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HF Ocean Graphic Radar and 5GHz Band Radar Interference Issue

Jaewoo, LIM

**Senior Researcher
Regulation Research Div.**

jwlim@kcc.go.kr

+82 2 710 6563



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RRA KOREA COMMUNICATIONS COMMISSION
RADIO RESEARCH AGENCY

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KCC/RRA Organization



**Korea
Communications
Commission**

KCC Head Quarters

- Commission
- Planning and Coordination Office
- B&C Convergence Policy Office
- Broadcasting Policy Bureau
- Communications Policy Bureau
- Consumer Protection Bureau
- Network Policy Bureau
- General Service Division



Radio Research Agency

- Radio Resource Development Div.
- Radio Environment Research Div.
- Regulation Research Division
- Certification Division
- Information Management Team
- Icheon Branch Institute
- Space Environment Center



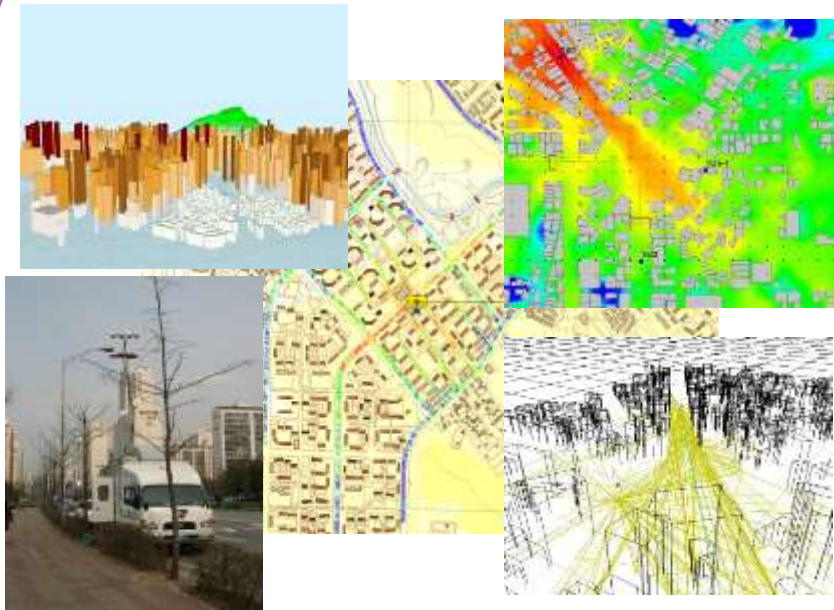
Central Radio Management Office

- Radio Management Division
- Radio Protection Division
- Radio Planning Division
- Radio Operation Division
- Regional Radio Management Office
(12 Offices around nation)
- Satellite Radio Monitoring Center

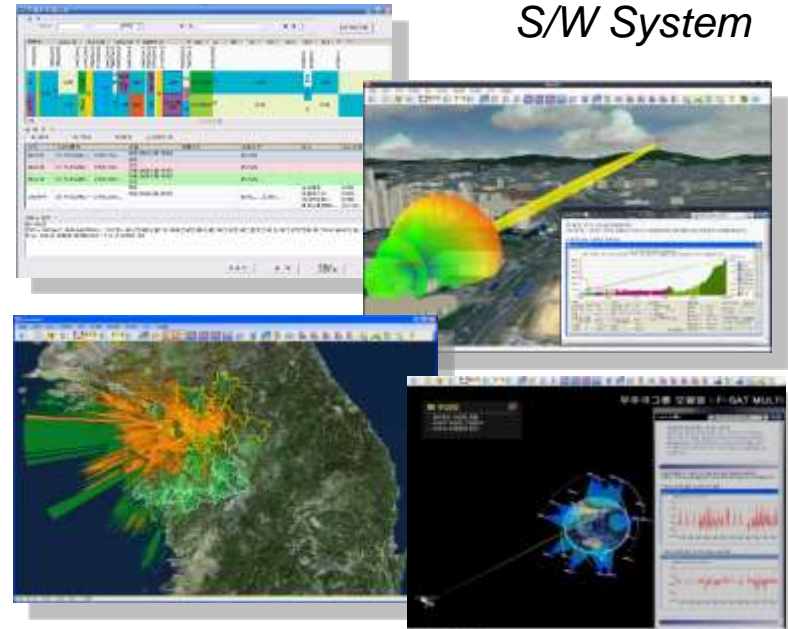
I

Information & Background

Measure & Estimate



Analysis & Management



Interference issue in KOR

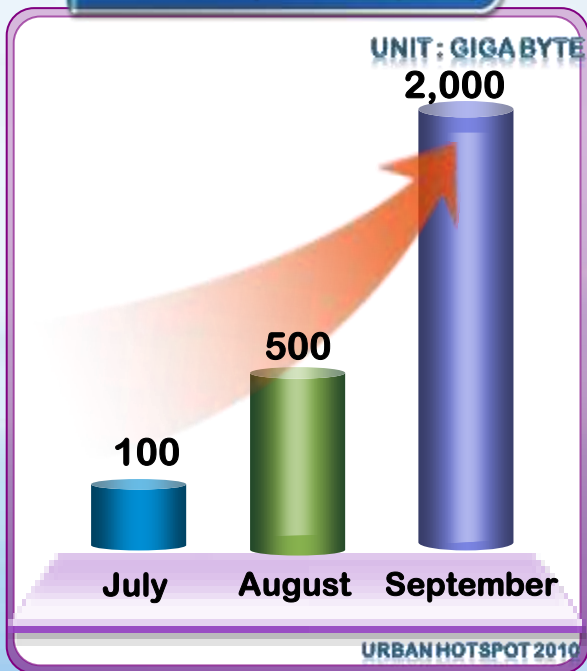
WRC-00 : 2GHz IMT-2000 with M/W, WRC-03 : 5GHz RLAN & 2.5GHz S-DMB & 2.3GHz Mobile-WiMax with M/W, WRC-07 : IMT-Adv. & 900MHz LTE with RFID etc.

II

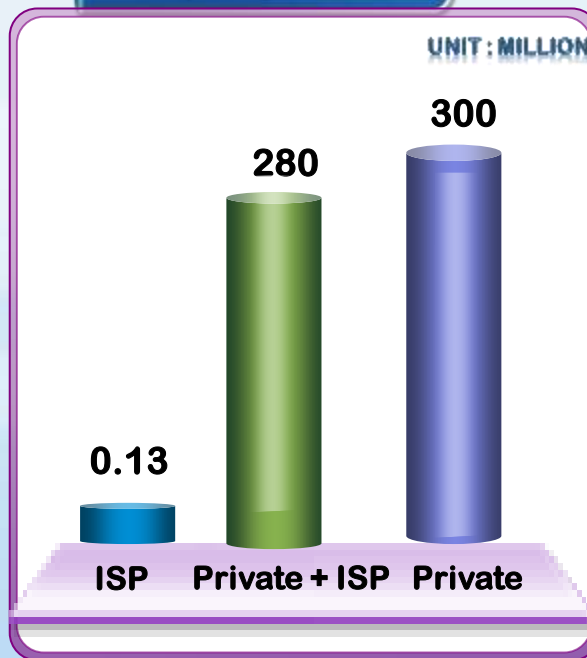
5GHz Band RLAN Issue



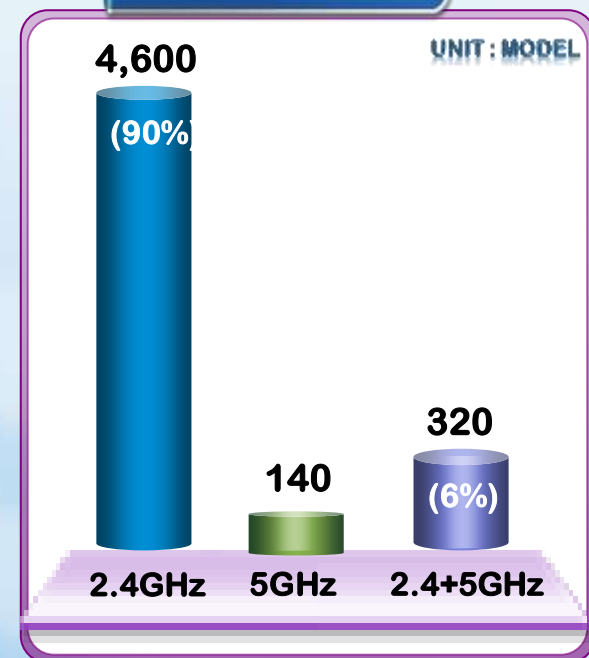
Traffic(example)



Deployment



Certification

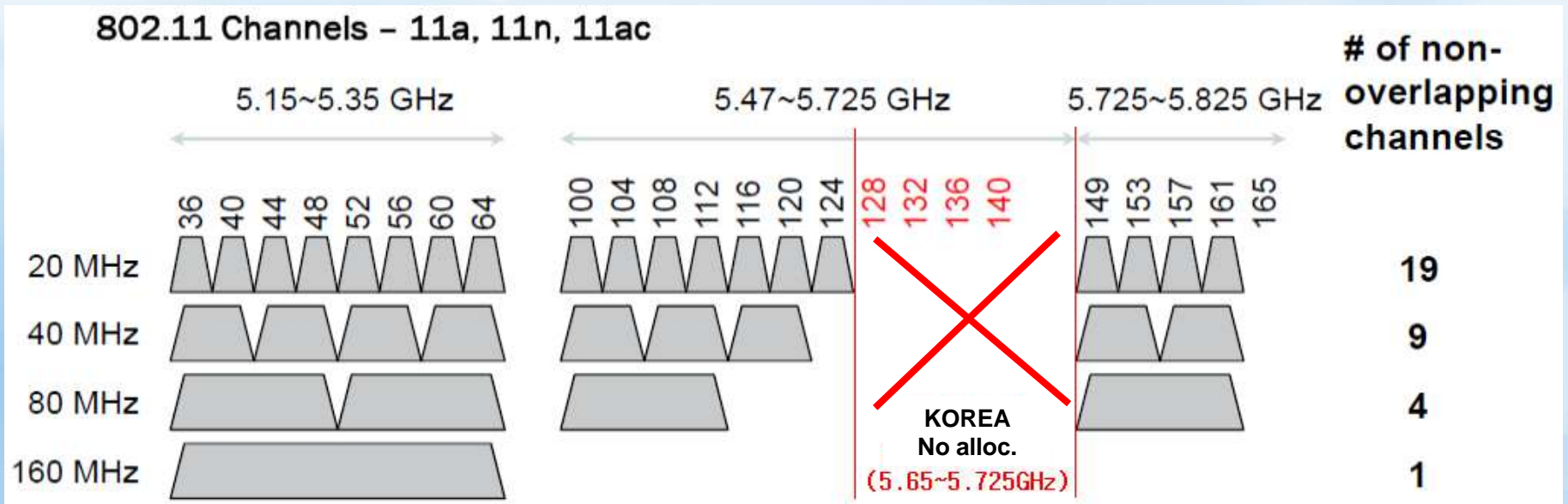


DEC. 2010; FROM KCC

2.4GHz band usages for unlicensed devices are almost full and 5GHz band usage will increase dramatically in the near future.

5GHz RLAN Channel usage

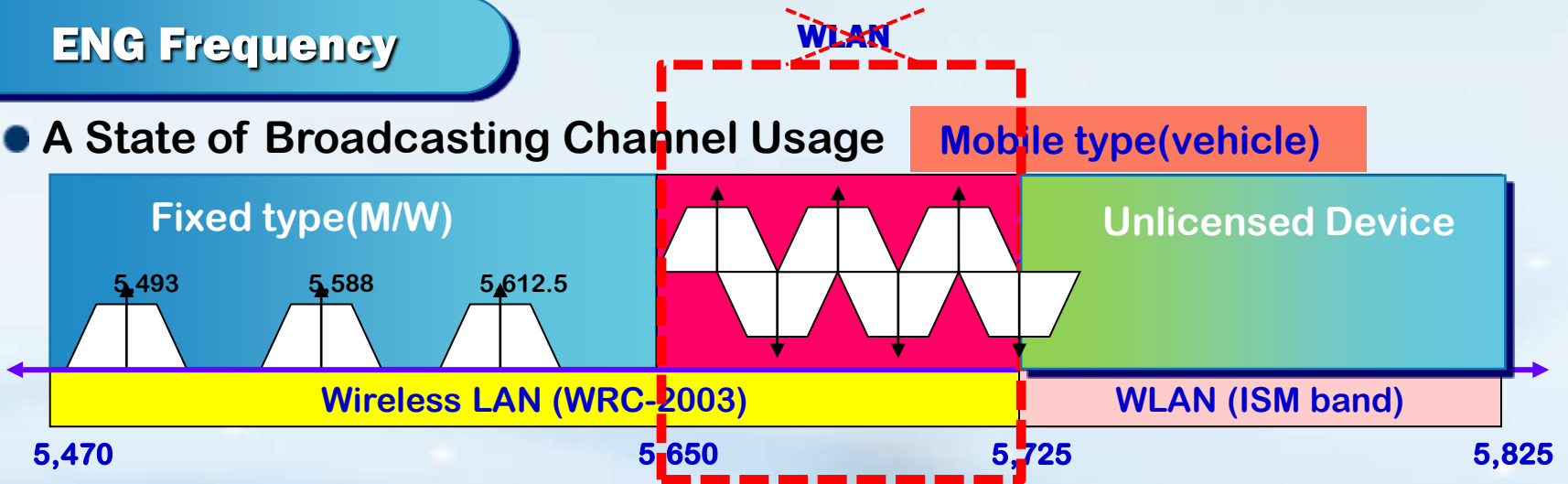
WRC-03 allocated the bands 5150-5350 MHz and 5470-5725 MHz for RLAN. However the band 5650-5725 MHz could not be allocated in Korea.



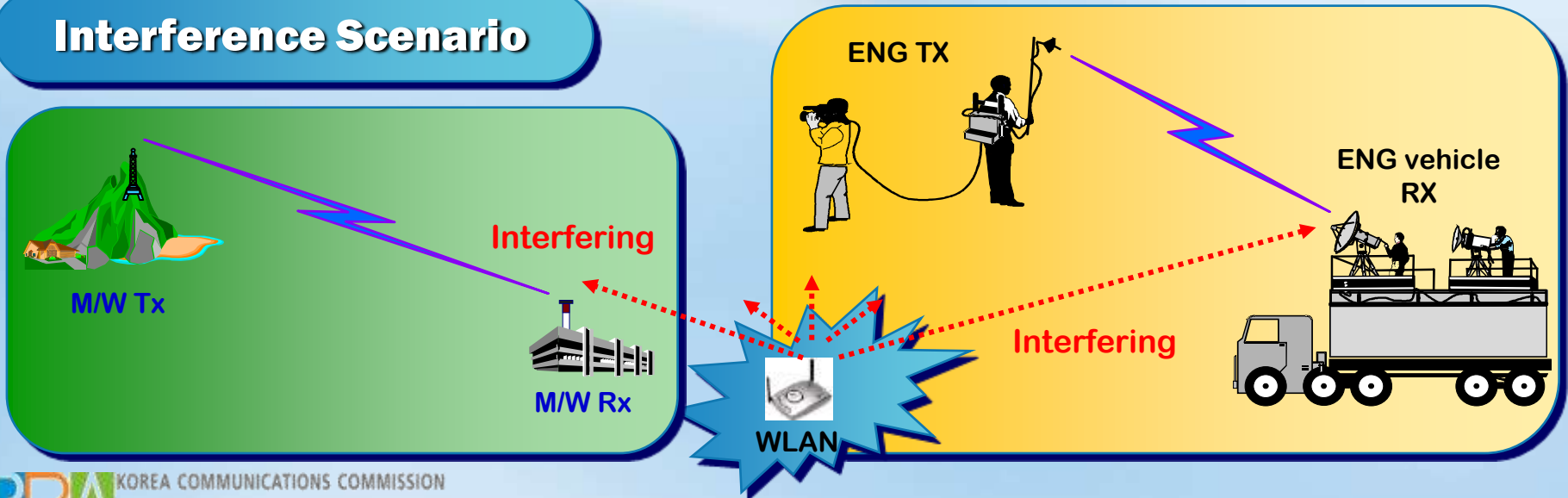
5GHz Band RLAN Issue

ENG Frequency

- A State of Broadcasting Channel Usage



Interference Scenario





5GHz Band RLAN Issue

Fixed type experiment

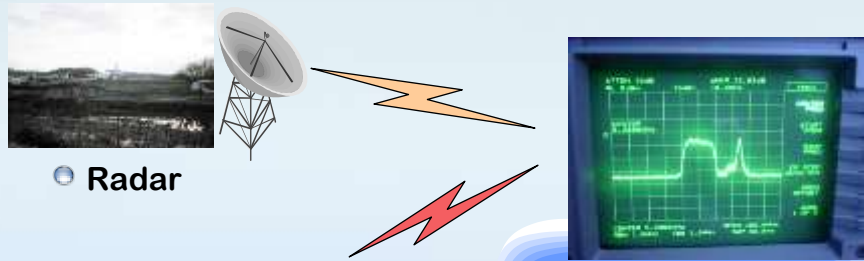
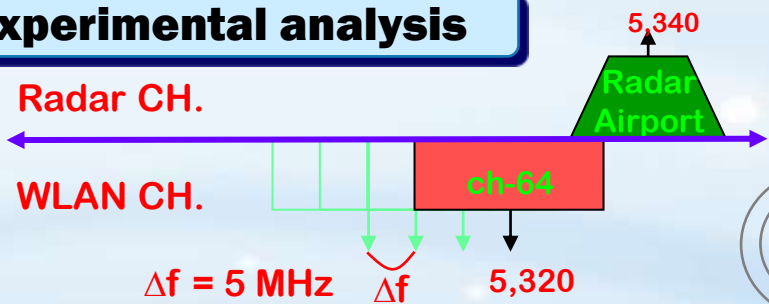


Mobile type experiment



Radar Interference

Experimental analysis

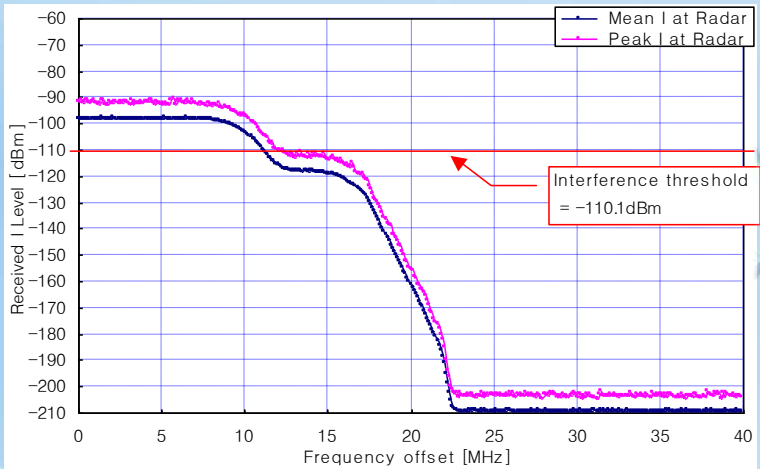


Radar

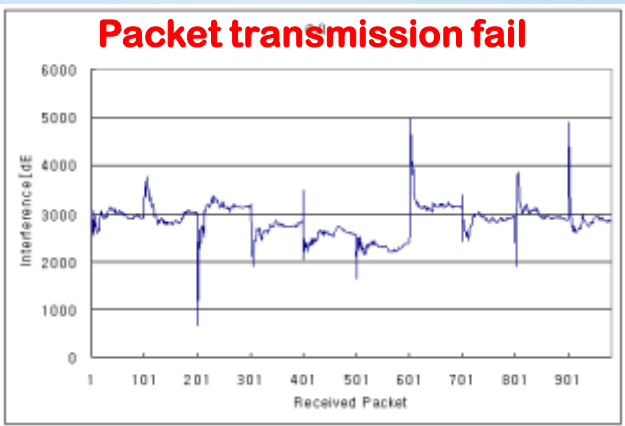


WLAN Device

Theoretical Analysis



Sharing condition :
Frequency separation
(at least 12MHz)
based on DFS



Interference Issue

◆ Example of Solution

- Guidelines for user including ISP
- update criteria(regulation)/certification procedures
- spectrum rearrangement
- sharing/mitigation technologies

◆ Trust and sharing needs to work for both sides

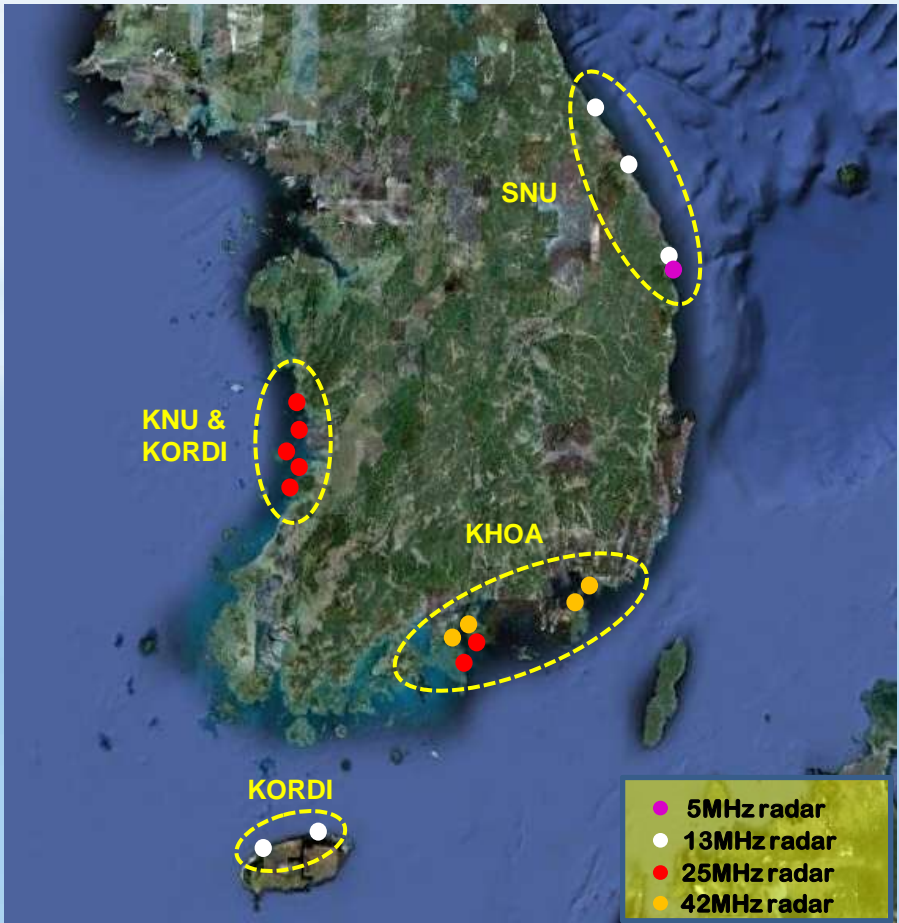


HF Ocean Graphic Radar Issue

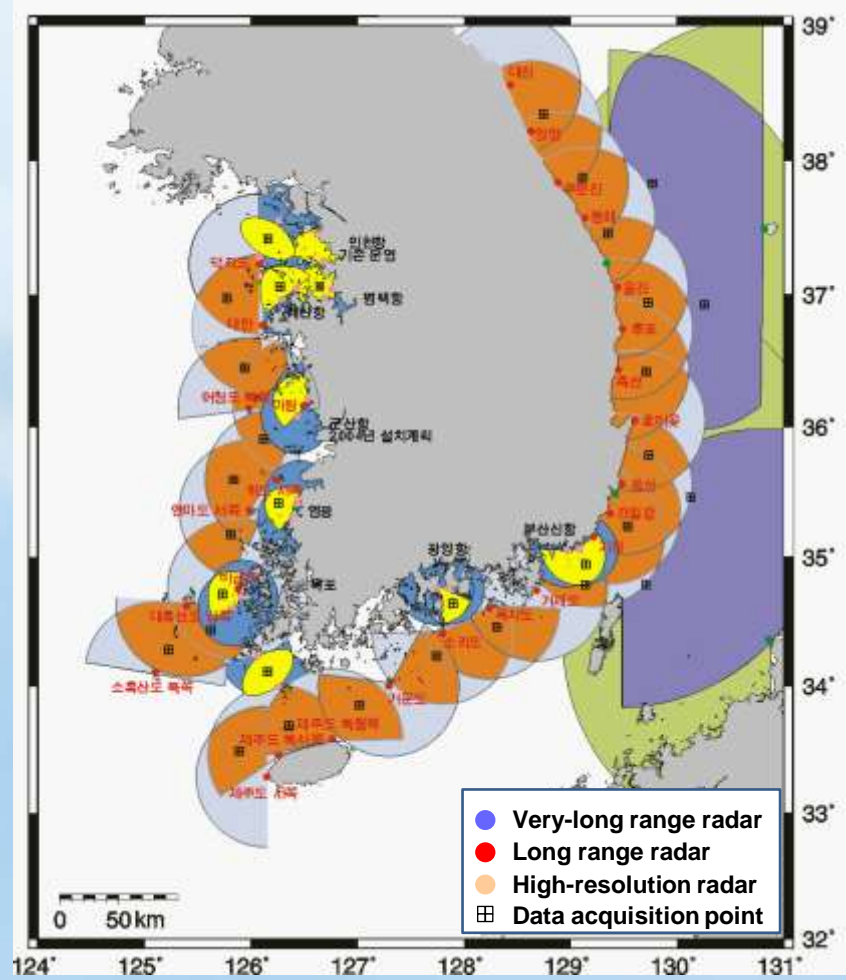


HF Ocean Graphic Radar Issue

Current Use

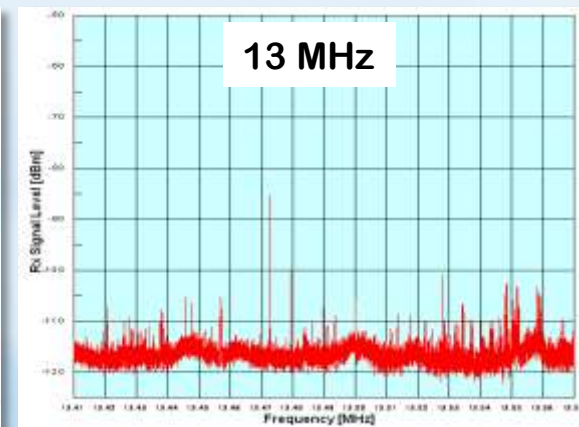
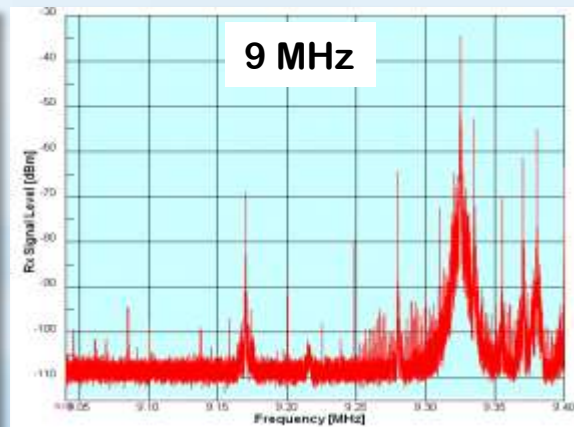
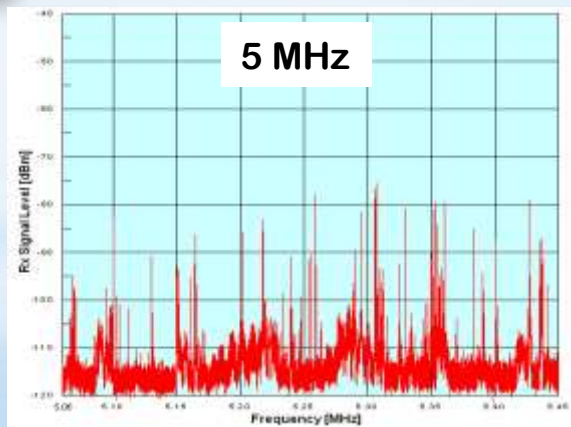


Future Deployments

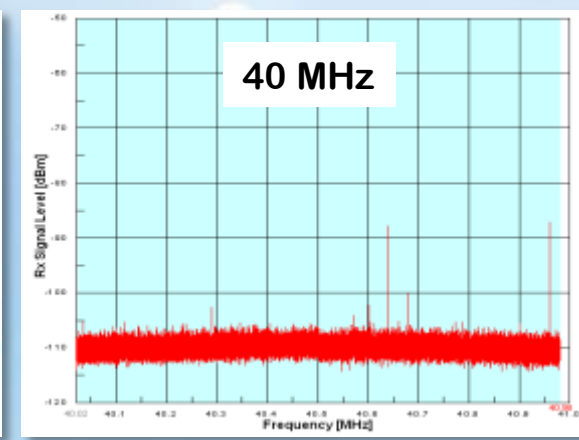
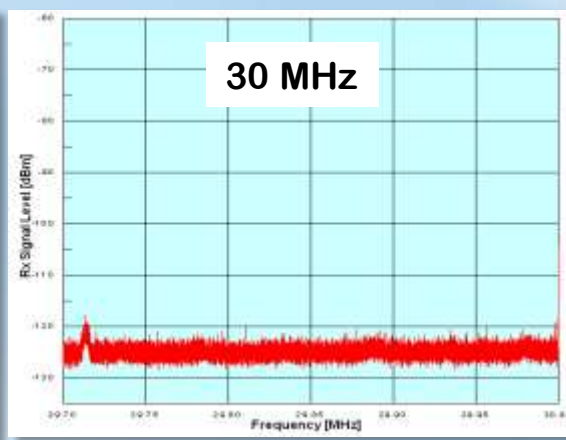
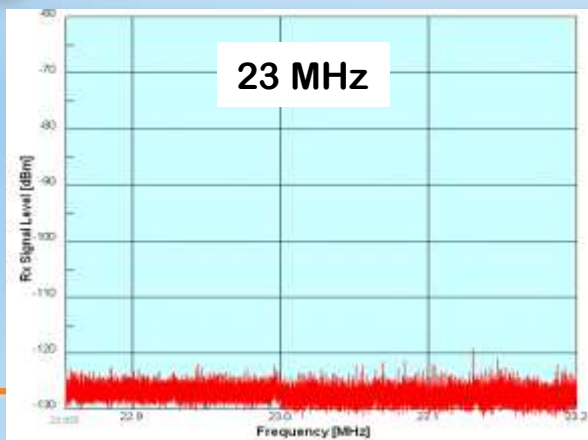


Example of Spectrum Occupation

Below 20 MHz



Above 20 MHz



Separation Distance

● Land Path [Back-lobe, Ground-wave]

Frequency band		5 MHz	8 MHz	13 MHz	16 MHz		27 MHz
Max. distance (ITU-R)		180 km	80 km	120 km	70 km	120 km	110 km
KOR	Urban area	77.8 km	28.2 km	56.7 km	22.8 km	48.1 km	44.9 km
	Residence	94.7 km	35.2 km	68.1 km	28.0 km	58.1 km	53.6 km
	Rural area	116.1 km	45.2 km	83.9 km	36.2 km	71.4 km	65.5 km
	Quite rural	166.8 km	68.7 km	114.0 km	54.6 km	99.3 km	88.4 km
EIRP (dBW)		19.9	2.8	19.9	3	18	19.9

● Sea or Mixed Path [Main-lobe, Ground-wave]

Frequency band		5 MHz	8 MHz	13 MHz	16 MHz	25 MHz
Max. distance (ITU-R)		950 km	680 km	530 km	450 km	320 km
KOR	Urban area	667 km	508 km	391 km	316 km	219 km
	Residence	724 km	553 km	422 km	339 km	238 km
	Rural area	788 km	606 km	461 km	371 km	258 km
	Quite rural	925 km	695 km	521 km	421 km	294 km
EIRP (dBW)		19.9	16.8	19.9	16.8	16.8

Review of operation & sharing

◆ Spectrum Occupation

- above 20 MHz band, to provide sufficient frequency within existing allocations in Korea
- however, below 20 MHz (especially below 10 MHz), to be required for careful design and site selection for stable radar operation

◆ Sharing Possibility

- Sharing between RLS and LMS/FS is possible under appropriate separation distance
- However the neighboring countries and HF propagation issue are need to be considered to minimize interference damage in the near future



**Radio Research Agency is
always with you.**

*Information on research projects as well as the status of certification of B&C
equipment are available on the website of Radio Research Agency.*

www.rra.go.kr

Thank you!