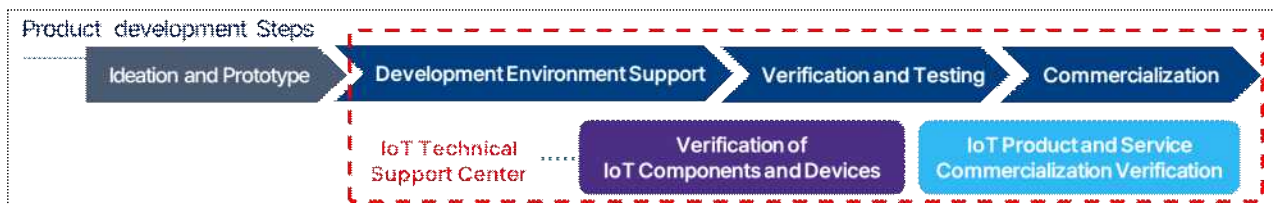


Introduction of the IoT Technical Support Center

(‘24.5.29., RAPA EMTI)

□ Overview

- **(Role) Utilizing facility infrastructure to provide technical support** throughout the development process of **5G AIoT services and products**.
- ⇒ **The aim of timely product launches for SME’s through ① technical support** from specialized institutions and **② test-bed support**.



□ Major Services

- **(Antenna and OTA)** Pre-test and verification for antennas, wireless devices and integrated antenna.
- **(5G Device Verification)** Conformance testing for 5G SA/NSA devices according to the requirements specified by communications operators.
- **(5G-Adv/6G Test Lab)** Providing an Test environment where companies needing Proof-of-Concept verification(PoC) of antennas and modules in the 5G-Advanced and 6G
- **(Reliability Test Lab)** Measurement and verification of compliance with quality standards for IoT products
- **(ICT R&D Verification)** Performance verification of R&D project outcomes for government and company

□ Key Achievements

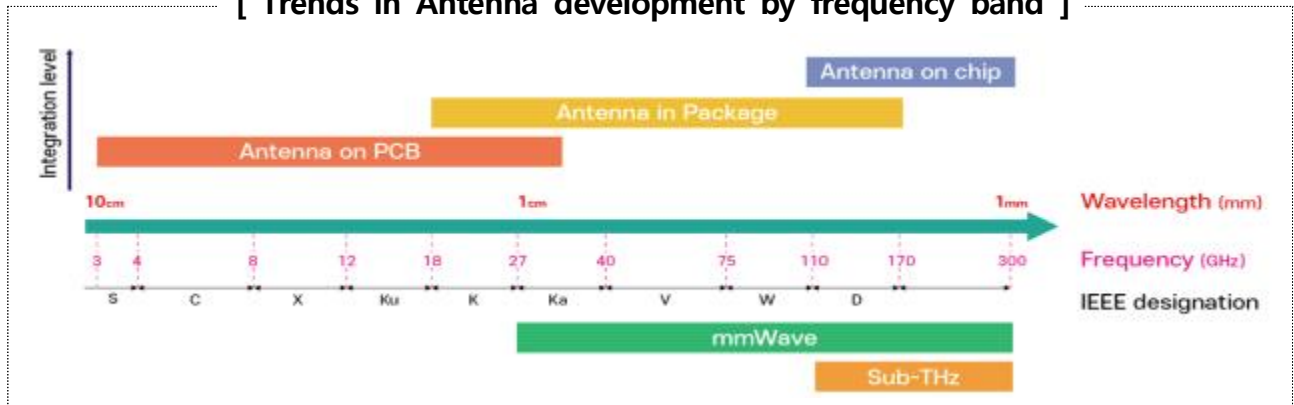
- Providing over **2,600 technical support services** annually to assist in product development
- Companies experience a **1.7 month product development time reduction** and a **cost saving of 117 million(KRW)** per company

□ Facilities

① Antenna Measurement System

- **(Features)** Performance measurement of antennas by frequency band
 - **(Measurement Capabilities)** Gain, Directivity, Beamwidth, sidelobe levels, 2D/3D Radiation pattern, Efficiency, Axial Ratio, EIRP

[Trends in Antenna development by frequency band]

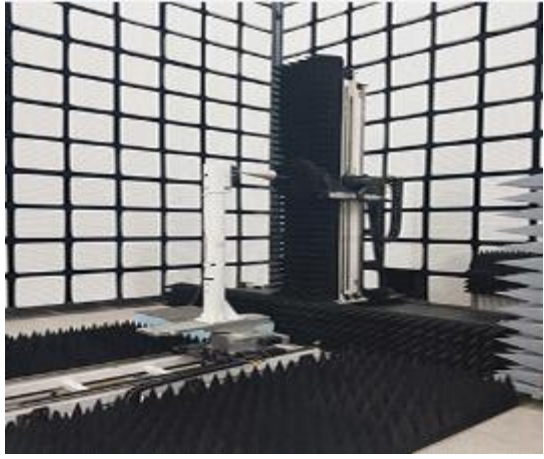





○ Specification

1) Far-Field System

Items	Far-Field System(10m)	Far-Field System(7m)
Method	Direct Far-Field	Direct Far-Field
Frequency	0.3 ~ 18 GHz	0.3 ~ 18 GHz
Dimensions	15 x 8 x 8 (m)	12 x 8 x 8 (m)
Type	Passive	Passive
Application	Mobile, Broadcasting, Radar, UWB, Military, etc	
Picture		

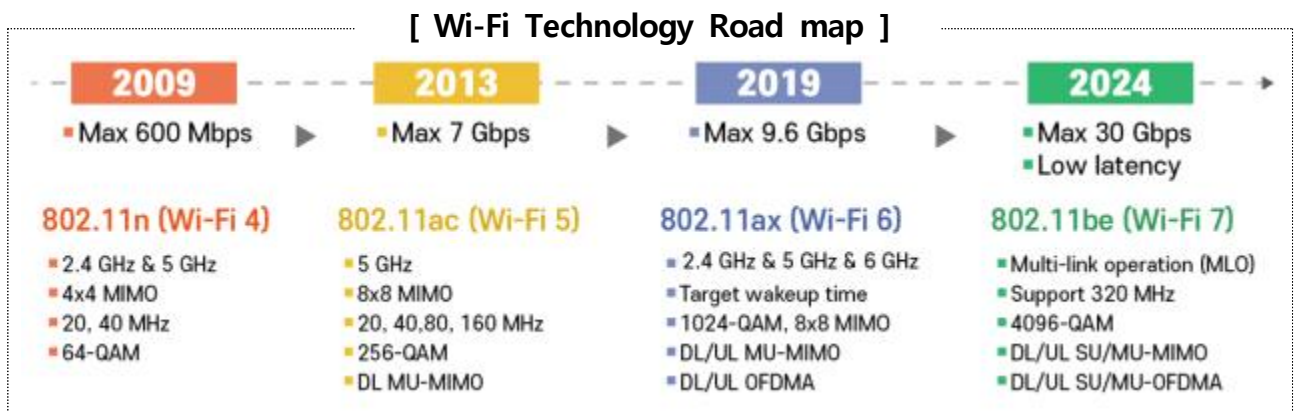
2) Indirect Far-Field System

Items	Planar Near-Field System	Cylindrical Near-Field System
Method	Planar Near-Field	Cylindrical Near-Field
Frequency	2 ~ 50 GHz	60 ~ 90 GHz
Dimensions	2.4 x 2.4 (m)	1.5 x 3.1 x 2 (m)
DUT Type	Passive	Active & Passive
Application	Mobile, Aerospace, Military, etc	Automotive Radar
Picture		

Items	Spherical Near-Field System	Compact Antenna Test Range System
Method	Multi Probe Spherical Near-Field	Compact Range
Frequency	3 ~ 40 GHz	18 ~ 40 GHz ^{Passive} 24 ~ 40 GHz ^{Active}
Dimensions	1.5 x 3.1 x 2 (m)	2.5 x 0.8 x 1.6 (m)
DUT Type	Passive	Active & Passive
Application	Mobile, Aerospace, Military, etc	Mobile, Automotive, etc
Picture		

② OTA Measurement System

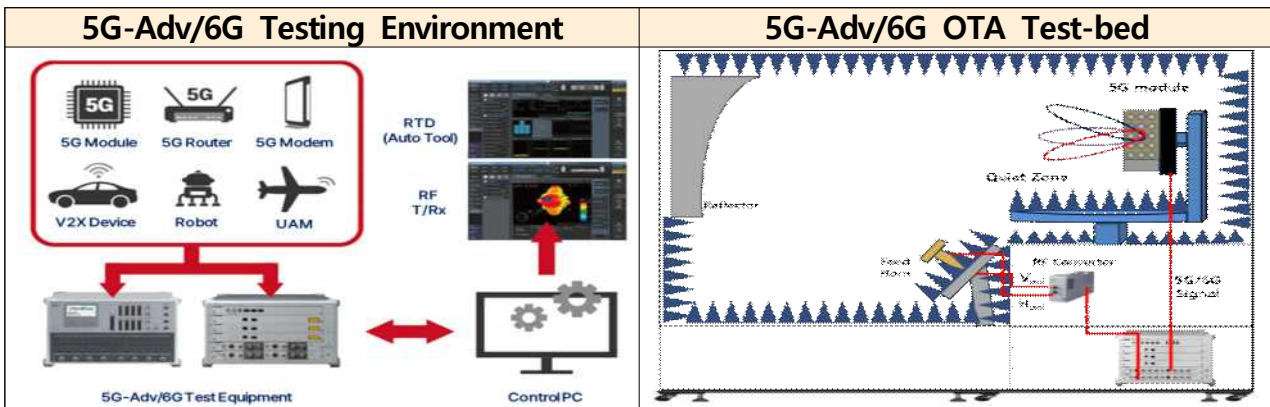
- **(Features)** Verification of radiated RF characteristics for LPWA (Wi-Fi/Bluetooth/Zigbee etc) wireless devices
 - **(Measurement Capabilities)** Total Radiated Power, Total Isotropic Sensitivity
- **Specification**
 - **(Wi-Fi)** IEEE 802.11 b/g/a/n/ac/ax(e)/be(Wi-Fi 7)
 - **(Bluetooth)** Bluetooth Classic, Bluetooth Low Energy
 - **(기타)** Zigbee, Z-wave, SigFox, LoRaWAN



Items	Over-The-Air System
Frequency	800 MHz to 10 GHz.
Method	CTIA OTA Test Plan
Dimensions	5 x 3 x 3 (m)
Picture	

③ 5G-Adv/6G Test Lab

- **(Features)** Providing an Test environment where companies needing Proof-of-Concept(PoC) verification of antennas and modules in the 5G-Advanced and 6G(Cooperation With global equipment company Anritsu)
 - ※ Anritsu provided the world's first 5G FR3 measurement equipment for free



○ Services

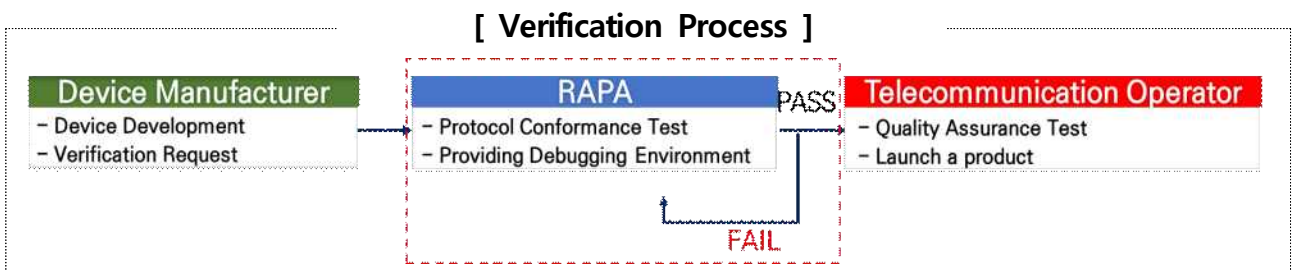
- **(Technical Support)** Performance testing and environmental support for antennas, devices, and modules in the 5G FR3 and 6G
- **(Coexistence Verification)** Verification of wireless coexistence, including immunity and interference, for smart sensors, robots, and IoT devices using wireless communication technology
- **(Professional Training)** Conducting seminars on technological trends related to next-generation communications such as 6G, and equipment training.

[5G-Adv/6G Test Lab]



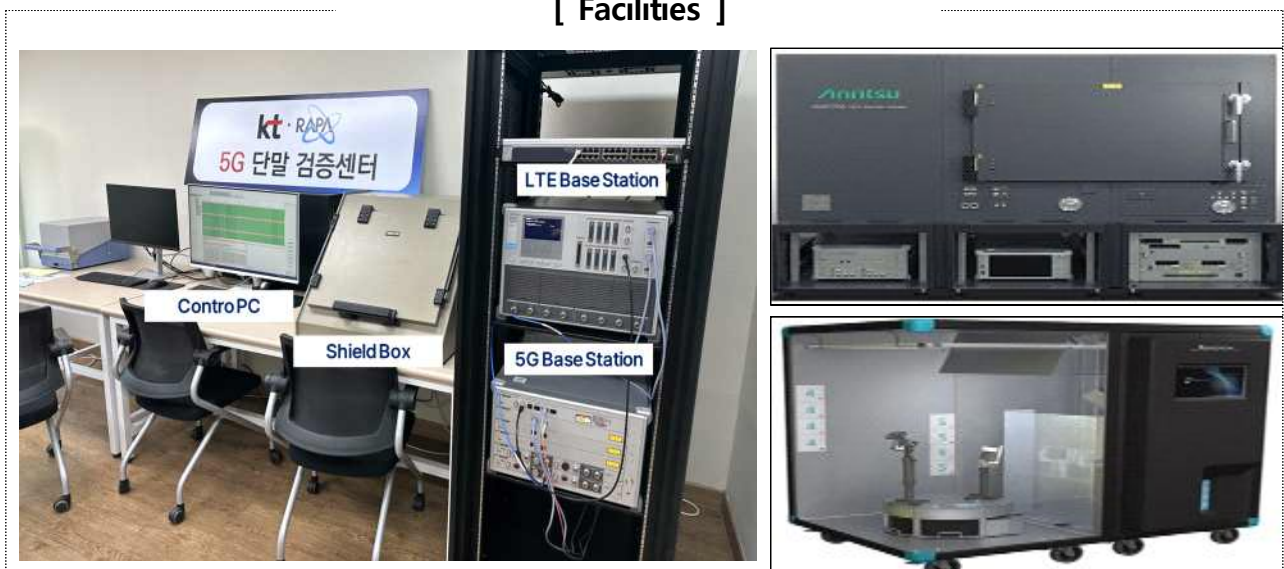
④ 5G Device Verification System

- **(Features)** Verifying that 5G devices meet 5G standard specifications (3GPP) and operate correctly on telecommunications networks according to the network compatibility verification items and procedures.
 - **(Measurement Capabilities)** Approximately 200 Items of Network Consistency Verification for 5G SA/NSA Mode



- **(Automation Solution)** Developing automation solutions capable of verifying compliance with requirements through acceptance tests
- **Expected outcomes**
 - **Simplifying verification procedures** by applying IoT Technical Support Center test results to the telecommunications operator's process.
 - **Reducing development time** for SME's by shortening verification time through automation.(3 days→ 4 hours)
- **Specification**

[Facilities]



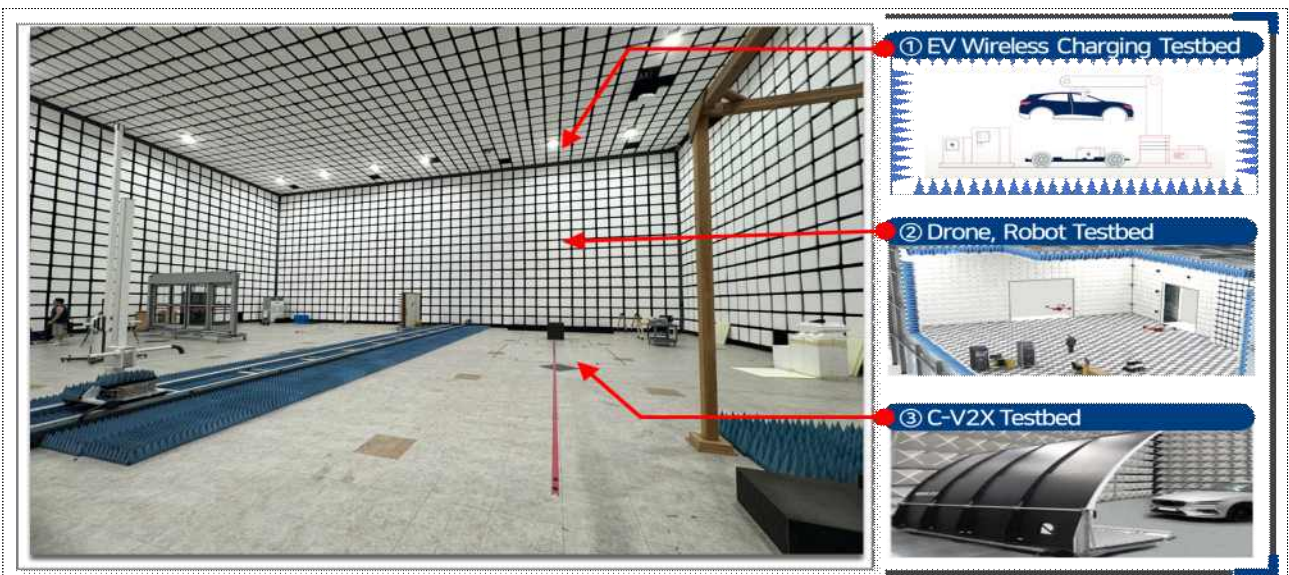
⑤ Large RF Shield Test-bed

- **(Features)** Conducting electromagnetic-waves tests for various converged devices such as electric vehicles, drones, robot and wireless charging
- **Services**
 - **(Technical Support)** RF and wireless communication performance testing and environmental support for 5G, Automotive Car, IoT RFID, etc.
 - **(Coexistence Verification)** Verification of wireless interference and immunity for products exposed to various wireless environments(4G, 5G, Wi-Fi) including sensors, IoT devices, and medical devices.
 - **(Standard)** Developing national standards and testing methods, as well as conducting international standardization, to support government policy development related to electromagnetic-waves

[Test Case]



○ Future Plan



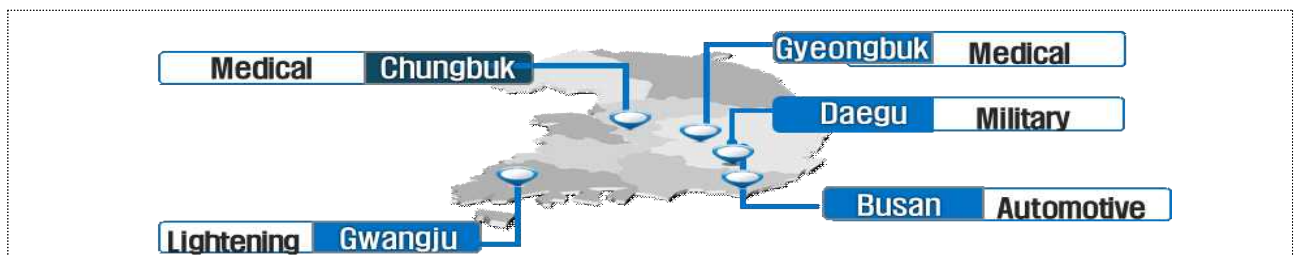
※ Large RF Shield Room Size : 25.4 x 22.5 x 11 (m)

⑥ EMC/EMF Debugging Lab

- **(Features)** Supporting the timely launch of products by resolving EMC issues for SME's through technical support and practical training for technical industries
- **Services**
 - **(EMC Technical Support)** Design and countermeasure technical support, including electromagnetic noise reduction technology, for non-compliant products at the certification stage



- **(EMF Technical Support)** Measurement of electromagnetic absorption rate and exposure levels, and countermeasure technical support for portable wireless devices and home appliances
- **(Technical Training)** Conducting specialized technical training for regional local enterprises



[Facilities]



3m Full chamber(5.2 X 7.2 X 4.5 (m))



Equipment and Test Environment

⑦ Reliability Test-bed

- **(Features)** Reliability test is an endurance evaluation for factors such as vibration, shock and waterproofing for the IoT product under normal or unusual circumstances

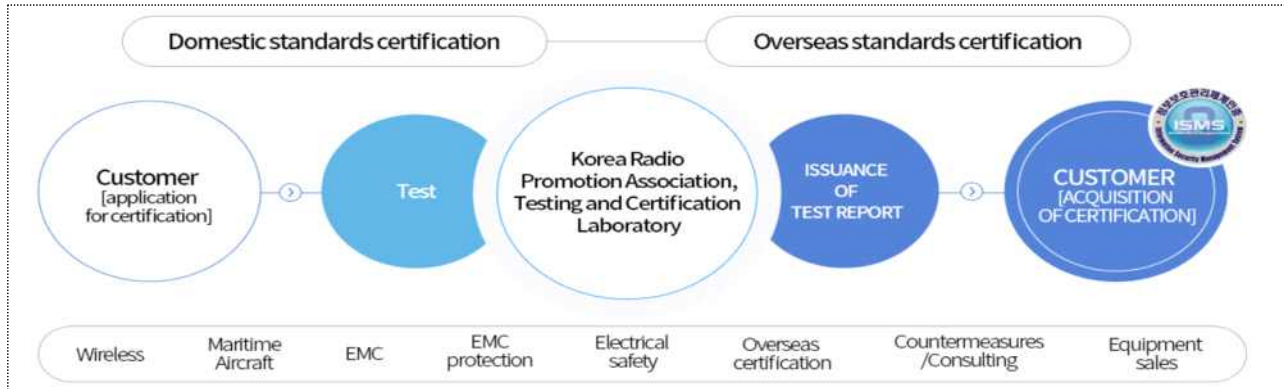
Test field	Services
Environmental	<ul style="list-style-type: none"> - High temperature test - low temperature test - High temperature/high humidity test - Thermal shock test - HALT, HAST - IP(Dust-proof and Water-proof) test
Mechanical	<ul style="list-style-type: none"> - Vibration test - Impact test - Drop test

[Facilities]



⑧ Testing and Certification Lab

- **(Features)** Providing one-stop service for obtaining domestic and international certifications for broadcasting and communication equipment and household electrical appliances.



○ Services

- Domestic conformity assessment test service
- Overseas Standard Certification Test and Acquisition
 - ※ CE, FCC, PSE, CSA, IC, NRTL, CCC, Vietnam, etc
- Electrical safety and environmental test
- Shield room and chamber shielding effect test
- Provision of pre-test and development stage design, countermeasure support service, and consulting support

[Facilities]



10 m Full chamber(20 X 12 X 7.7 (m))

