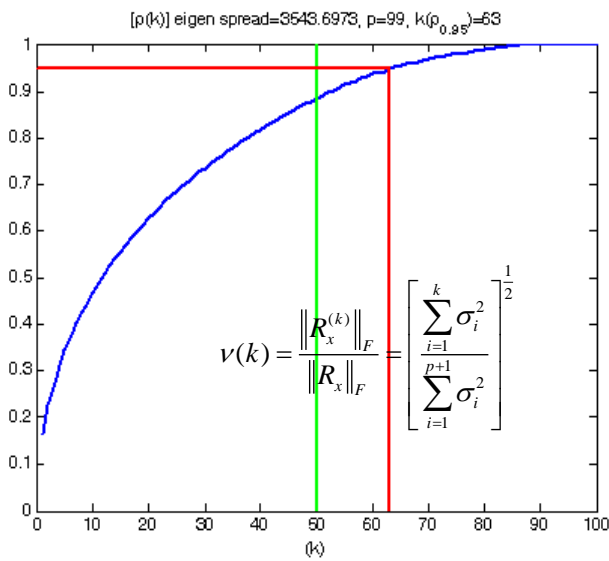


- **Frequency Range** : 20 MHz ~ 6.0 GHz
- **IF Bandwidth** : 25 MHz
- **Frequency Resolution** : 1 Hz
- **Frequency Accuracy** : 0.1 ppm (0.03 ppm@GPS)
- **3rd IIP3*** : > 12 dBm typ.
- **Noise Figure** : < 14 dB typ.
- **Phase Noise** : < 95 dBc/Hz @ 10 kHz
- **Sensitivity(@DANL*)** : < -160 dBm/Hz typ.
- **Size** : < 360(H)x300(W)x200(D) mm
- **Weight** : < 10 kg

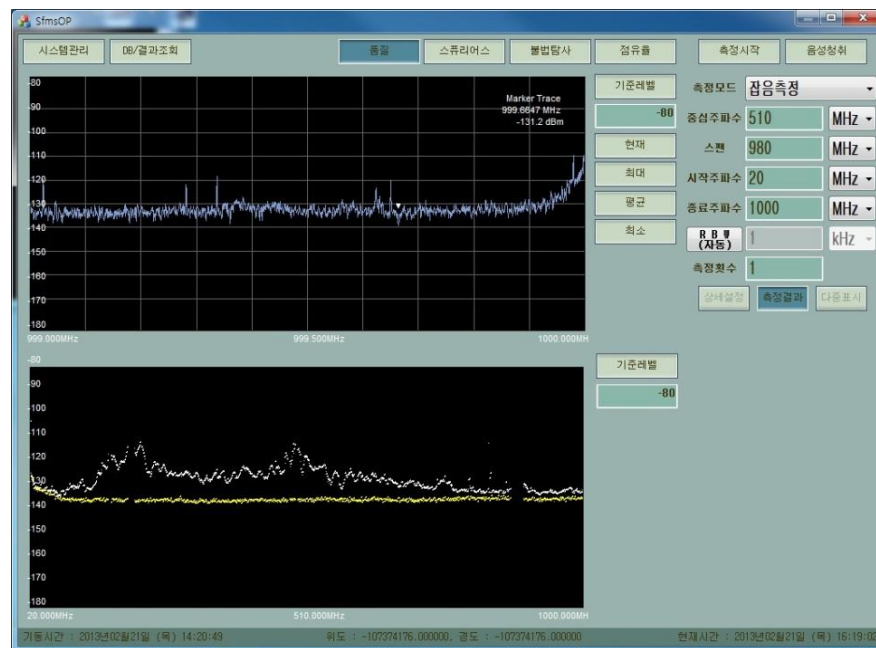
* IIP3 : Input 3rd Order Intercept Point

● 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 Radio 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 **10** 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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