

# Open RAN推進分科会

## -Maturation of Open RAN-

9/8/2022

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Rakuten Mobile, Inc.

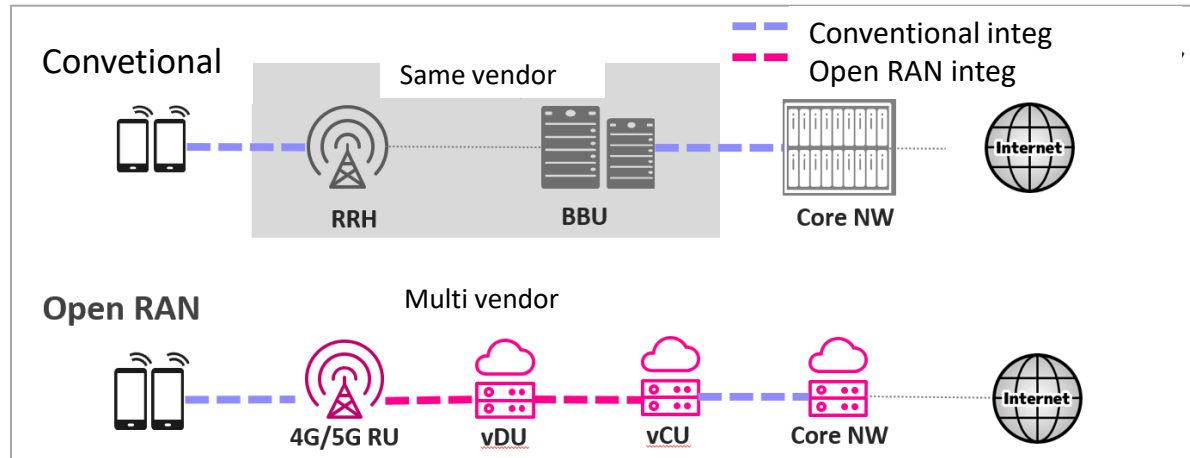
# Agenda

**1 : Open RAN Integration**

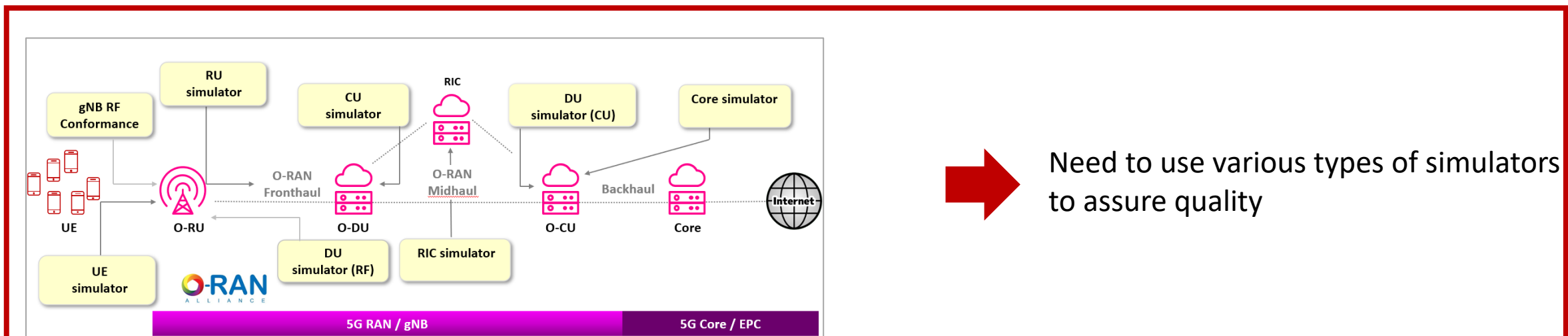
2 : Integration Support Program

# Integration and Quality Assurance of O-RAN

高品質 High quality and low cost, but integration has become more complex.  
Establishment of efficient integration methods and quality assurance methods are needed.



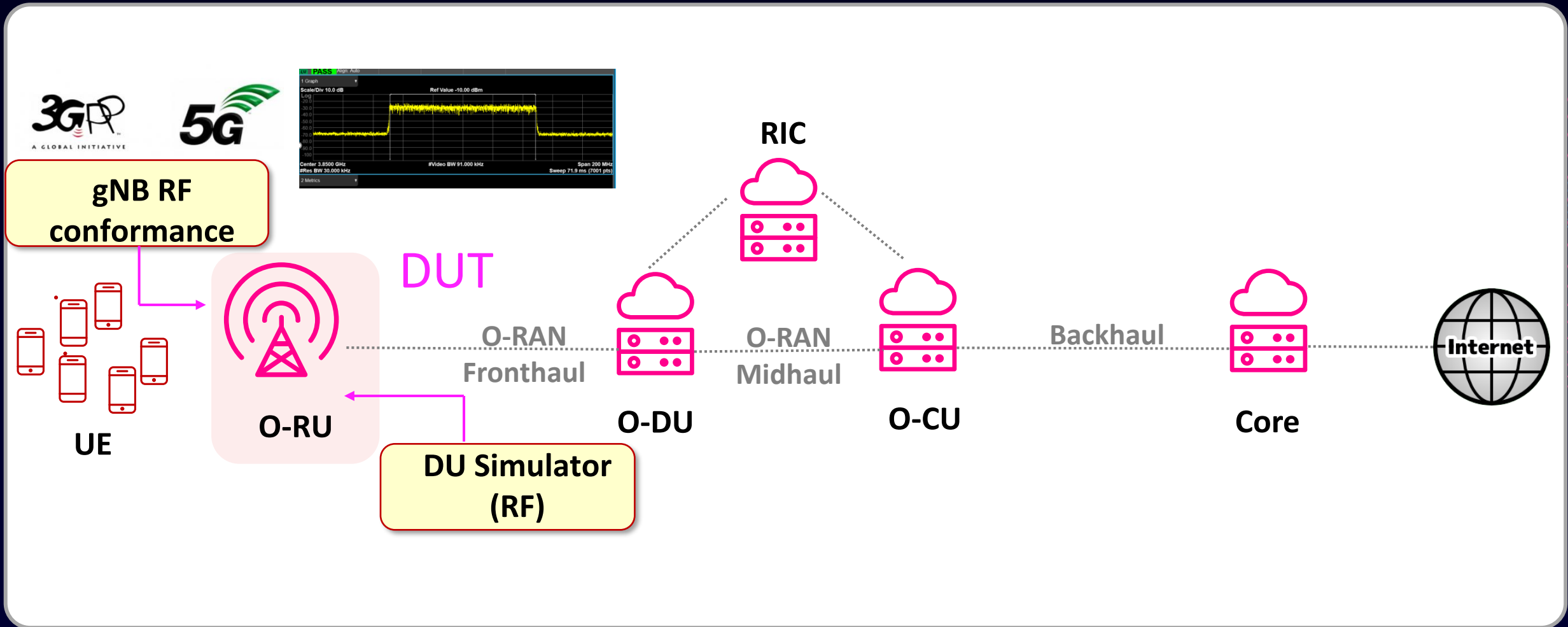
➔ Integration previously not considered by operators occurs



➔ Need to use various types of simulators to assure quality

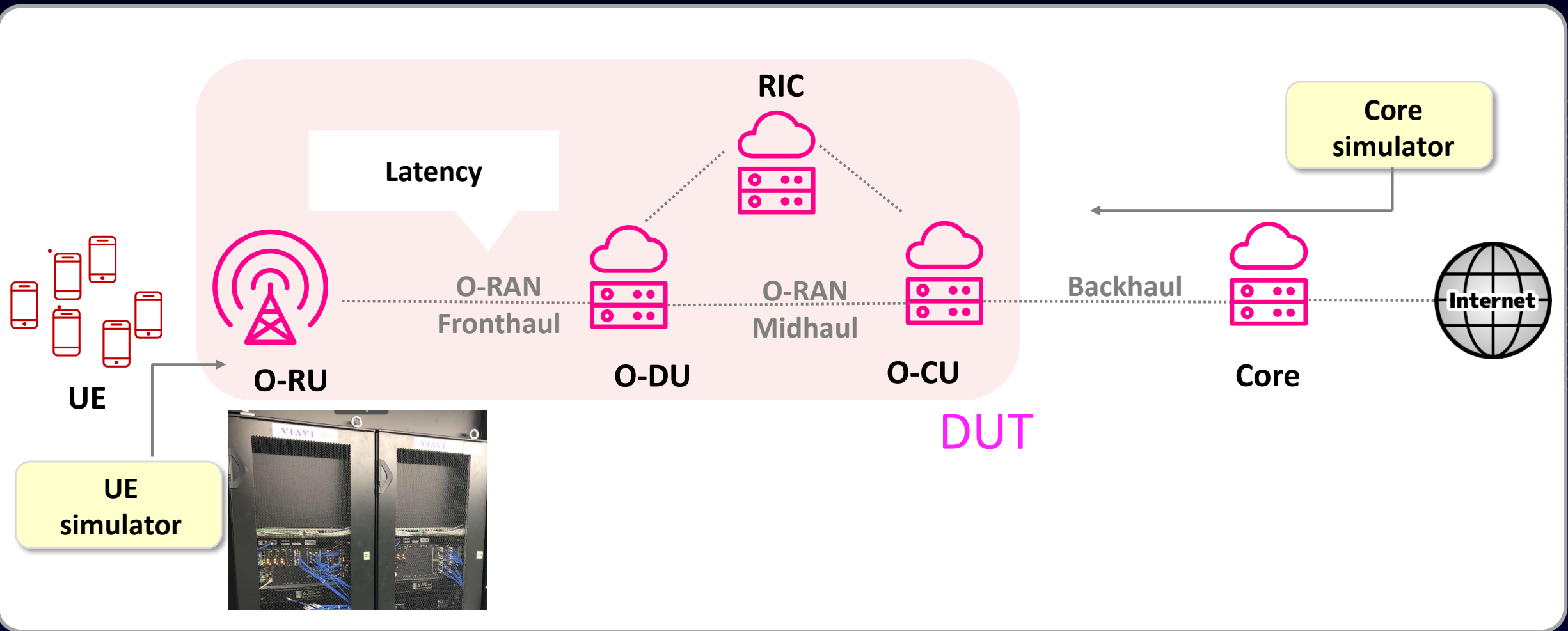
# O-RU test

Combination of 3GPP RF Testing and O-DU Simulator Introduced at Plug Fest



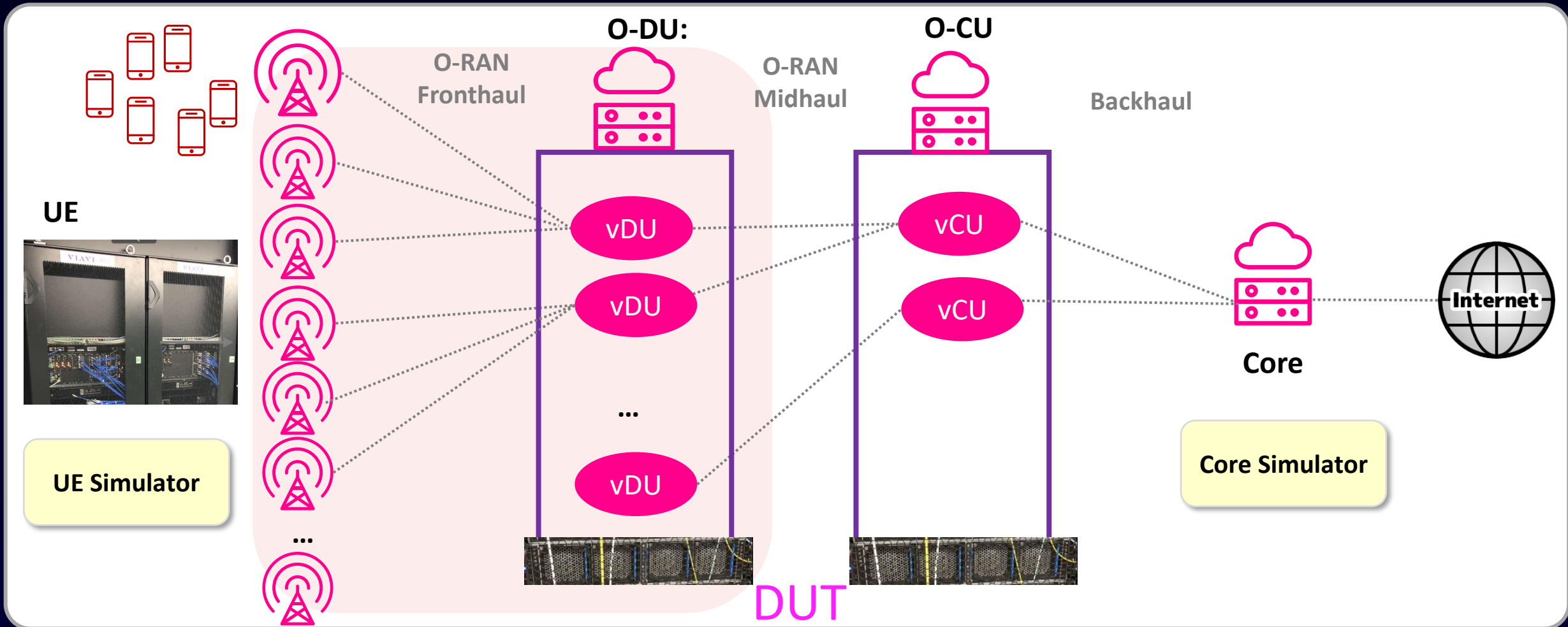
# O-RAN Fronthaul E2E test

Combination of UE and Core Simulator, Fronthaul Latency Considered



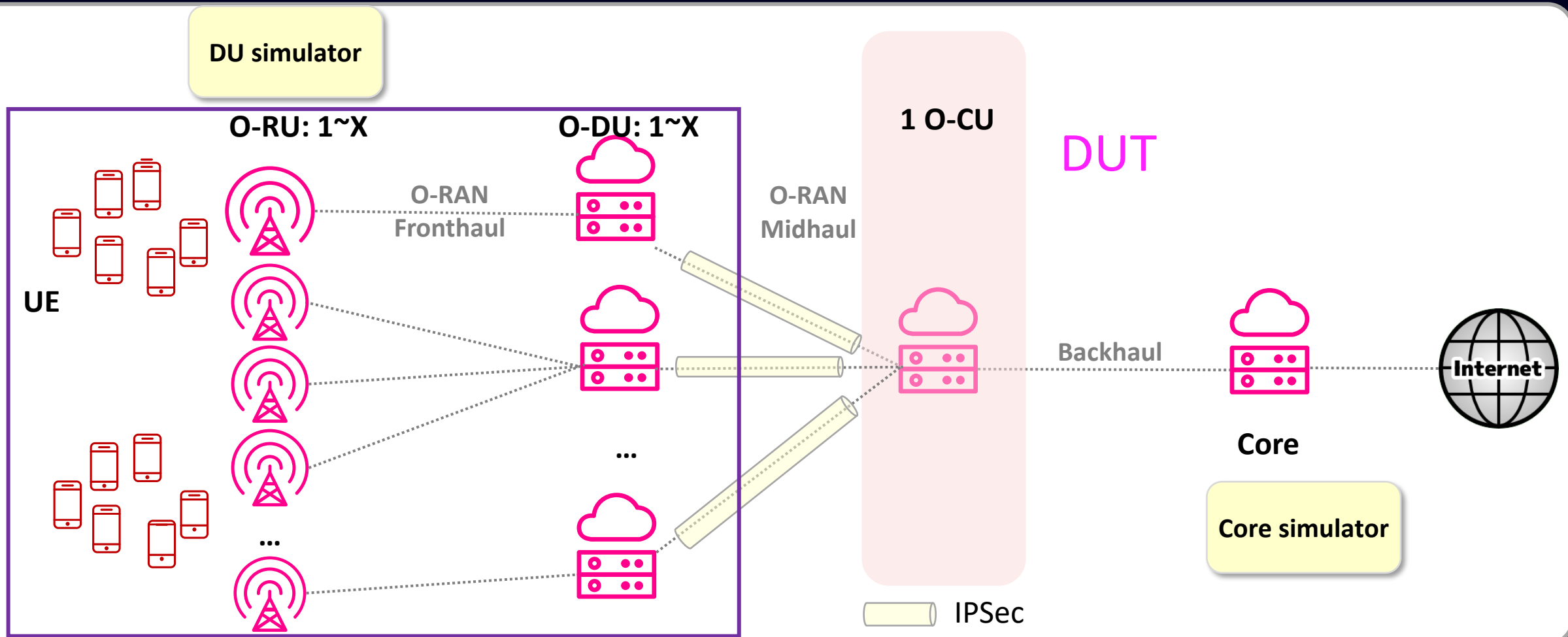
# vRAN RU/DU Performance Test

All vDUs in a server are put under load from UE and Core simulator to verify virtualization.



# vRAN CU Performance Test

O-RUs can accommodate multiple O-DUs, and O-RUs can also accommodate multiple O-RUs, the pattern increases.  
1 O-CU accommodates more than 100 O-RUs, so simulators including O-RUs are needed.



# Agenda

1 : Open RAN Integration

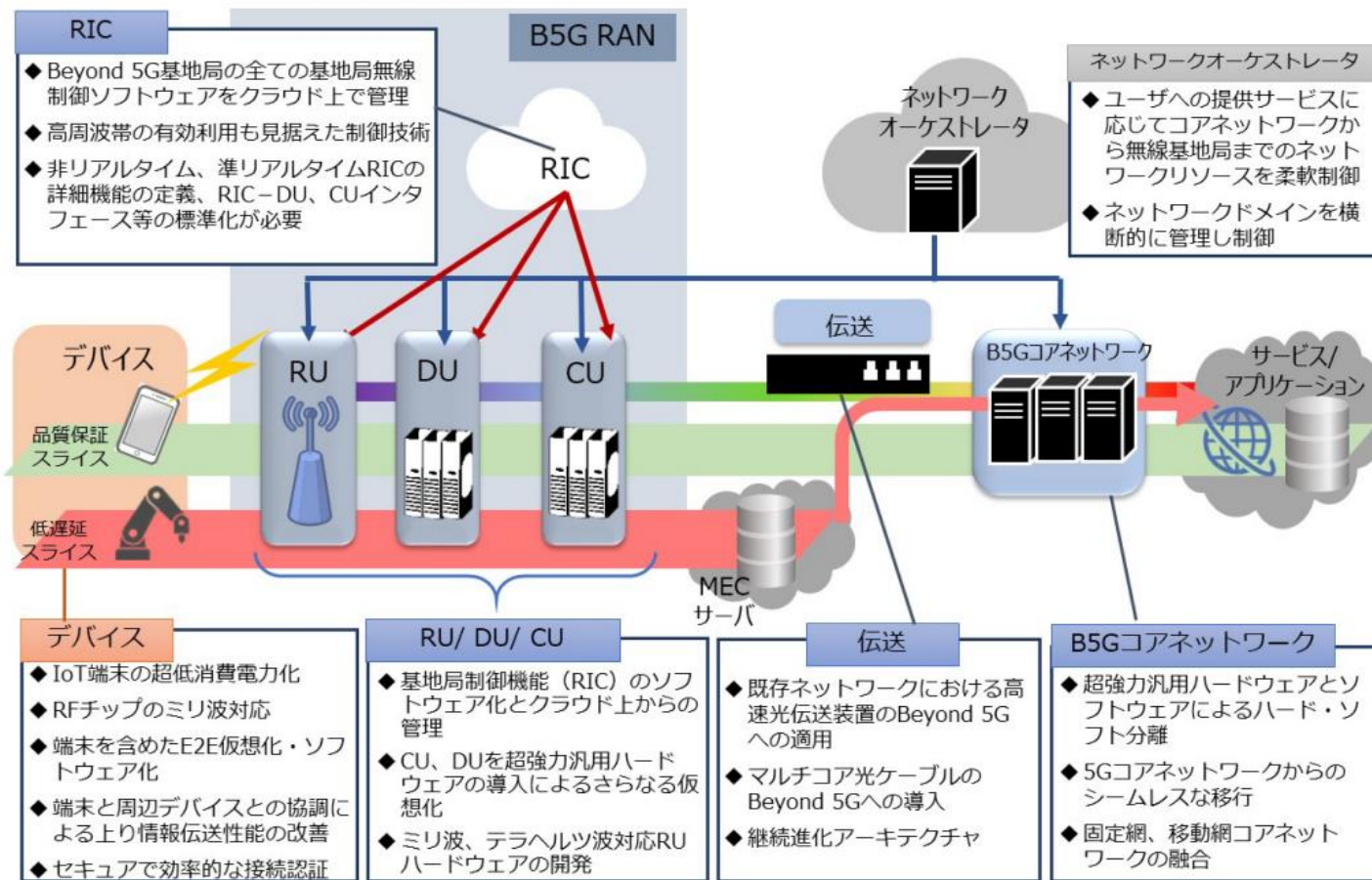
**2 : Integration Support Program**



# Basic Components of Beyond 5G Network

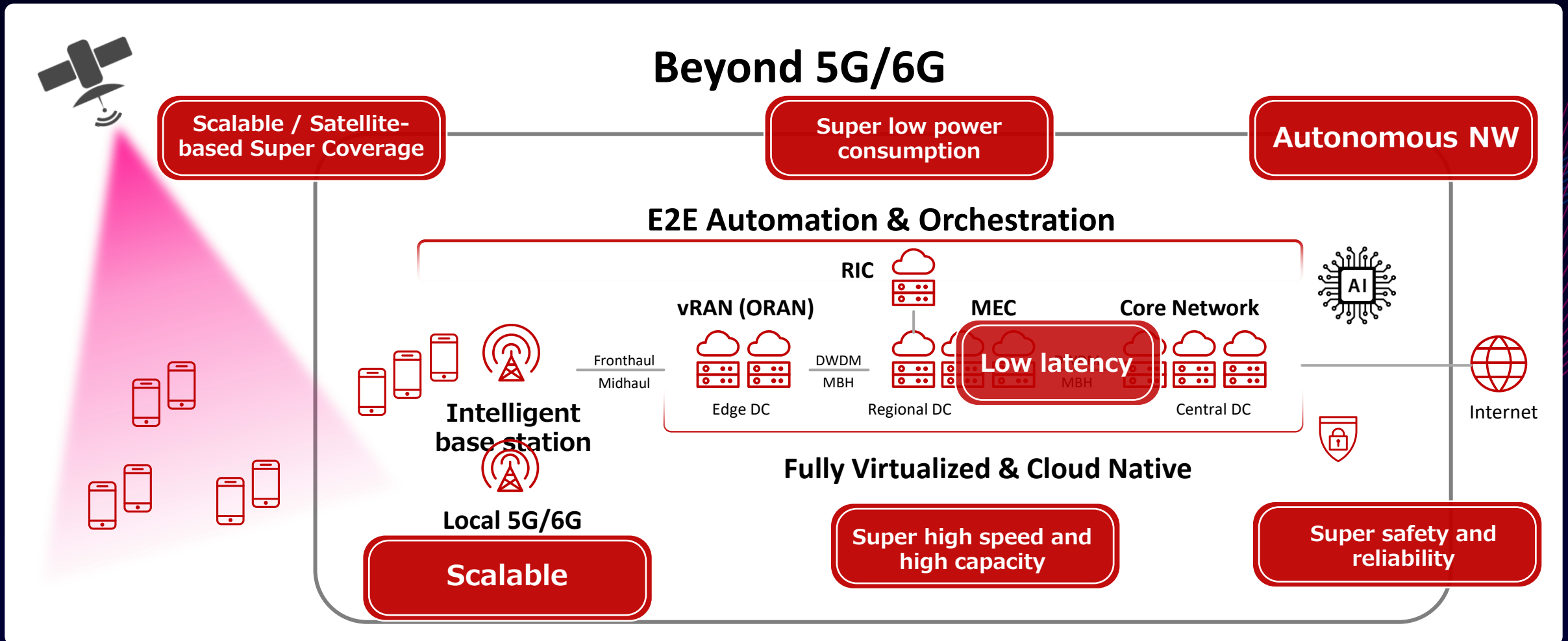
O-RAN and MEC, including RIC, are considered in the basic components of Beyond 5G Network stated by Ministry of Internal Affairs and Communications in Japan.

図表 15 Beyond 5G ネットワークの基本構成要素(方向性)



# Beyond 5G – Rakuten Mobile’s Focus Area

Rakuten Mobile NW is taking into account the future NW configuration set forth by O-RAN ALLIANCE and MIC.



# Domestic and Global Expansion Support

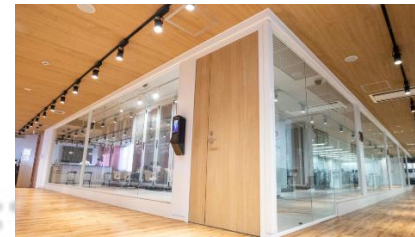
New lab in India as a R&D center for Open RAN-based cloud-native mobile network was established.  
The domestic lab also provide partner support programs.

**Rakuten Symphony Global  
Innovation Lab**

**Rakuten Cloud Innovation Lab**

**Rakuten Symphony**

**Rakuten Mobile**





# Joint R&D with Partners for Beyond 5G

Depending on the partner's demonstration, not only remote testing, but also joint R&D by installing Rakuten Mobile's O-RAN and related equipment in the partner's environment.



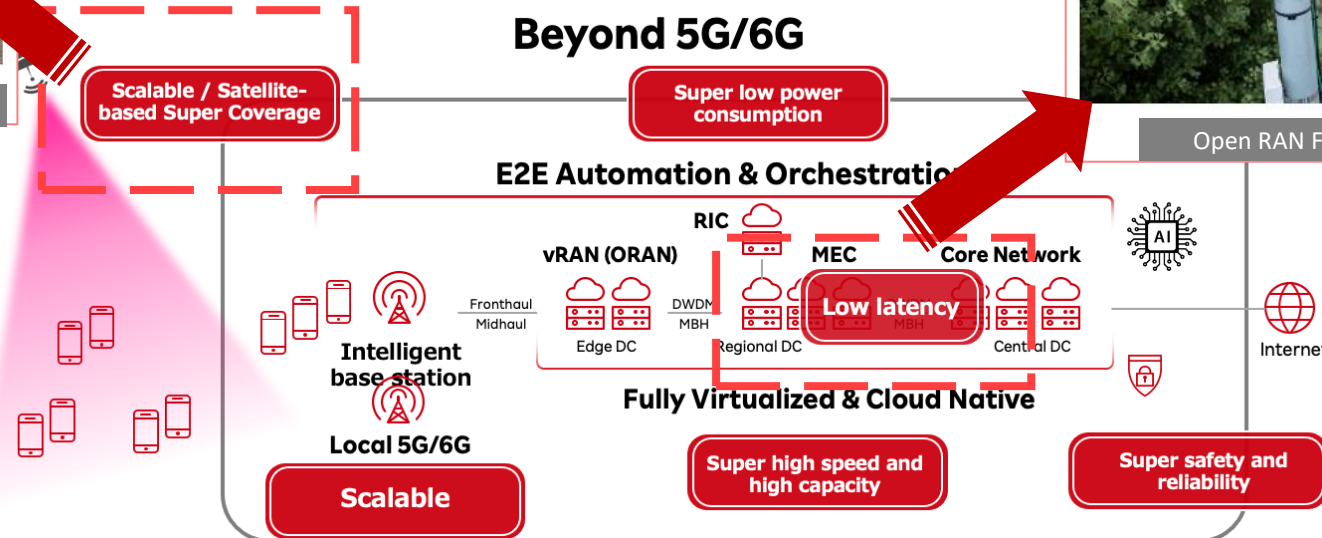
Open RAN Facility of the University of Tokyo

## Low Earth Orbit Satellite Joint R&D

## Beyond 5G Edge Cloud Computing Joint R&D

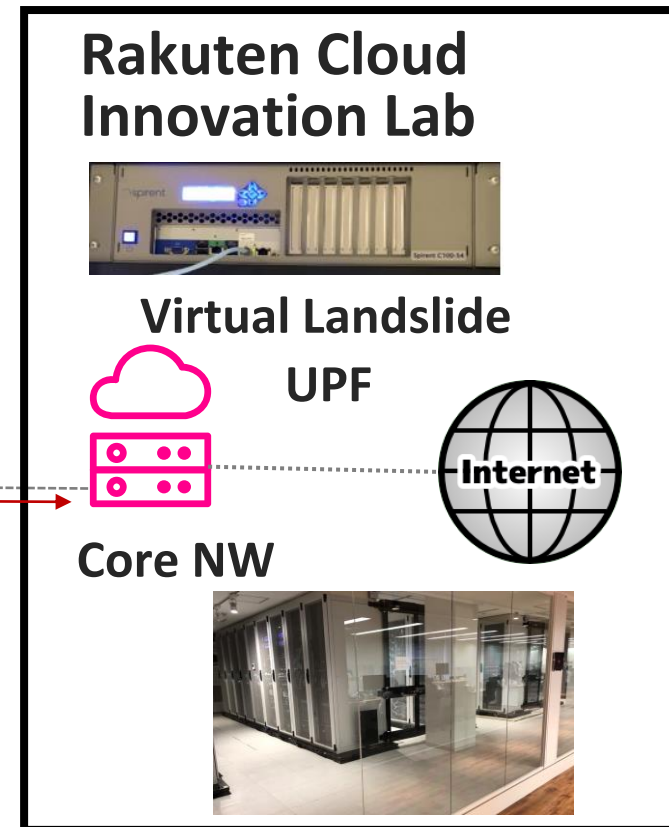
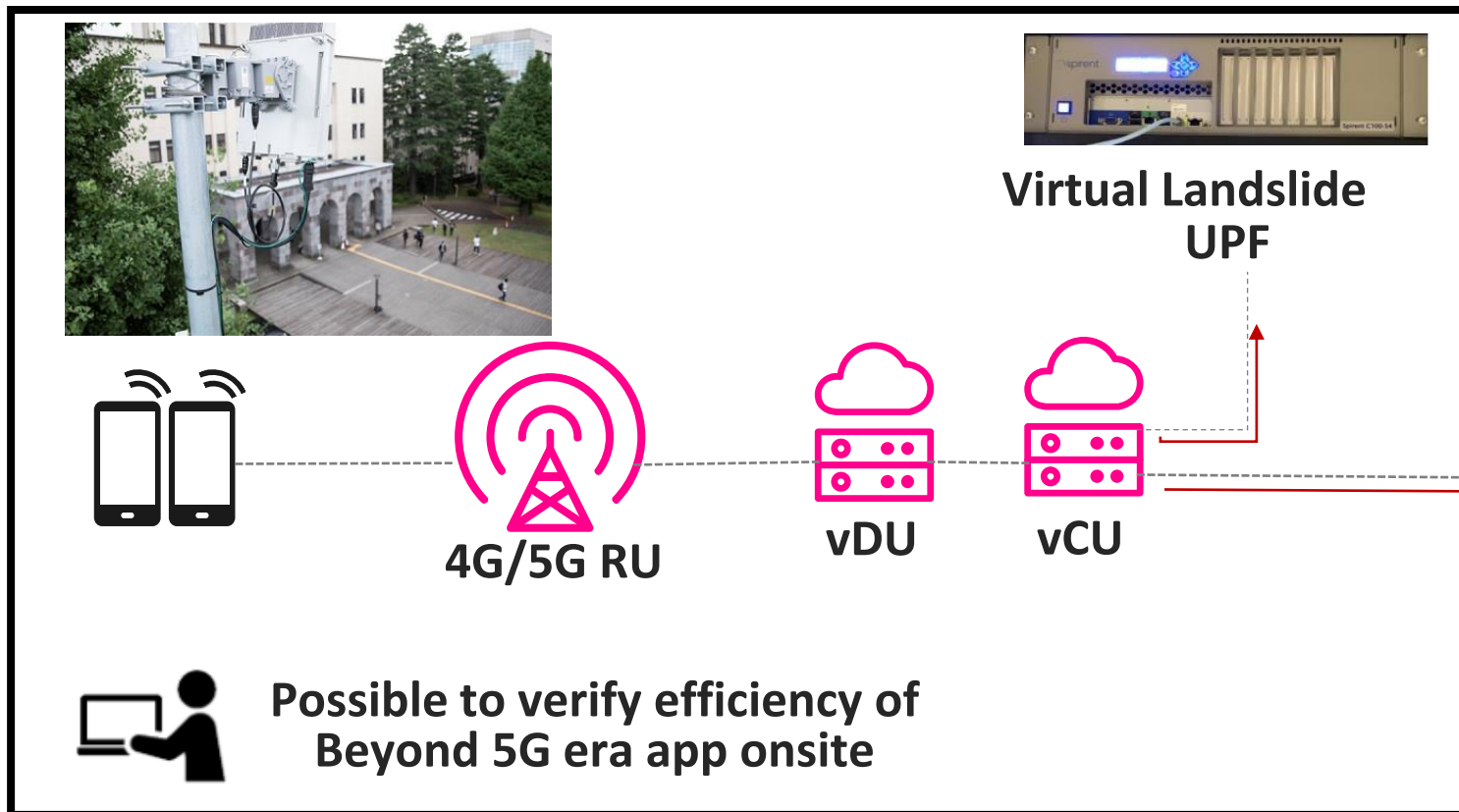


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# Examples of Edge Cloud Computing Demonstrations

Change 5GC placement with Virtual version of Landslide  
for more effective low latency

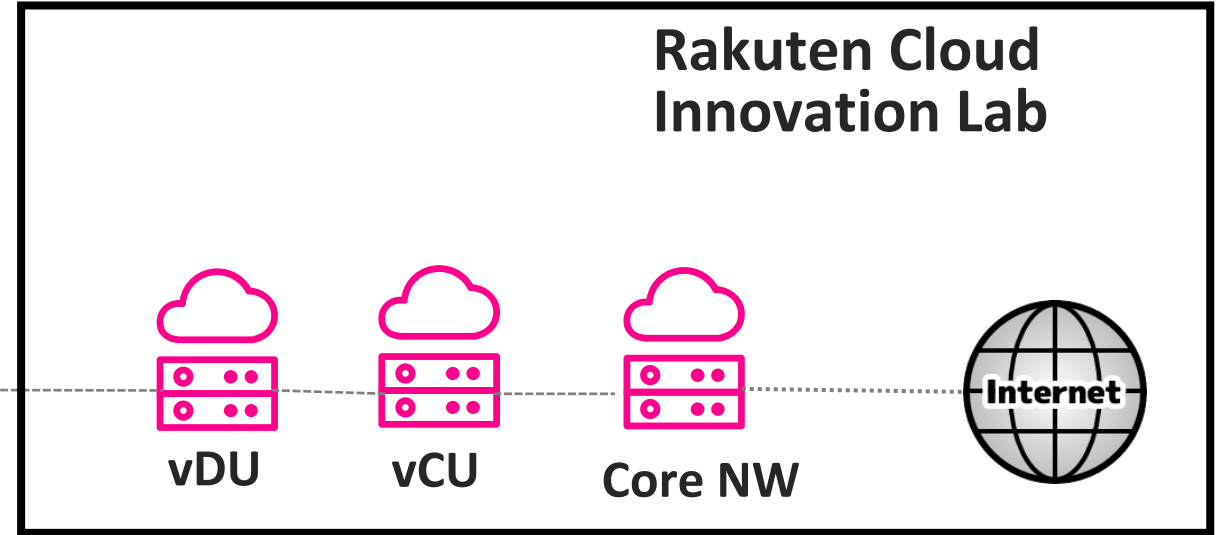
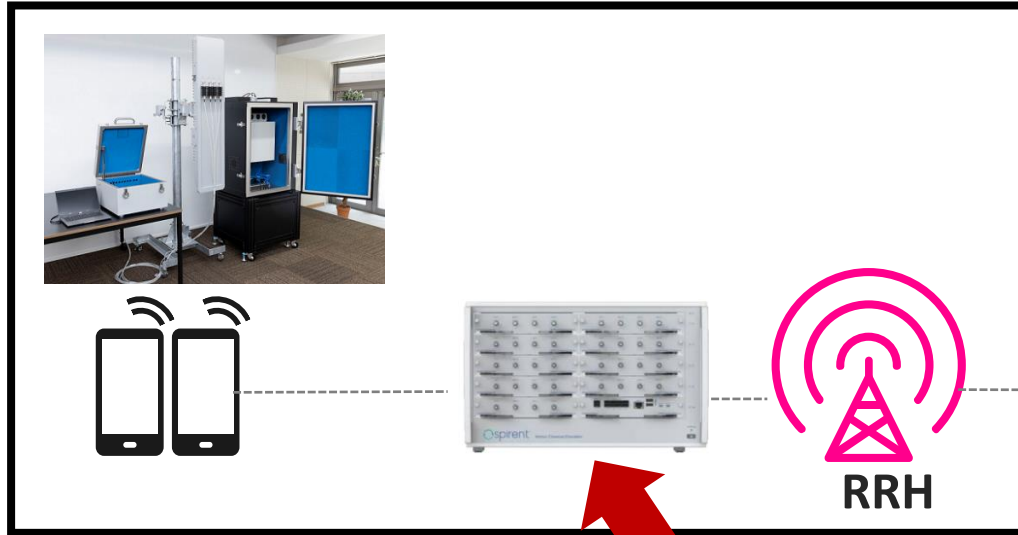


Possible to access remotely



# Example of SpaceMobile Demonstrations

For Space Mobile demonstration in vRAN configuration, provide wireless environment Partner environment to be augmented according to research themes



Emulate wireless environment with consideration of satellite-specific delays

# Example of O-RAN Integration

Support various types of O-RAN testing remotely, including E2E testing, if vendor's equipment to be tested is brought in the lab.

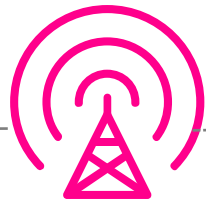
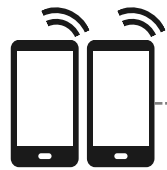
## O-RAN Integration Support Environment



UE simulator



Landslide C50



4G/5G RU



vDU



vCU

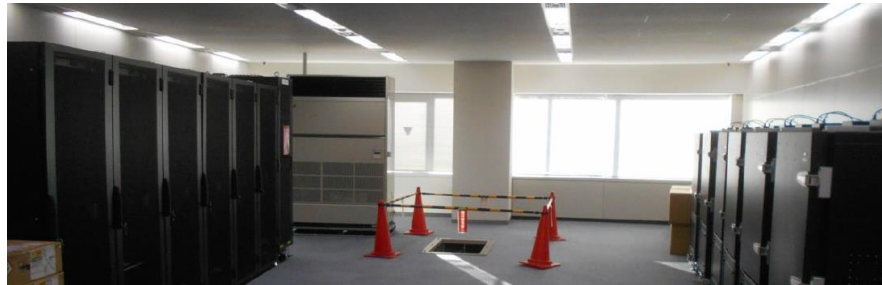
Core of our Lab environment can be used as a connection point for CU.



Core NW



Internet



Various Open RAN Simulator



## Rakuten Cloud Innovation Lab



**Rakuten** Mobile