



## VIRTUAL PRESENCE IN MOVING OBJECTS THROUGH 5G

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# Outline

- Project goals
- Use case: Public safety/emergency response
- Testbeds and testing scenario



# Project Goal

- PROJECT GOAL

- To demonstrate an *end-to-end 5G system providing immersive video services for moving objects*. This will be done by *cross-continental testbeds* that integrate radio access and core networks developed by different PriMO-5G project partners.

- OBJECTIVES

- **Objective 1:** To demonstrate an end-to-end 5G system providing immersive video services for moving objects
- **Objective 2:** To develop technologies of mmWave access, 5G core networks, and AI-assisted communications fulfilling requirements for Objective 1
- **Objective 3:** Input to 5G standardization and spectrum regulation activities

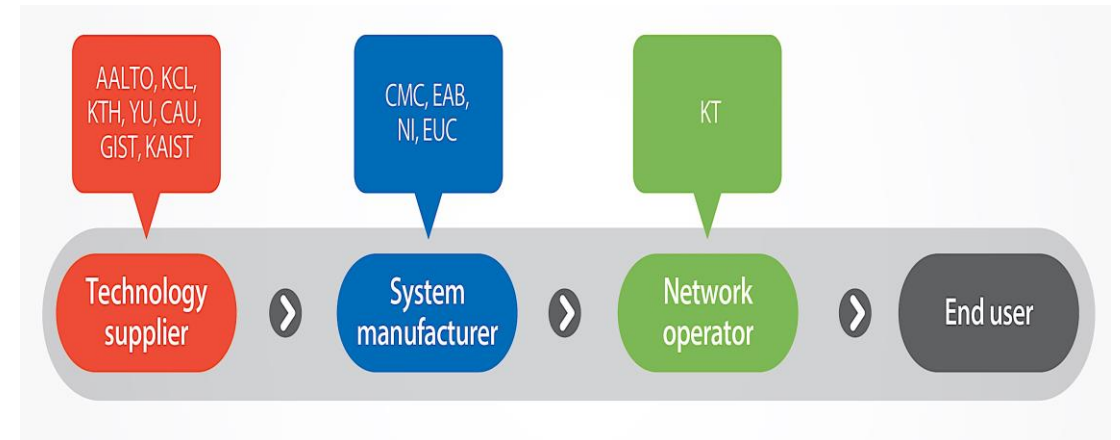


# Consortium

## EUROPEAN PARTNERS

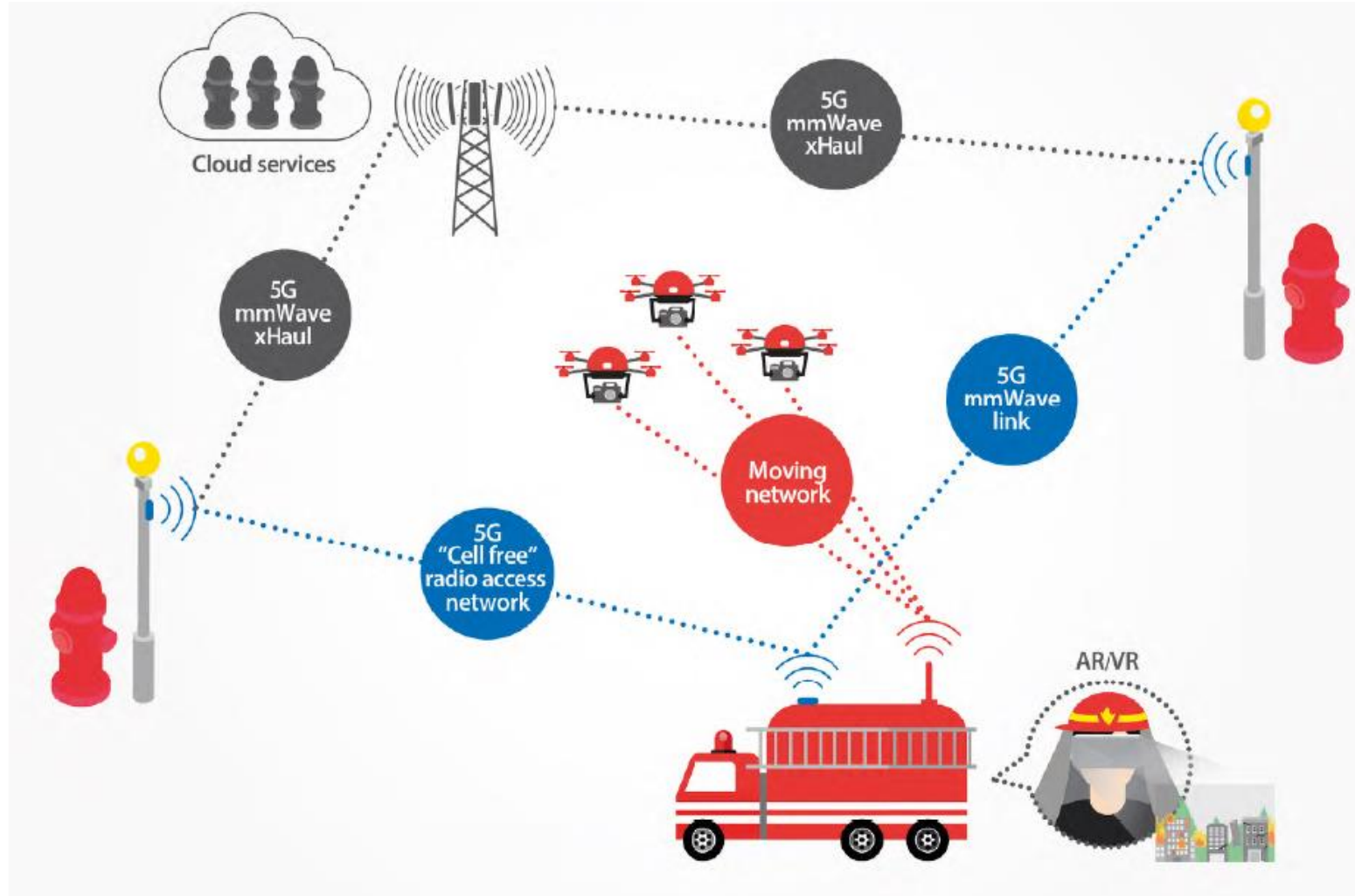


## KOREAN PARTNERS



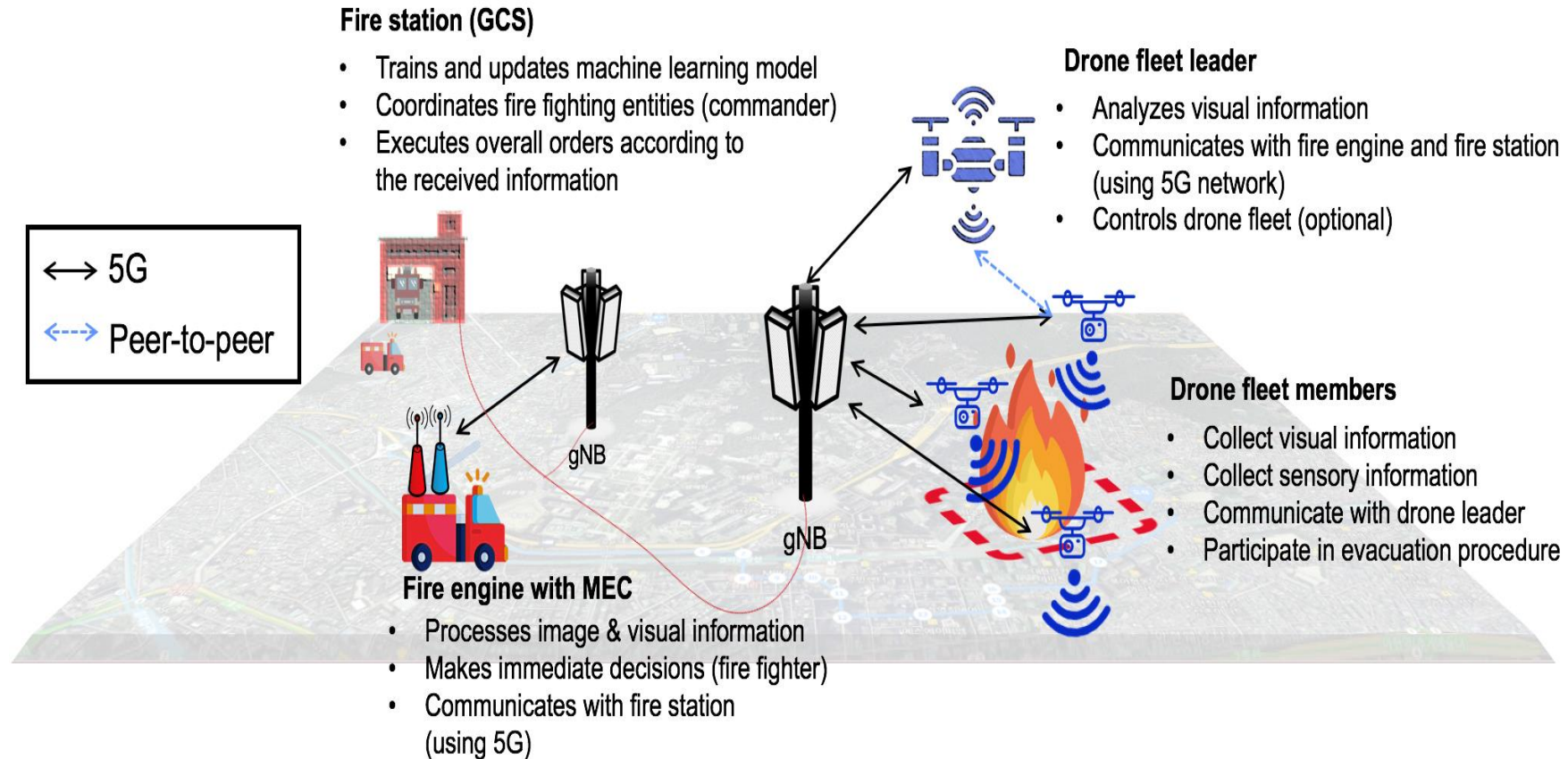
Value chain of 5G industry and the representation by PriMO-5G consortium

# Use Case: Public safety/emergency response

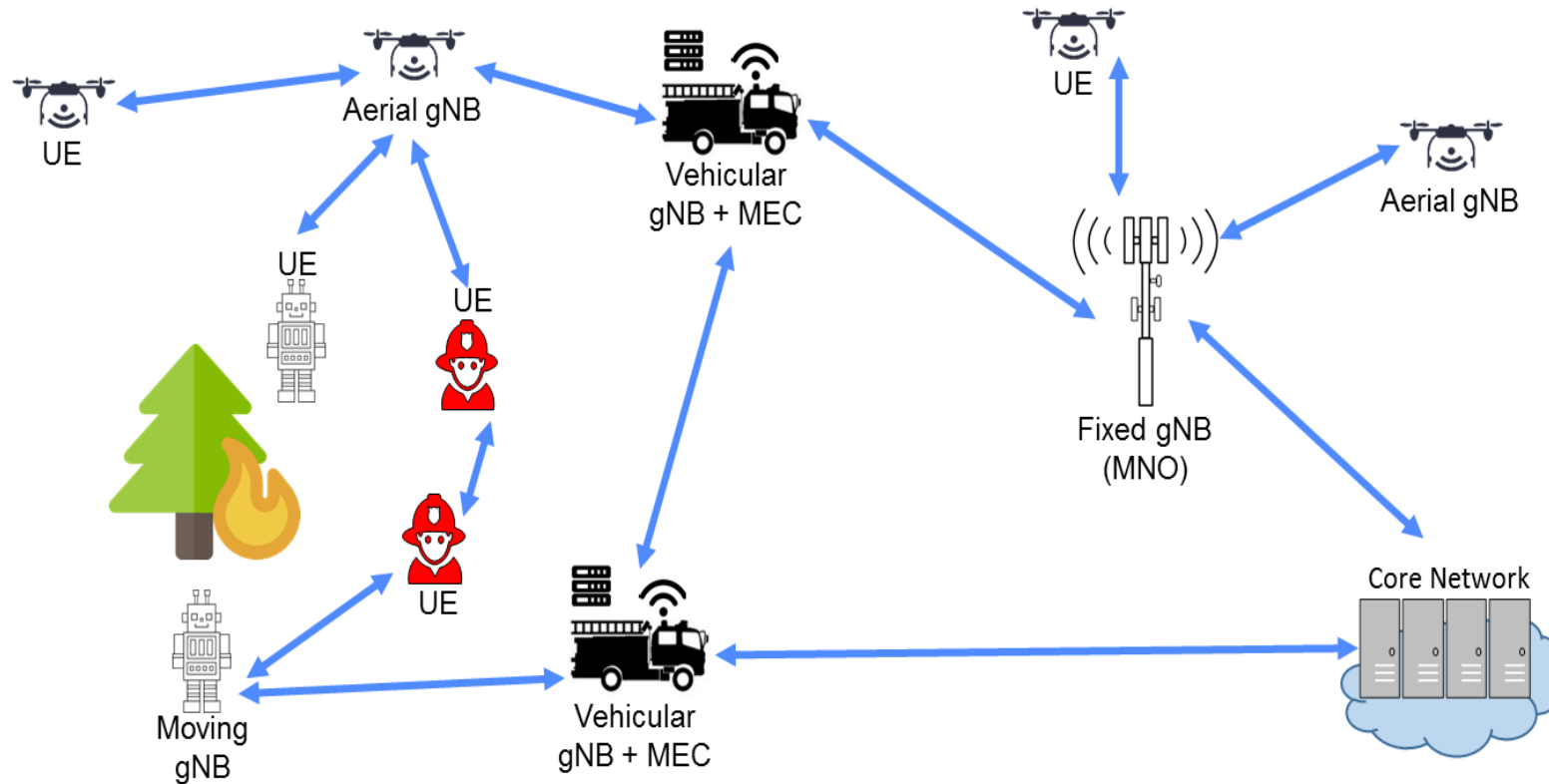




# Use Case: Firefighting in urban areas



# Use Case: Firefighting rural areas



Infrastructure may not be present. The network must be deployable.

# Testbed components

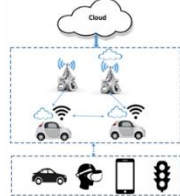
**A!**  
Aalto University



AALTO 'TAKE-5' test-network



UDN SDR testbed

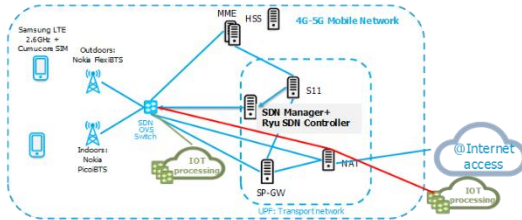


Vehicular fog Computing platform

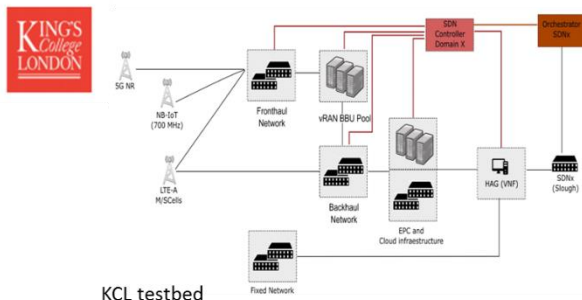


Drones-based integrative IoT platform

**Cumucore**

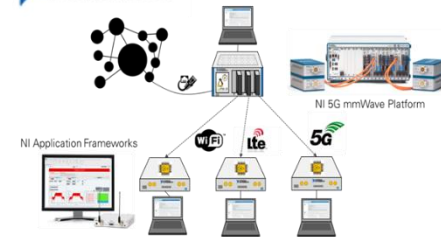


Virtualized SDN based core network



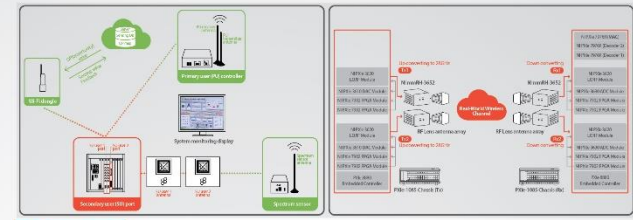
KCL testbed

**NATIONAL INSTRUMENTS**



NI's 5G Multi-RAT platform

EU



YU testbed



KAIST Drones



CAU Edge Server

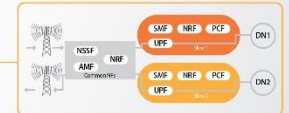


EUCAST Mobile LTE eNB

KT mmWave NR Link



KT 5G



EUCAST Mobile LTE eNB

KT mmWave NR Link

Korea



# Testbeds – 5G OPEN

- Yonsei University in Seoul, Korea has announced its launch of the world's first 5G OPEN (Open Platform for Evolved Networks) in partnership with KT.
- 5G OPEN is an R&D platform based on a 5G commercial network established as part of an agreement signed by Yonsei University and KT last October.
- It is the Korean testbed of the Korea-Europe joint research initiative PriMO-5G Project\*, a joint research consortium of European and Korean universities and industry partners with the initiative to demonstrate an end-to-end 5G system providing immersive video services for moving objects. .



# YONSEI UNIVERSITY - KT 5G R&D TEST NETWORK CONFIGURATION

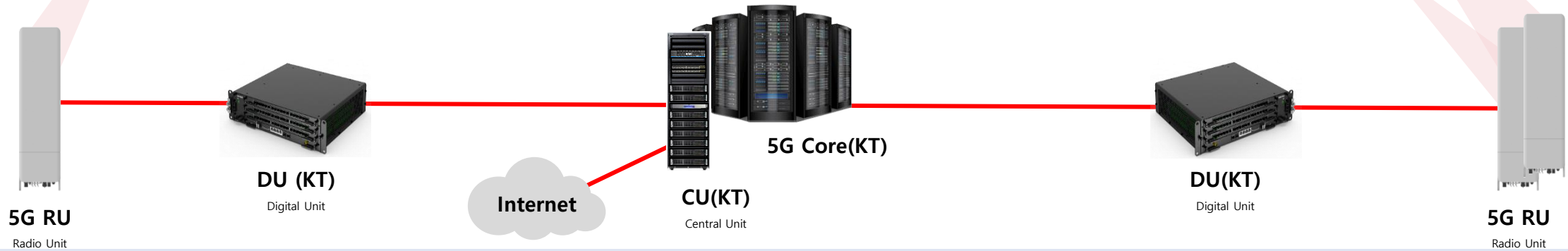
5G 3.5GHz 3 RUs open, / YU global campus 28GHz RU will be opened until 2019

Yonsei International Campus (Song-do, Incheon)

Yonsei Main Campus (Sinchon, Seoul)



Yonsei-KT  
5G OPEN







# KT 5G base station (3.5GHz, YU Global Campus, Incheon, Korea, 2018.11.30)





# Ground Control Station (YU, Seoul, Korea, 2018.11.30)



# GPU-based mobile computation server (Seoul, Korea, 2018.11.30)

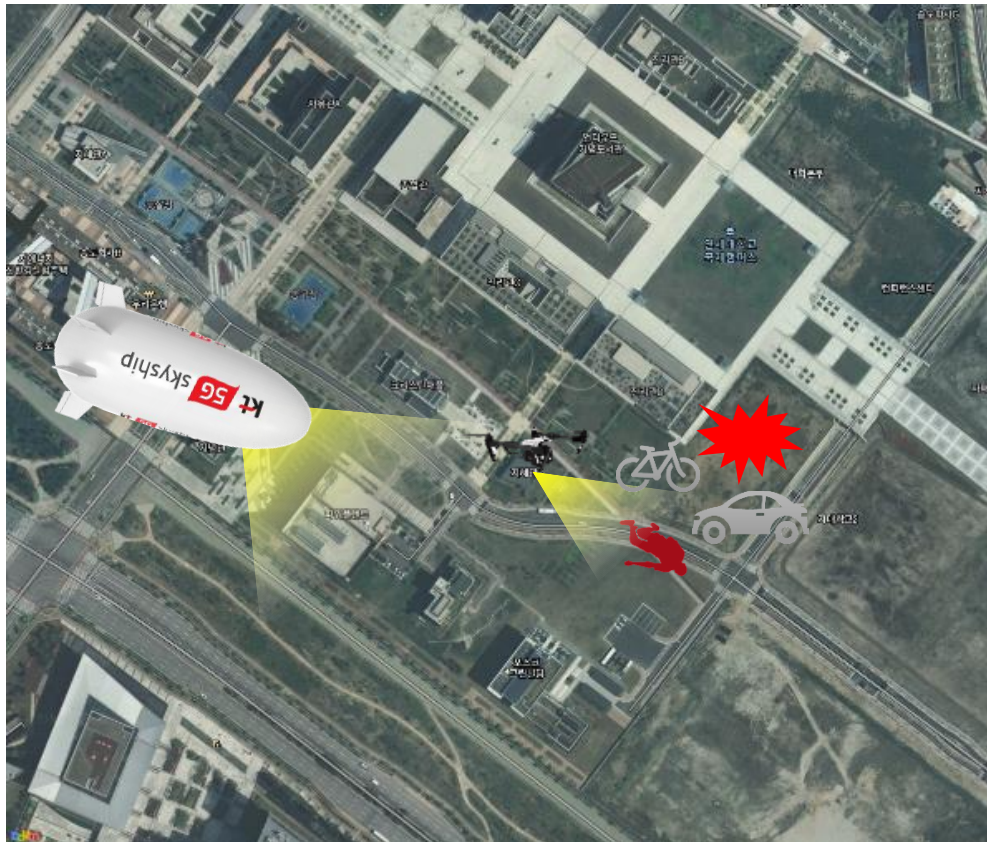




# TESTING SCENARIO

1. Traffic accident (Incheon)
2. Arial surveillance & recording (KT skyship & YU drone)
3. Video real-time streaming through 5G network and processing (Seoul)

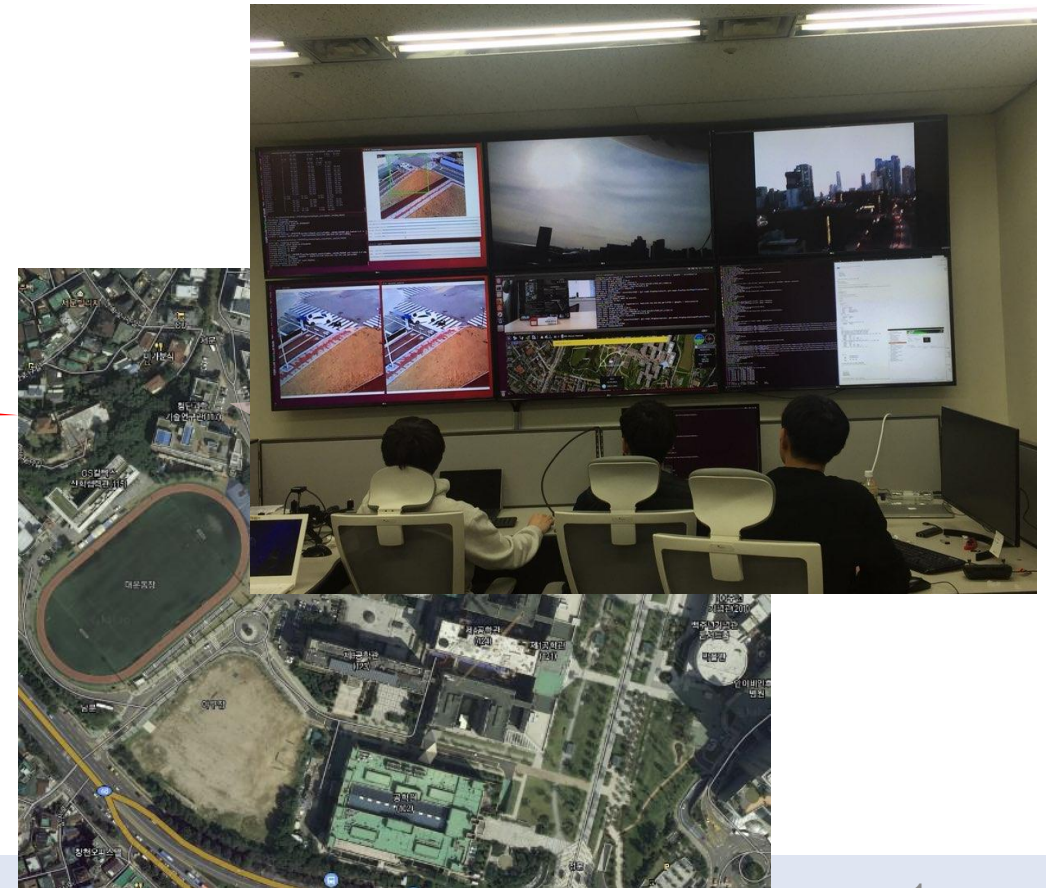
International Campus (accident spot)



5G



Yonsei Main Campus (Ground Control Station)



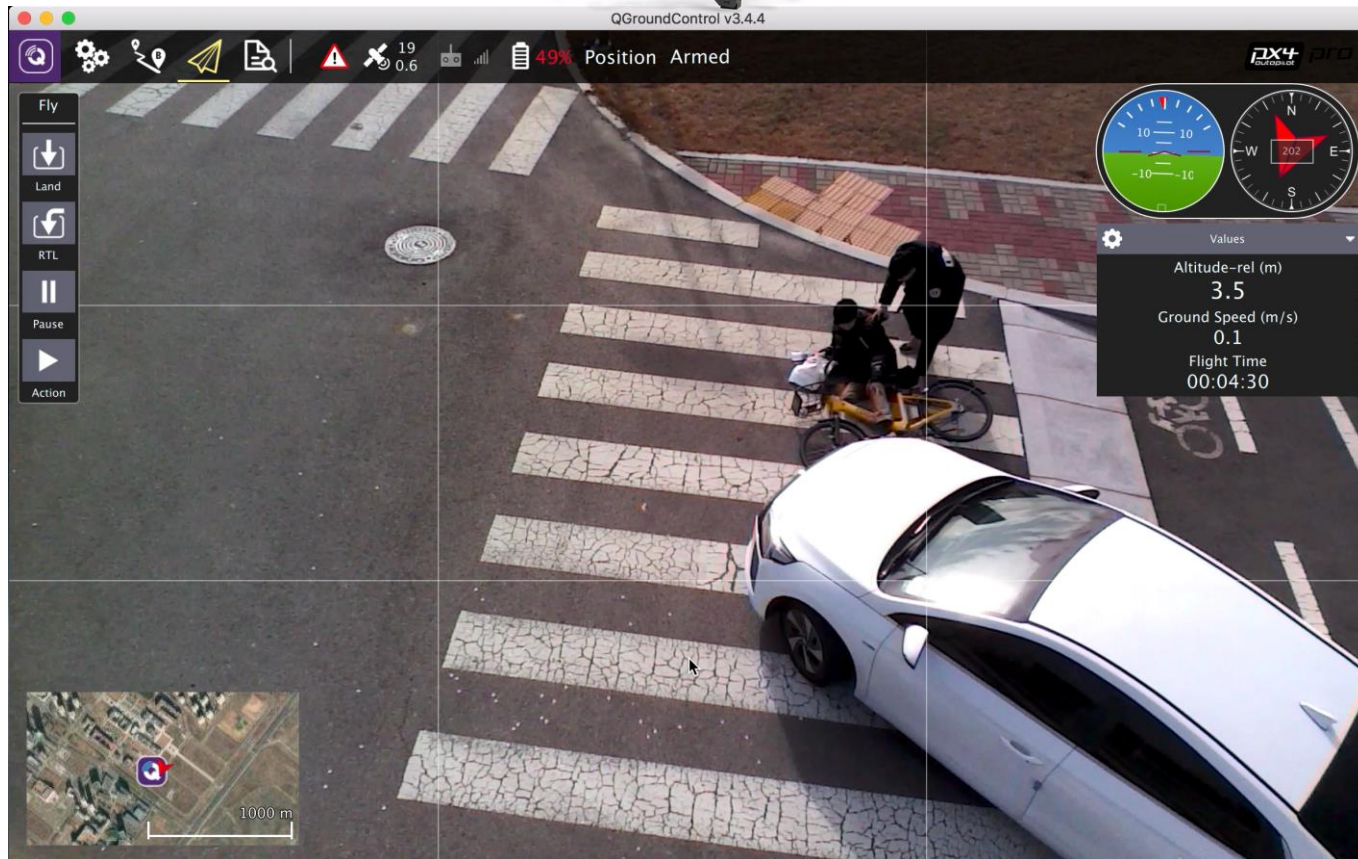




# Autonomous UAV Control System



QGroundControl v3.4.4





Event surveillance



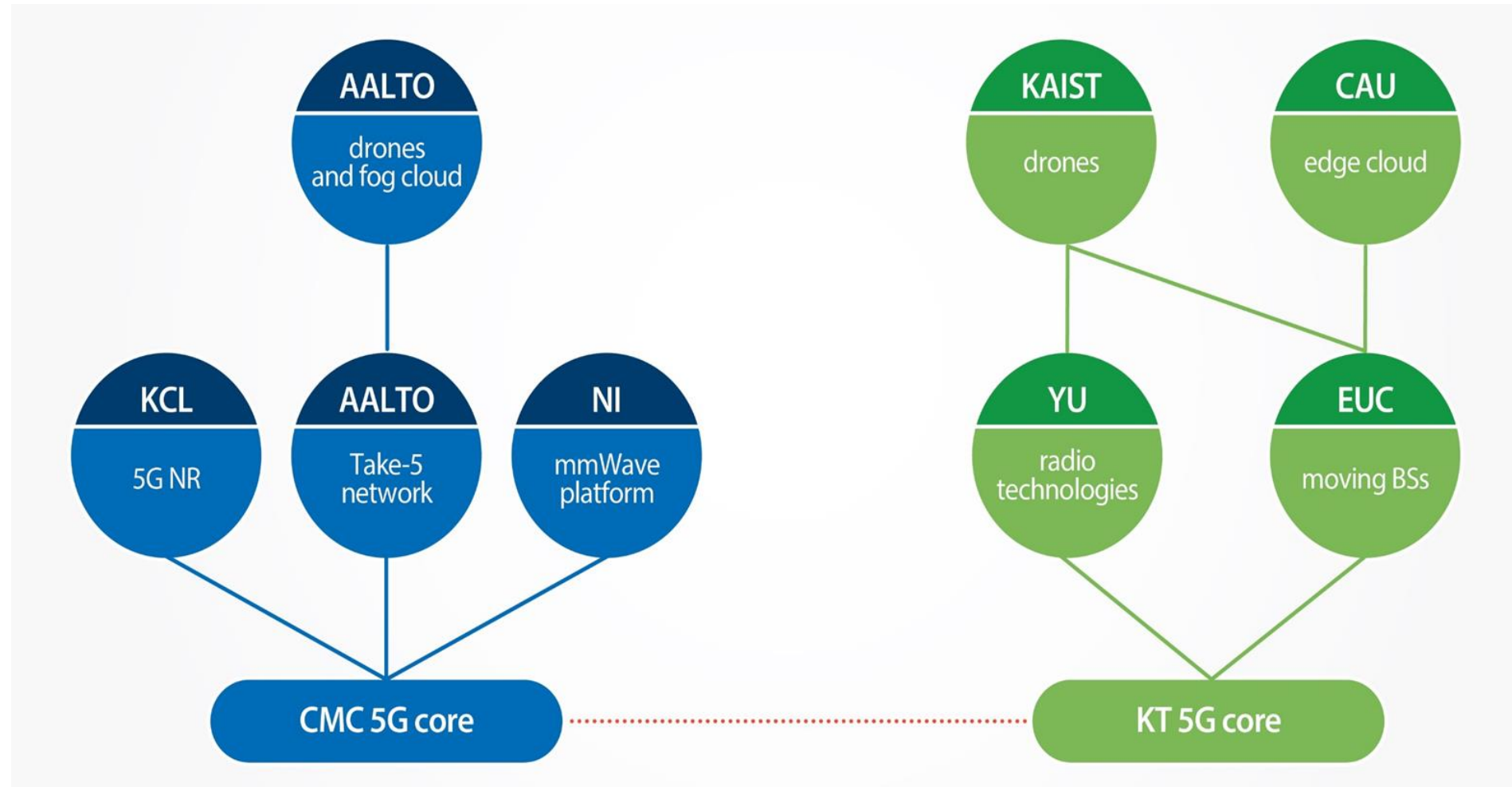
Disaster surveillance



Sports event streaming



# Cross-continental testbed integration



AALTO: Aalto University (Finland)  
 CAU: Chung-Ang University (Korea)  
 CMC: Cumucore (Finland)  
 EUC: EUCAST (Korea)  
 KAIST: Korea Advanced Institute of Science and Technology (Korea)  
 KCL: King's College London (UK)  
 KT: Korea Telecom (Korea)  
 NI: National Instruments (Germany)  
 YU: Yonsei University (Korea)



<https://primo-5g.eu/>



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[@PriMO5G](https://twitter.com/PriMO5G)



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