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OPR: Future Drone Traffic Directorate, MOLIT

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Comprehensive Demonstration Conducted at Gimpo Airport on Korea's Urban Air Mobility, Bound for Commercialization in 2025

*- A demonstration event of K-UAM held on November 11 at Gimpo Airport
- Mock tests on UAM services and traffic management carried out to promote advanced level of Korea's UAM technology and the ecosystem*

The Ministry of Land, Infrastructure and Transport (MOLIT, Minister NOH Hyeong-ouk) announced that it conducted a demonstration of Korea's Urban Air Mobility (K-UAM¹) services at Gimpo International Airport on November 11.

This event was held to try out and validate Korea's UAM Concept of Operations (K-UAM ConOps) in an airport environment, as airports are the place where the first commercial services of UAM will be introduced in 2025.

In particular, through the demonstration, it was found that the current air traffic control system that manages domestic and international flights at the airport can also monitor and manage UAM aircraft in real-time. This shows that the existing air traffic operations can be conducted in harmony with UAM operations.

The demonstration of K-UAM at the airport was carried out in three parts: 1) aircraft, 2) operation and services, and 3) traffic management, and the details of each part are as follows.

1) (Aircraft) A multirotor-type two-seater aircraft, which had performed a number of public demonstrations in the United States and Europe, participated in the flight demonstration at the airport, followed by a flight demonstration of a domestic UAM aircraft. A smaller model (wingspan: 3.1m) of "OPPAV²", a domestic UAM aircraft model which is being developed under the national R&D project, conducted the flight demonstration equipped with the flight control technologies that have been developed so far.

The original technology of the Korea Aerospace Research Institute (KARI), the second in the world to succeed in developing the aircraft-class tiltrotor technology following the US, will be applied in the development of OPPAV. By next year, an actual-size OPPAV aircraft will be made and start flight tests.

¹ Urban Air Mobility (UAM) is a future mobility service which can provide safe and convenient transport of people and goods in urban areas with quiet electric vertical take-off and landing (eVTOL) aircraft and vertiports

² The OPPAV (Optionally Piloted Personal Air Vehicle) R&D project is jointly conducted by MOLIT and the Ministry of Trade, Industry and Energy.

The OPPAV R&D project will be completed by 2023, and the technologies developed will be used in building five-seater UAM aircraft going forward.

* (Specifications/Functions) Multirotor-type single-seater, size: 3.8m, maximum take-off weight: 220kg (load weight 80kg), maximum speed: 90km/h (cruising speed: 60km/h), and range: 10km (Source: VOLT Line website)

	One-Seater Prototype (Under R&D and production)	44% miniaturized model (Under R&D and test flight)	Five-seater model (To be developed per future follow-up research)
Length / Wing (m)	6.2 / 7.0	2.7 / 3.1	9.2 / 10.5
Maximum takeoff weight / Load weight(kg)	650 / 100	46 / 3	2,500 / 500
Maximum speed (km/h)	240	130	340
Range (km)	60	10	120

< Specifications and Functions Per Size >

2) (Operation and services) An operating model for future UAM services was demonstrated at the event. This UAM service operating model is based on the operating model for commercial UAM services in the initial stage described in the K-UAM ConOps document released by the Korean government in September.

If the operational concept as shown in the demonstration is applied for future UAM services, passengers at the airport will be able to enjoy seamless connection between UAM and different transportation means while traveling to their destination. Such operating model will provide momentum for UAM to grow as one of the main means of transport.

3) (Traffic management) At the event, advanced air traffic management technologies currently being developed for UAM operations in an airport environment were demonstrated through trial flight performances, and related equipment was displayed.

During the flight demonstration, the UAM aircraft was under integrated monitoring with the existing domestic and international flights. This feat was enabled by transmitting the flight data of the UAM aircraft to System Wide Information Management³ (SWIM, ~'25), which is being developed under the National ATM Reformation And Enhancement (NARAE) 2.0 plan ('21.8).

All essential information for air navigation, including flight information of domestic/international flights and the UAM demonstration aircraft, was shown on a single SWIM monitoring screen.

Voice communications between the pilot of the UAM aircraft and the ground control during the demonstration used not only the airband frequencies (VHF/UHF) but also commercial communications networks.

³ System Wide Information Management (SWIM) is an aviation internet-based multimedia information exchange system, which enables the management of ANS related information and its ground-to-air exchange to achieve interoperability. It integrates and manages air navigation plans in digital format ('22~) and converts aeronautical meteorological information into three-dimensional digital format ('22~).

This is also in line with the government's K-UAM ConOps which promotes utilization of commercial communications networks in UAM traffic management, after verifying safety and security of using commercial networks.

The real-time image monitoring technology, which is one of the potential UAM traffic management tools proposed by NASA, was also introduced at the event.

Domestically-developed imaging equipment installed at the airport automatically detected and tracked the flight route of the UAM demonstration aircraft and monitored its takeoff and landing.

UAM-related devices and equipment were also introduced at the event, such as three-dimensional digital twin technologies for simulating UAM traffic changes in urban areas, and patented vertiport lighting devices for safe landing of UAM aircraft.

The event also presented UAM traffic management technologies and concepts of operations developed by private-sector entities, which enable more precise traffic management and real-time information exchange between service providers.

With regards to the traffic management for UAM, the Korean government plans to conduct an R&D project for the development of a UAM surveillance data collection system from 2022 to 2025 (KRW 45.8 billion).

The government's plan is to develop and validate core technologies to be utilized at the initial phase of UAM commercialization in 2025, taking into consideration the unique features of UAM as a means of urban mobility and the necessity to ensure interoperability with the existing air traffic management (ATM) systems.

The government has been making efforts to accelerate the commercialization of UAM, which is rising as a new alternative means of urban transport, by establishing a policy roadmap ('20.6) and a technology roadmap ('21.3).

MOLIT Minister Noh Hyeong-ouk, who attended the demonstration event, said, "We will make our best effort to smoothly carry out the initiatives outlined in the roadmaps to achieve commercialization of UAM by 2025."

He added, "As UAM is expected to become one of the common means of transportation that citizens use in daily life, it is absolutely imperative that we test and try out UAM services in various environments through demonstrations."

"Also, the 'K-UAM Grand Challenge^{*}' program will be launched at the end of next year, centered around the UAM Team Korea. The K-UAM Grand Challenge program will allow public and private sector entities from diverse industries in the UAM ecosystem to jointly demonstrate their UAM technologies and services."

^{*} The K-UAM Grand Challenge is a comprehensive demonstration program for overall UAM systems, including aircraft, operation, traffic management, and infrastructure, which are required in the initial phase of UAM commercialization in 2025. (A project on the infrastructure launched in 2021, demonstrations planned for 2022~24, total KRW 48.4 billion)

"In line with such effort, the government will prepare necessary institutional framework and standards such as the establishment of a special act on UAM. We will continue to promote large-scale R&D projects going forward, so that our UAM ecosystem can have world-class competitiveness," he said.

A member of the UAM Team Korea said, "UAM is a comprehensive means of mobility that can be

competitive only when all areas involved – namely, aircraft, operation, traffic management, and infrastructure - are developed in a balanced way.”

He added, “If domestic UAM businesses work together with the UAM Team Korea at the center, they will be able to achieve competitiveness on the global stage. With such a competitive UAM ecosystem, Korea will be able to become a leader in the global advanced transport sector that can export its UAM systems to other countries.”

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MINISTRY OF LAND, INFRASTRUCTURE AND TRANSPORT

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Urban Air Mobility, UAM

The Urban Air Mobility, UAM, is a new system of air traffic synchronized with other means of transportation using Electric Vertical Take-Off and Landing Aircraft, which runs on eco-friendly electric power, and other transportation methods to transport passengers and freight. The UAM can be utilized within cities for public purposes (emergency medical assistance, disaster relief, etc.,) and tourism for passengers and freight. The system is attracting attention as the next-generation method of efficient mobility expected to resolve ground traffic congestion concentrated in the metropolitan area. The commercial utilization of the UAM will begin sometime between 2023 and 2025 in the USA and European countries.

UAM Team Korea

The UAM Team Korea was established following the announcement of the 'Korean Urban Air Traffic (K-UAM) Roadmap,' and is a policy community as well as a civilian-government cooperative body focusing on the field of air traffic within cities. Led by the second vice minister of Land, Infrastructure and Transport, the UAM Team Korea is comprised of 37 key organizations including the government, local governments, businesses, schools and public institutions to lead the establishment of the domestic industrial ecosystem. In line with the core principle of 'healthy discussion and competition for mutual development,' the UAM Team Korea is actively engaged in discussions to further Korea's UAM capabilities to lead the global scene.