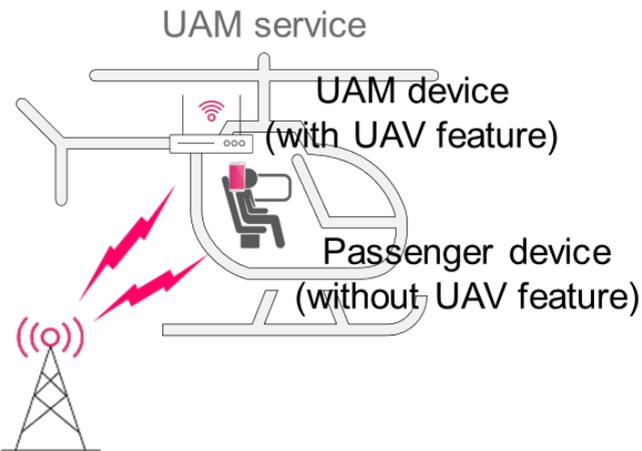


Challenges on UAM

Issues on Service scene

❑ UAM communication

- Branched to ATC (Air Traffic Control) communication and Passenger communication



ATC communication

Device installed on aerial vehicle



- Higher reliability and uplink data rate (Sensing data, Video, Possibility on tethering service for multiple devices)



Passenger (with airborne communication feature)

Passenger's device can support airborne communication features.



- Device type with the features could not be general.
- Bigger power consumption due to unstable channel



Passenger (w/o airborne communication feature)

Passenger's device cannot support airborne communication features.



- The device on the air cannot be distinguished from device on the ground.
- Unless distinguished, frequent HO, low quality by strong interference, ANR distortion could be.



Issues on Network deployment

❑ Possible network deployment methods for UAM service

Using ground network deployment

Utilizing the side lobe of the ground-network antenna for aerial service



- Unstable aerial channel due to jagged side lobe (frequent HO, etc)
- Lower SINR for the similar RSRP as comparing to the ground network (different criteria for cell optimization)



Additional uptilted antenna

Installing additional uptilted antenna for aerial service

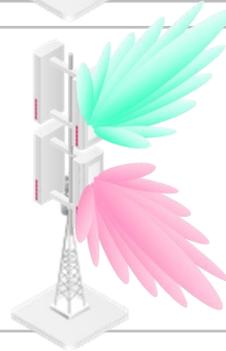


- Interference to the ground network by the back/side lobe of the additional uptilted antenna



Dedicated spectrum for aerial service

Applying dedicated spectrum to aerial service

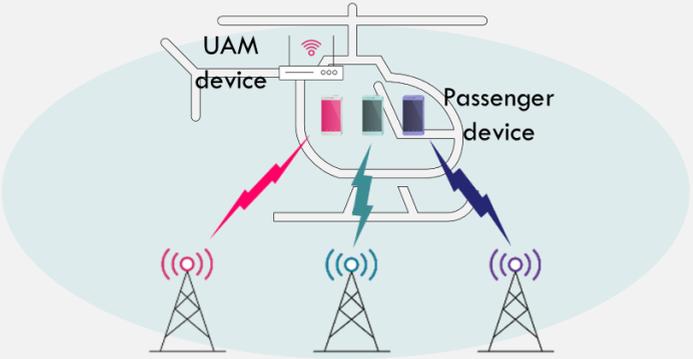


- Without mobile relay, a passenger cannot take the aerial service since the dedicated spectrum will not be supported by the passenger's device.



Issues on Multi-tenant operation

- ❑ UAM should support multi-tenant mobile communication for passengers contracted with diverse telecom operators.

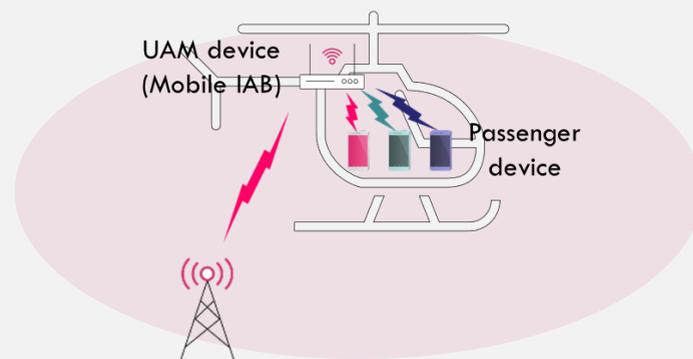


The diagram illustrates direct communication. A helicopter is shown with a 'UAM device' and a 'Passenger device' inside. Three ground-based radio towers are positioned below the helicopter. Colored lightning bolts (red, green, and blue) represent direct communication links between each tower and its corresponding device on the helicopter.

Direct communication

Passenger device will do direct communication with corresponding operator network individually.

- Passenger devices should be distinguished from ground devices.
- Interference between ground and aerial network should be resolved.



The diagram illustrates relay communication. A helicopter is shown with a 'UAM device (Mobile IAB)' and a 'Passenger device' inside. A single ground-based radio tower is positioned below the helicopter. A red lightning bolt connects the tower to the UAM device. Inside the helicopter, colored lightning bolts (red, green, and blue) connect the UAM device to the passenger devices.

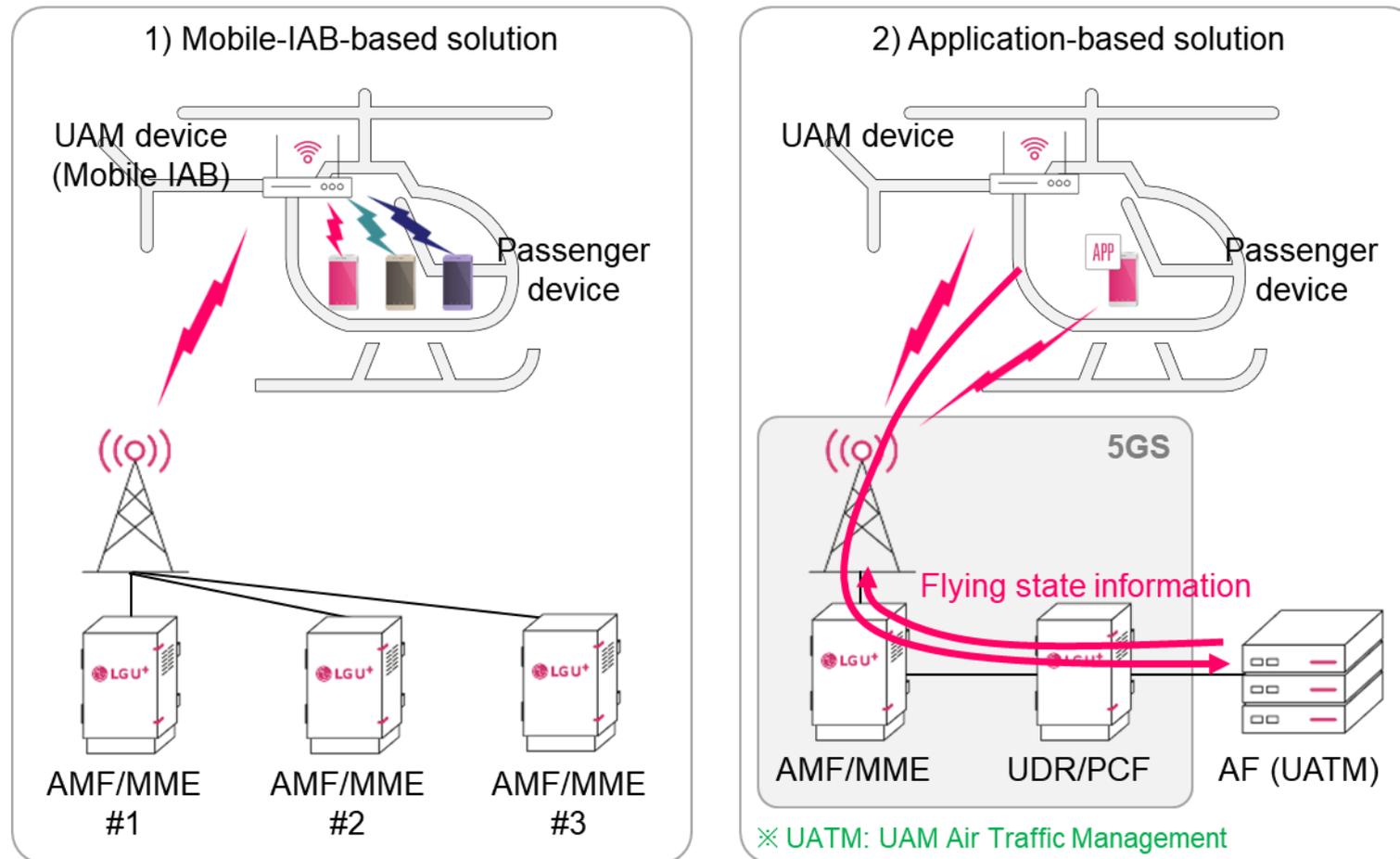
Relay communication

Passenger device will connect to mobile IAB DU and mobile IAB MT will connect to shared RAN.

- Mobile IAB MT/DU should connect to multiple PLMNs.
- Donor gNB should cooperate with multiple PLMNs.

Candidate solutions

- We suggest two candidate solutions. For Rel-19, we suggest **application-based solution as an identification baseline solution.**



Research topics



How to distinguish aerial device from ground device?

How to resolve interference between ground and aerial network?

How to support multi-tenant operation?

How to maintain connection between device and mobile IAB on boarding for both connected and idle modes?

Thank you!
