OneM2M-based Unmanned Aircraft Data Management Platform
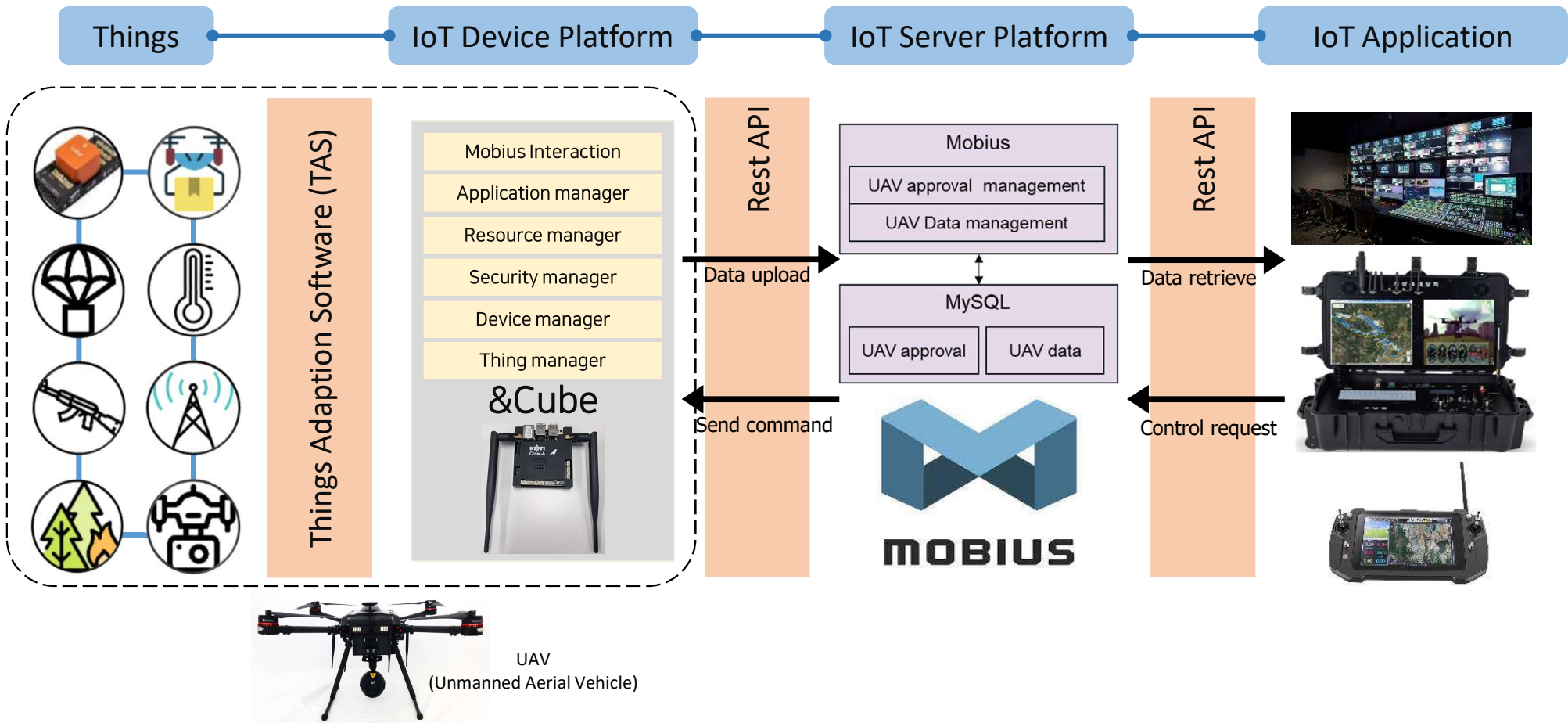
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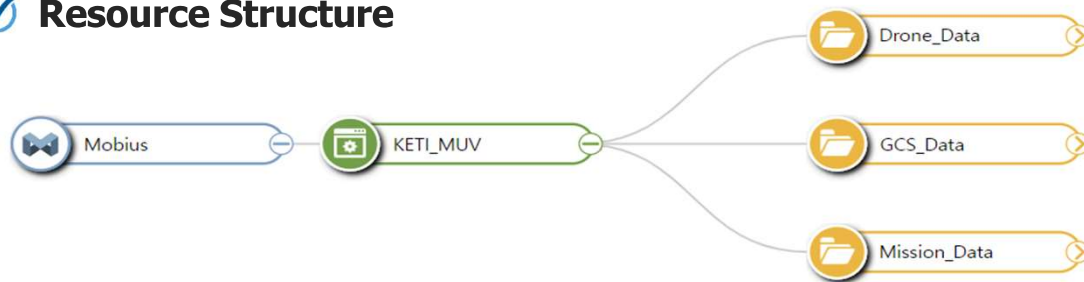
11/10/2022

✅ System Architecture

| Things | IoT Device Platform | IoT Server Platform | IoT Application |

Things Adaption Software (TAS)

&Cube
- Mobius Interaction
- Application manager
- Resource manager
- Security manager
- Device manager
- Thing manager

Rest API

Data upload

Send command

Mobius
- UAV approval management
- UAV Data management

MySQL
- UAV approval
- UAV data

MOBIUS

Rest API

Data retrieve

Control request

UAV
(Unmanned Aerial Vehicle)

✅ Resource Structure

Drone_Data : drone flight information
- creates a container in every 2 seconds during each sortie (1 flight session)

GCS_Data : drone control information
- includes take-off, landing, movements from point A to point B data, etc.

Mission_Data : mission device information
- includes camera, gimbal, airdrop, sensors, LTE measurement data, etc.

http://gcs.iotocean.org:7575/#!/monitor
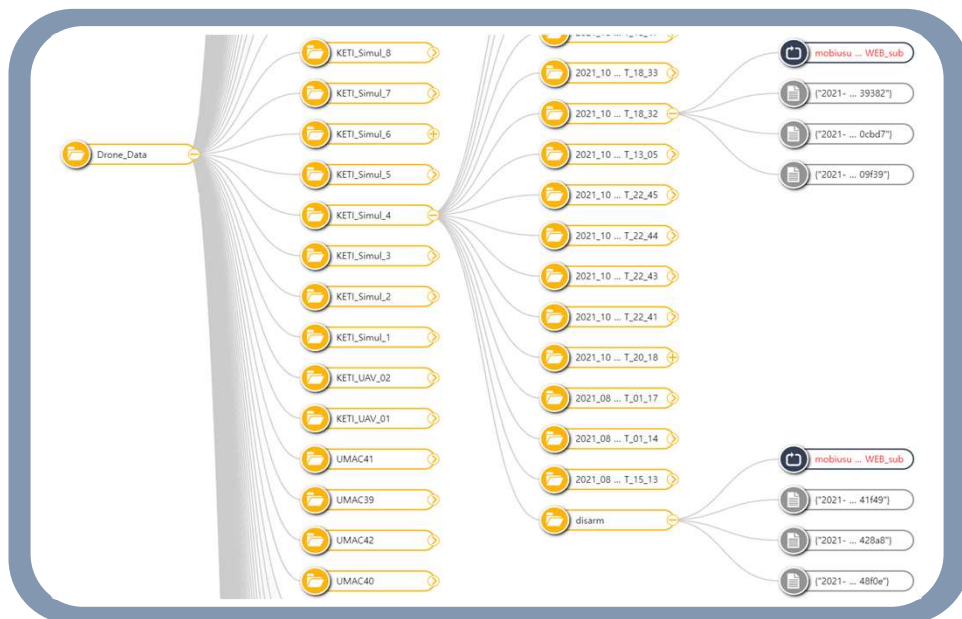
☑ Issue
- UAV system requires real-time data communication
- oneM2M structure contains many data properties that are not related to drone communication → not fast enough

```
▼ m2m:cin: Object
    pi: "3-20220901055445879436"
    ri: "4-20220901060526005247"
    ty: 4
    ct: "20220901T060526"
    st: 15
    rn: "4-20220901060526004"
    lt: "20220901T060526"
    et: "20240901T060526"
    cs: 17399
    cr: "SCupid"
```
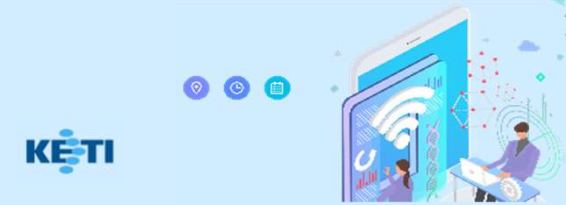
☑ How we do
- MQTT protocol adoption with oneM2M for lightweight publish/subscribe message-carrying structure
- With this structure, a standard contribution is being prepared.

☑ Application1: Multi-heterogeneous UAV Ground Control System


http://gcs.iotocean.org:8060/
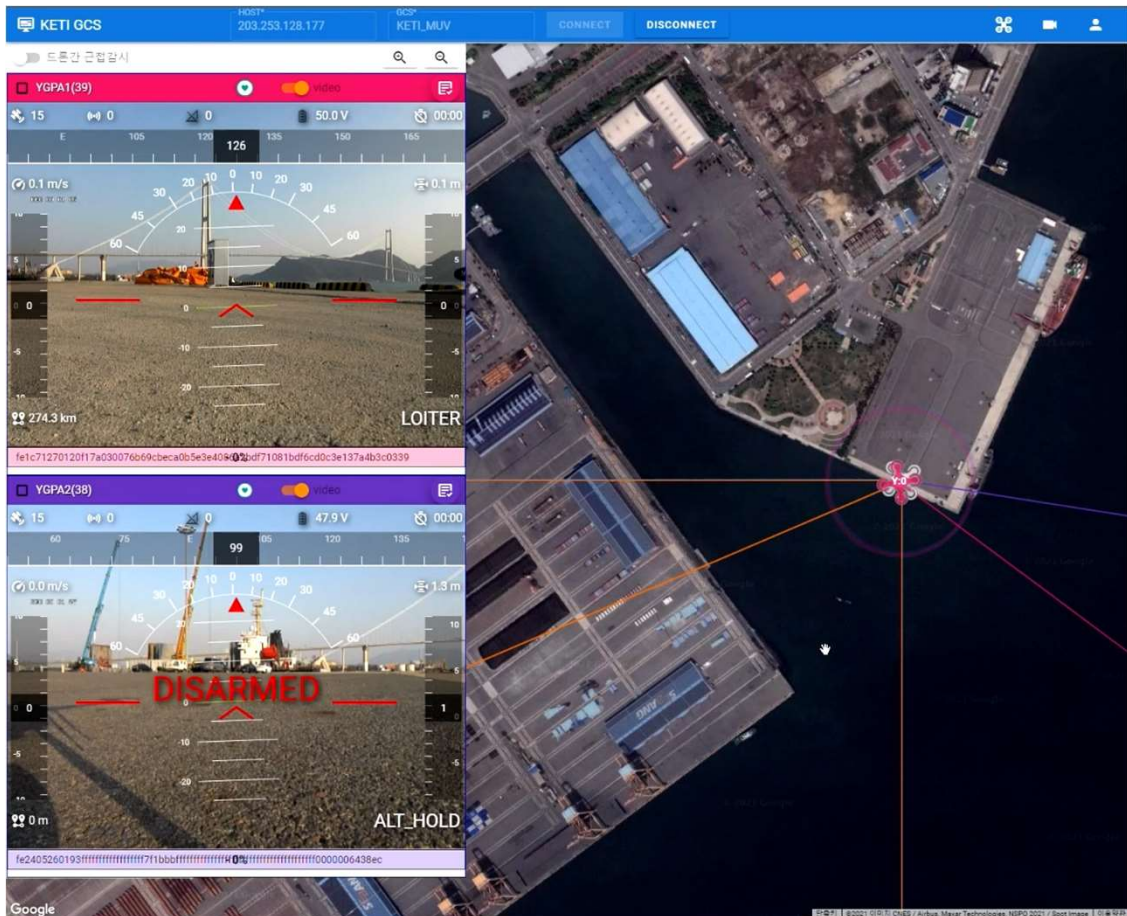
Features

- ☑ LTE-based ground control system
- ☑ Monitoring the flight status of multiple UAVs
- ☑ Collecting all the data from multi-heterogeneous UAVs
- ☑ UAV flight/mission data management & ground control data management system
- ☑ Able to playback the past UAV data with the exact timestamp

- ☑ ex) Surveillance, military purpose, shipping, and etc.

☑ Application2: Mission data collecting (LTE quality coverage map)
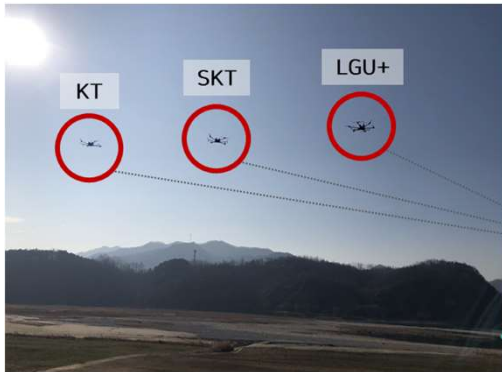
*KT, SKT, LGU+: Major mobile operators in South Korea
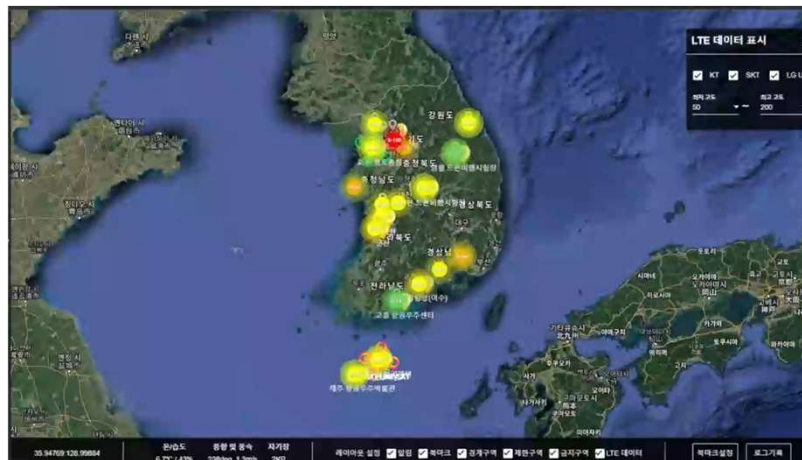
Features

☑ Collecting the data during operating given missions

☑ Examples

- Aerial network quality data for operation of unmanned aerial vehicles (transportation, UAM, etc.) between cities
- Air pollution measurement data
- Camera image data

☑ Collecting not only our data but also from others who use **Mobius** and **&Cube**

☑ Able to playback the past mission data with the exact timestamp

Application3: Digital Twin Data Relay Engine

IoT Platform
(Digital Twin Relay Engine)

LTE

Real Drone

LTE

Virtual Drone

simulator

GCS

Military Training Center

GCS Monitor Human operator
Simulator

SystemStatus : MAV_STATE_ACTIVE
Data(hex) : FE24B46901 93F50000006C000000FF7FA12FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFA00A0000005C387E
Rotation(x,y,z) : -0.001 0 0.018
Relative altitude(m): 20.493
Ground Speed (vx,vy,vz) : 0 0 0
PWM(1,2,3,4)…1,548 1,546 1,546 1,549
DistanceToHome(m) : 3.12
MavVersion 1

MavVersion 1

Sim ↔ Real
Linkage Test

Features

☑ Military drone training system
☑ Digital twin application
☑ Connect and synchronize data of virtual drones and real drones in real-time
☑ **Mobius** connects the virtual drone with the real drone in the middle

☑ Various military training support in simulator
☑ Example
▪ Simple flight
▪ Gun fire
▪ Bomb dropping

Thank you for your attention.

For the further information,
please visit our demonstration booth.