

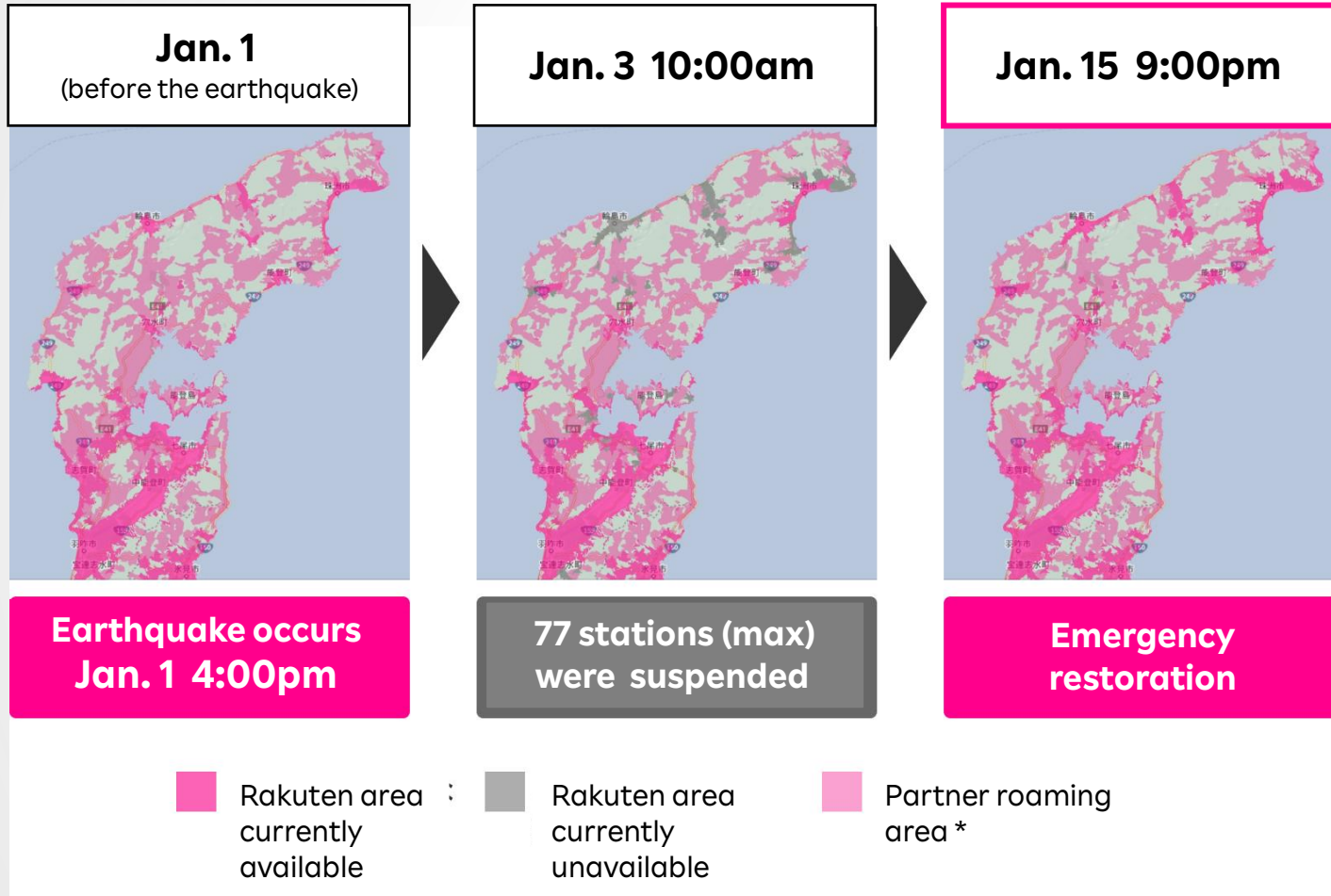
Rakuten Mobile's initiatives for Beyond 5G

February 2024

Ryoji Osaka

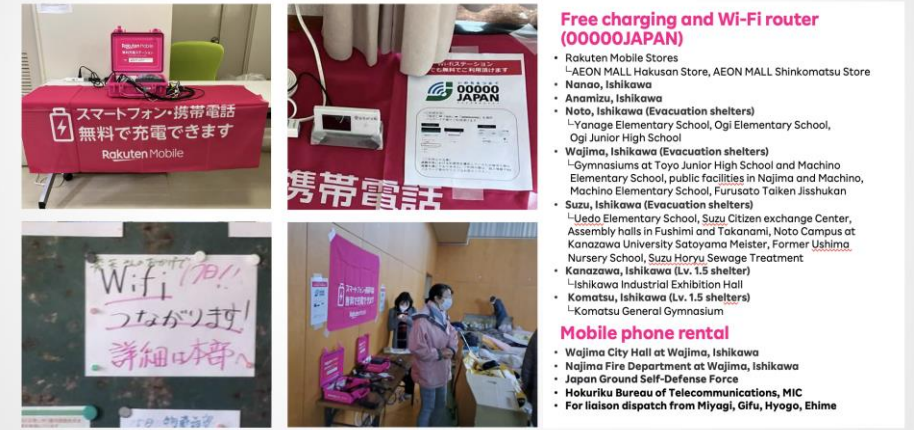
Rakuten Mobile, Inc.

Noto Peninsula Earthquake



*Disturbances in partner network areas are not reflected on this map.

Recovery activities: Free charging service



Free charging and Wi-Fi router (0000JAPAN)

- Rakuten Mobile Stores
 - ↳ AEON MALL Hakusan Store, AEON MALL Shinkomatsu Store
- Nanao, Ishikawa
- Anamizu, Ishikawa
- Noto, Ishikawa (Evacuation shelters)
 - ↳ Yanoge Elementary School, Ogi Elementary School, Ogi Junior High School
- Wajima, Ishikawa (Evacuation shelters)
 - ↳ Gymnasiums at Toyo Junior High School and Machino Elementary School, public facilities in Najima and Machino, Machino Elementary School, Funasato Taiken Jishukan
- Suzu, Ishikawa (Evacuation shelters)
 - ↳ Ueda Elementary School, Suzu Citizen exchange Center, Assembly halls in Fushimi and Takunami, Noto Campus at Kanazawa University Satoyama Meister, Former Ushima Nursery School, Suzu Horyu Sewage Treatment
- Kanazawa, Ishikawa (Lv. 1.5 shelter)
 - ↳ Ishikawa Industrial Exhibition Hall
- Komatsu, Ishikawa (Lv. 1.5 shelters)
 - ↳ Komatsu General Gymnasium

Mobile phone rental

- Wajima City Hall at Wajima, Ishikawa
- Japan Fire Department at Wajima, Ishikawa
- Japan Ground Self-Defense Force
- Hokuriku Bureau of Telecommunications, MIC
- For liaison dispatch from Miyagi, Gifu, Hyogo, Ehime

*As of January 17, 2024 *Liaison: Disaster countermeasure local information liaison officers

Free service for customers in Ishikawa

Rakuten Mobile service plan fees waived from January to March, 2024

■ Target: Customers in Ishikawa Prefecture

- Customers whose contractor address as of January 1, 2024, or contractor address of a new contract registered after January 2 are: Nanao, Wajima, Suzu, Shiga in Hakuji District, Anamizu in Hosu District, or Noto in Hosu District.

■ Plans that are free of charge

- **Rakuten Mobile (MNO)**
Rakuten SAIKYO Plan, Rakuten SAIKYO Plan Data Type, Apple Watch Family Sharing Plan, Rakuten Turbo
- **Rakuten Mobile (MVNO)**
Super Hodai, Kumiawase Plan, Komikomi Plan

*Plan fees include service plan fees, various optional fees, domestic calls, domestic SMS, universal service fees, and telephone relay service fees.
*Please note that international calls, international SMS, and data charges are not eligible for free service.
*Customers using the old FREETEL and DMM Mobile are not eligible.

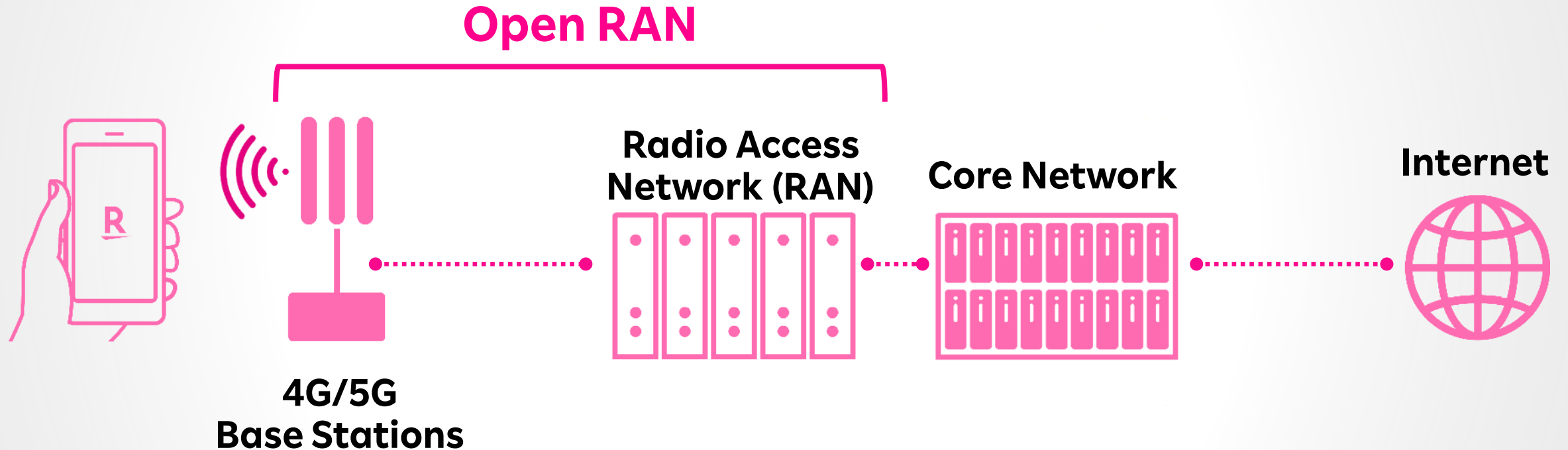


Global initiatives for Beyond 5G

Rakuten Mobile

Fully Virtualized Cloud Native Mobile Network

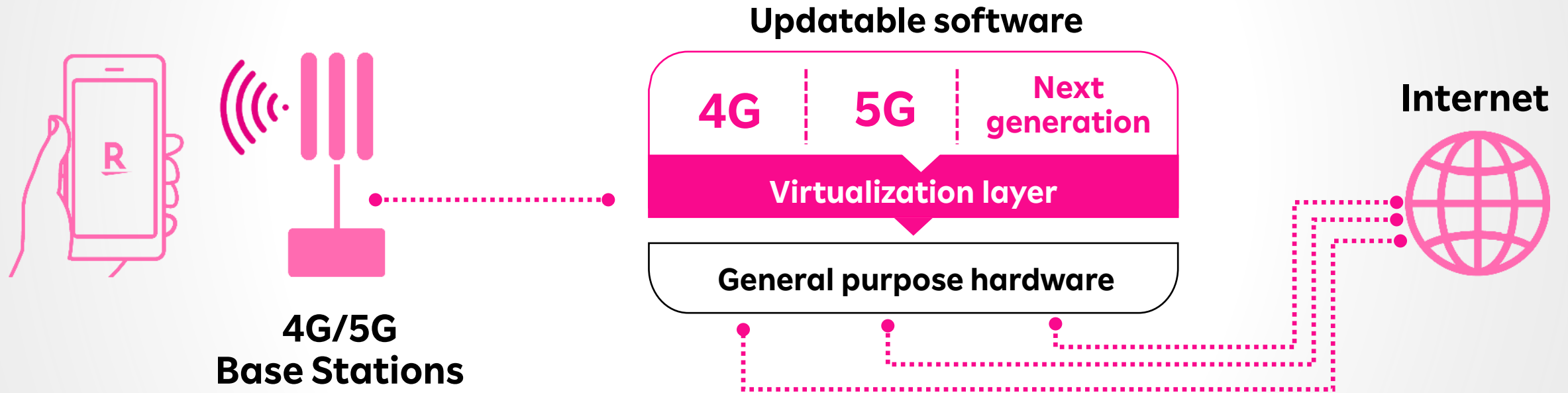
Fully virtualized network for scalable network configuration



Fully virtualized and cloud native

Features and Benefits of Virtualization

Software running on general purpose hardware through virtualization



Fully virtualized and cloud native

Further intelligence of Open RAN

Aiming for a high-efficiency network in the beyond 5G era

- **Frequency Band utilization efficiency**
- **Enhancements to Security**
- **Energy Efficiency**



RIC (RAN Intelligent Controller)



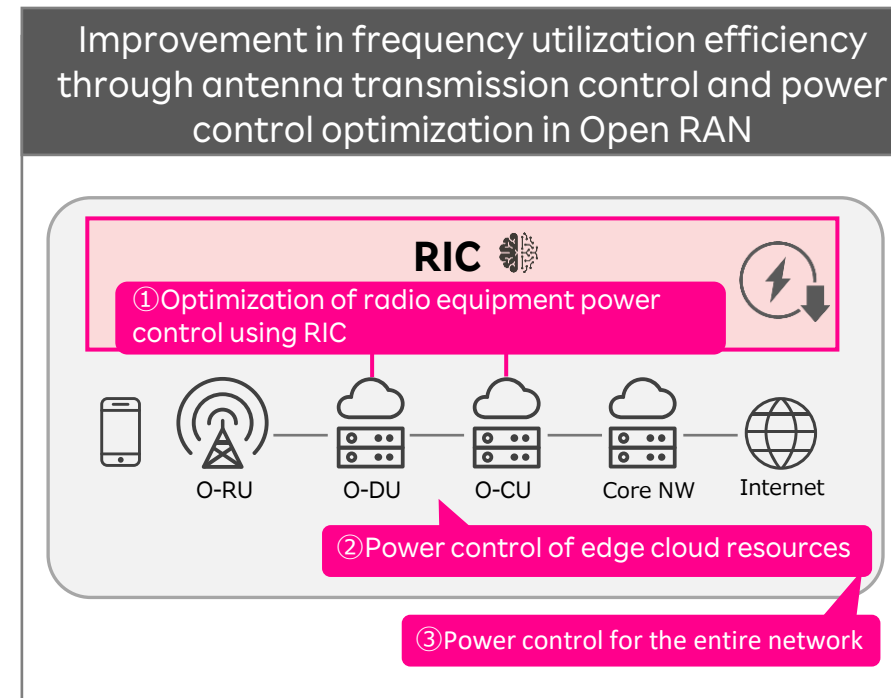
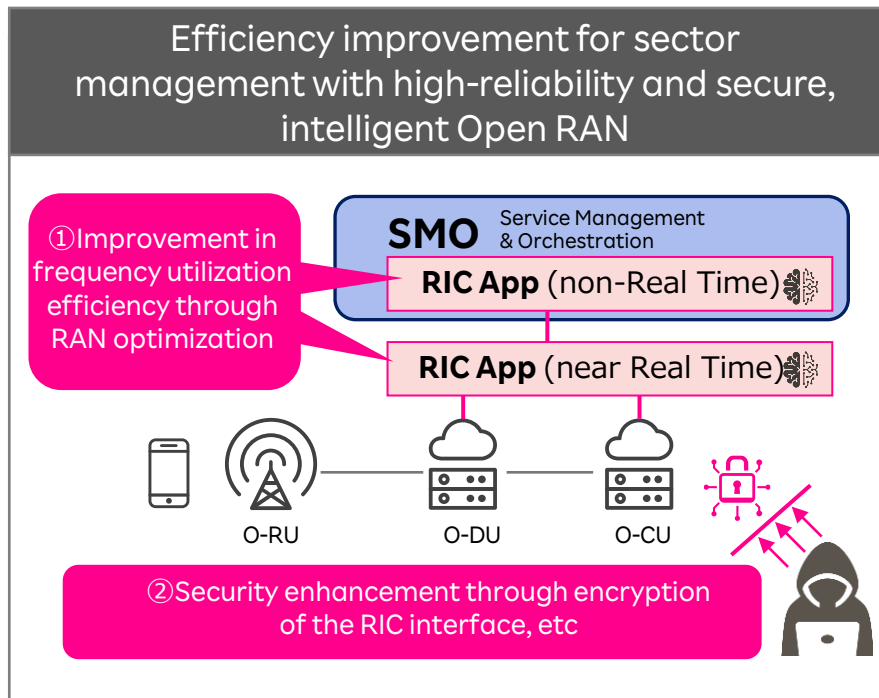
Technology with intelligence that leverages AI/ML to efficiently control multi-vendor RAN equipment in Open RAN

R&D for Open RAN and RIC (NICT)

In January 2023, Rakuten Mobile was selected for a Beyond 5G R&D Promotion Project by NICT*

R&D of Open RAN Wireless Communication Technologies to Realize Advanced RAN Infrastructure Beyond 5G

Aiming to achieve high-efficiency networks through RIC (RAN Intelligent Controller)

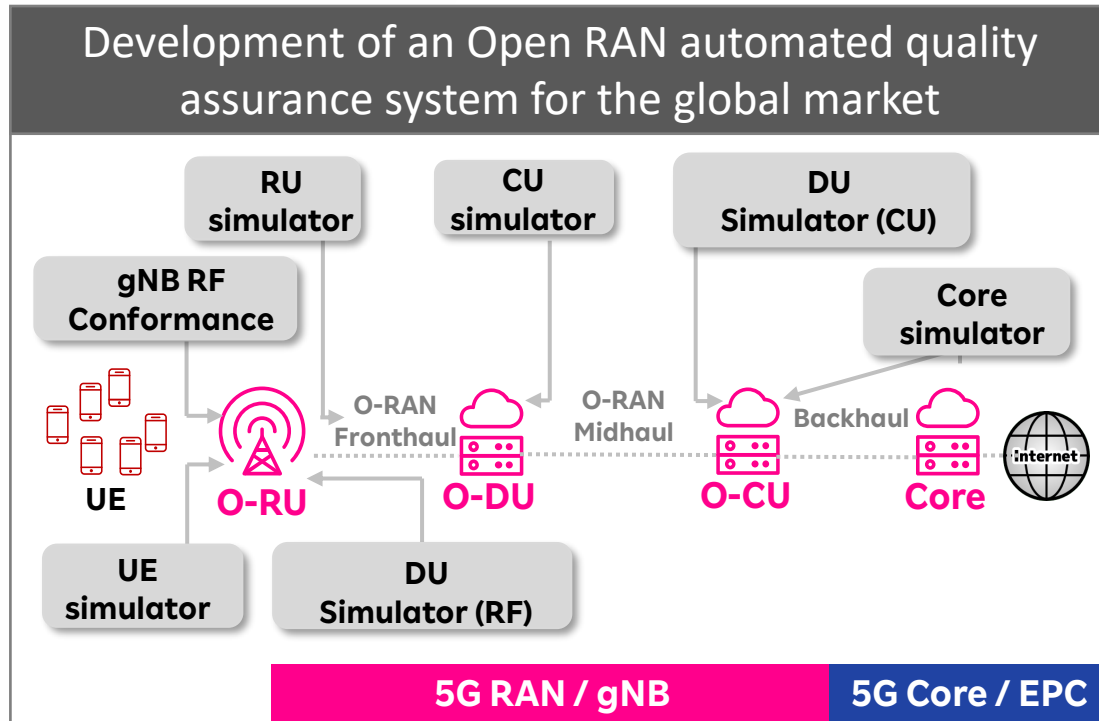


*NICT : National Institute of Information and Communications Technology

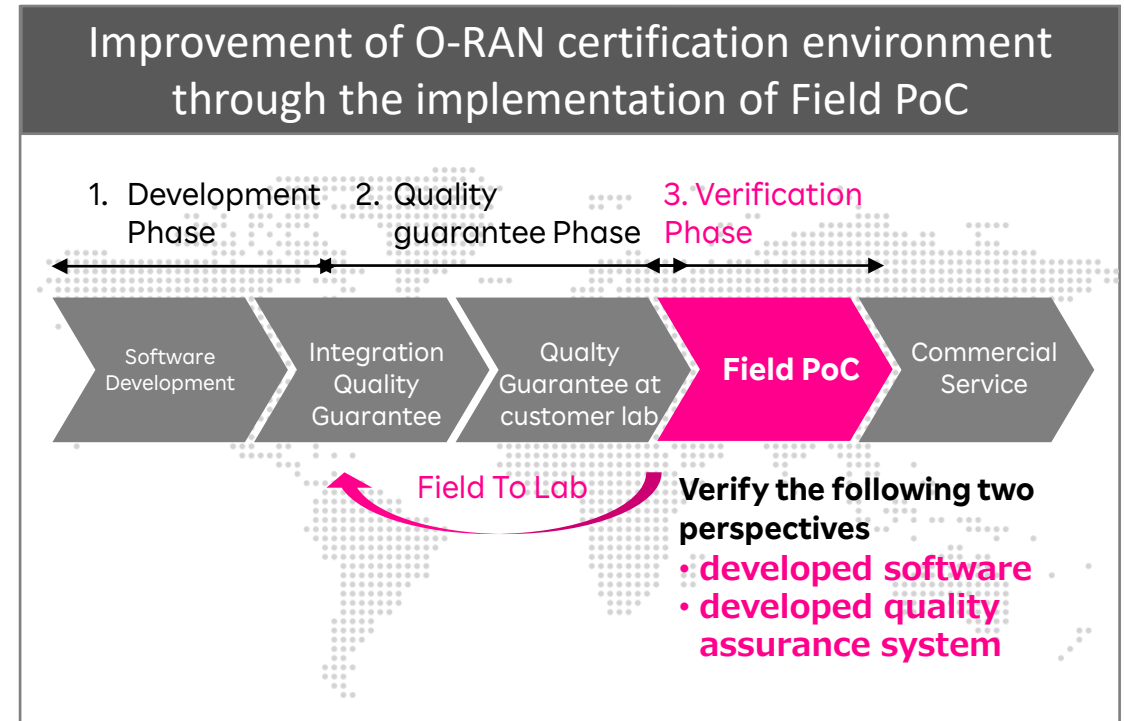
O-RAN integration platform technology (NEDO)

Selected by NEDO for the “R&D Project of Enhanced Infrastructures for Post-5G Information and Communication Systems” and launched activities from 2023

Promoting O-RAN through the realization of automated Open RAN quality assurance and acceleration of O-RAN certification



Building an automated quality assurance system in an environment compliant with O-RAN ALLIANCE specifications



Improving the quality of O-RAN certification through the reproduction of traffic data obtained through Field PoCs in a lab environment

Rakuten Mobile

Japan OTIC issues O-RAN End-to-End Badge

In January 2024 Japan OTIC issued the world’s 1st End to End Badge for Non-stand Alone (NSA) equipment

Press Release



January 12, 2024
Japan OTIC

Japan OTIC issues O-RAN End-to-End Badge

- Facilitating the adoption of Open RAN networks that comply with the O-RAN specifications by multiple vendors -

Japan OTIC (*1) has issued an O-RAN E2E Badge (*3) that certifies compliance of a combination of 5G base station equipment from different vendors with O-RAN End-to-End (E2E) specifications established by O-RAN ALLIANCE (*2), an international Open RAN standards promotion organization. This is the world's first E2E Badge for the Non Stand Alone (NSA) system, which links 5G base stations to the 4G core network (*4).

Certification and Badging by Japan OTIC is expected to expand adoption and entry opportunities for equipment vendors, and enhance functions and shorten development and introduction periods for communications services, thereby contributing to the realization of a more open, more reliable, and more secure 5G communication society not only in Japan but also globally.

Outline of the O-RAN E2E Badge

Certification/ Badge Type; Certification/ Badge ID	Radio Access Technology under test	Device under test	Vendor name	Model name
E2E Badge; JPOT240001	5G NR	O-RU	NEC Corporation	MB5420-m5770
	5G NR	O-DU	SW: Rakuten Symphony / HW:	BareBone S5I 2U
	5G NR	O-CU		BareBone D52BQ 2U
	4G LTE	O-eNB OF	Quanta Cloud Technology	BareBone D52BE 2U
	4G LTE	O-eNB CU		BareBone D52BE 2U



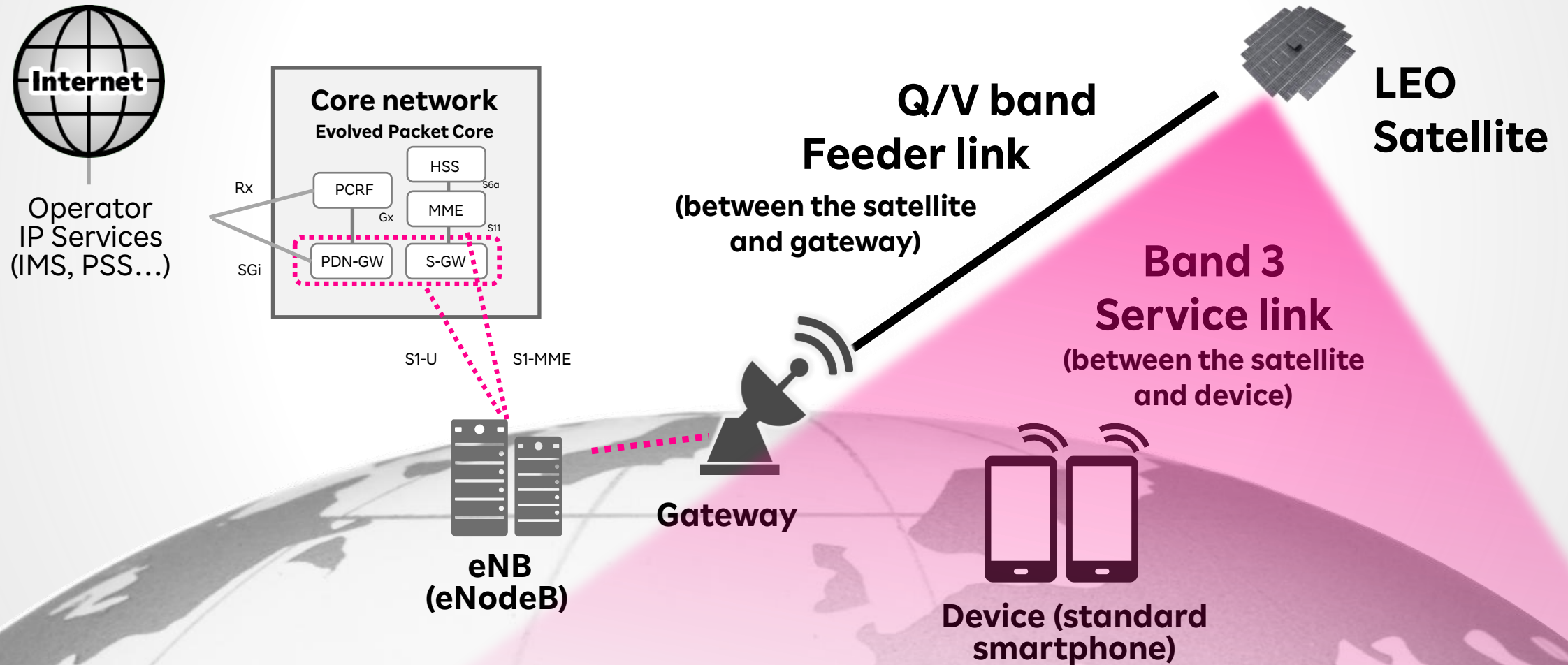
R&D into mobile communications using low Earth orbit (LEO) satellites with **AST SpaceMobile**

AST
SpaceMobile

Rakuten Mobile

Network architecture

The technology enables direct communication between everyday unmodified smartphones and the satellite



PoC with Blue Walker 3

Sep. 10, 2022

Successful launch of BlueWalker 3



April 21, 2023

Successful voice call via BlueWalker 3



Sep. 19, 2023

Successful 5G connectivity with 14Mbps download and Video call



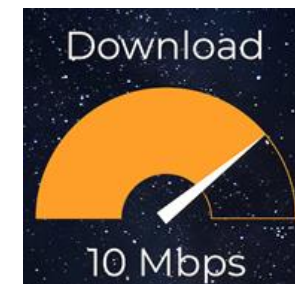
Nov. 14, 2022

Successful deployment of phased array antenna



June 21, 2023

Achieved download speed above 10Mbps



Rakuten Group CEO Mickey Mikitani successfully exchanged a voice call with AST SpaceMobile CEO Abel Avellan and AST personnel at a Hawaii test site



<https://www.youtube.com/watch?v=O0D4G5CKK9s>



Advancing technologies for the Beyond 5G era

Rakuten Mobile

Rakuten
Symphony

Rakuten Mobile