58th CONFERENCE OF
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ASIA AND PACIFIC REGIONS

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AGENDA ITEM 3:   AVIATION SAFETY

CURRENT STATUS OF UNMANNED AIRCRAFT SYSTEM TRAFFIC MANAGEMENT DEVELOPMENT IN THE REPUBLIC OF KOREA AND FUTURE PROMOTION PLANS

(Presented by Republic of Korea)

INFORMATION PAPER

SUMMARY

This document describes the current status of the national R&D promotion currently underway by the Korean government for safe traffic management (UTM, UAS Traffic Management) for drones flying at low altitudes (150m or less). In addition, it describes UTM demonstration projects, remote ID, improvements in laws and systems, and future plans.

CURRENT STATUS OF UNMANNED AIRCRAFT SYSTEM TRAFFIC MANAGEMENT DEVELOPMENT IN THE REPUBLIC OF KOREA AND FUTURE PLANS

1. INTRODUCTION

1.1　　　Safety and reliability are the most important factors for any flight operation, including UAS. Unmanned Aircraft System Traffic Management (UTM) includes the production of VLOS (Visual Line of Sight) / BVLOS (Beyond Visual Line of Sight) flight plans and provision of information on location of drones, airspace, flights, weather, obstacles and etc. to support the safe and efficient operation of multiple drones from take-off to landing.

1.2　　　Since 2017, the Korean government has been conducting an R&D project to establish a system that can provide drone traffic management such as flight plan approval and information monitoring for safe and efficient operation of drones in low altitudes (AGL 150m or less). In view of rapidly evolving technology, the R&D project has been carried out in two phases.

1.3　　　Phase 1 was conducted from 2017 to 2022 with research and development on establishing a system for UTM Service Supplier (USS) featuring demonstrations. Scheduled from 2023 to 2026, Phase 2 aims to develop the system into the pre-stage for commercialization by devising a Concept of Operation for UTM including operators, technical standards, scope of traffic control, measures for interoperability between systems, and the development of FIMS, advancement of USS system and identification equipment, as well as draft framework to operate UTM. Currently, a total of 9 organizations are participating in the UTM Phase 2 development project, including Korea Institute of Aviation Safety and Technology (KIAST) with Korea Aerospace Research Institute (KARI), Korea Electronics and Telecommunications Research Institute (ETRI), Korea Airports Corporation (KAC).

1.4　　　This paper intends to share the status of UTM development and future plans, along with the direction to be headed to realize the UTM ecosystem in Korea.

2. DISCUSSION

Major Achievements of UTM R&D in Korea (Phase 1)

2.1　　　In the Phase 1, the main research contents and achievements include the development of operation procedures for UTM, the development of prototype USS* system. Utilizing the USS, it became possible to simultaneously monitor flight information (such as position, airspace, and weather information) of up to 100 drones, so the users could efficiently create flight plans and the operators could effectively provide flight approvals. Furthermore, significant improvements in safety management are anticipated with the development of functions such as advisory, warnings, alerts, and urgent flight plan modifications and approvals to prevent collisions. Also, one of the essential achievements of the Phase 1 was the development of module called UTID (Unmanned Aircraft Traffic Identification Device) to monitor the flight information of other drones. UTID was applied with LTE (4G) network-based communication technology, enabling the identification of drone location anywhere within the territory of South Korea. It is meaningful that the technology allows for a receipt of real-time location information, without relying on the pilot's report of drone's position.
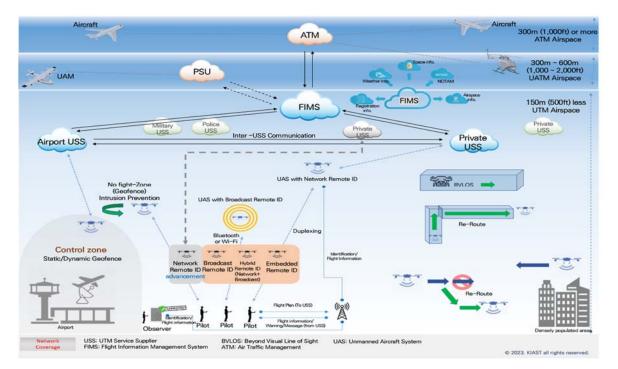
Note. (UTM Service Supplier) Private and public sector systems that provide UTM services

| USS System Display | UTID | UTM Center(Located in Incheon) |

2.2   For the technological verification of the UTM system developed in Phase 1, there was a total 4 flight demonstrations in conjunction with the "K-Drone Demonstration Program" from 2021 to 2022, with 10 participants as shown in the table below. Demonstrations have been conducted to check responses to situations such as VLOS and BVLOS flights, sharing of flight plans, flights in congested airspace and abnormal flight events (emergence of emergency helicopter, collision, communications failures, etc.).

Year	Fields	Participants	Description
2021	Airport	KT	Drone operations in controlled airspace near Incheon Int'l Airport
	Urban	Korea Airports Corporation	Multiple-purpose drones monitoring in urban area
		HancomInspace	Urban drone corridor/routes
	Long-Distance/ Marine operation	Incheon Intl' Airport Corporation	Long distance/marine operation on emergency medicine delivery
		Korean Air	Long distance/marine operation on emergency delivery
		Marine Drone Technology	Marine delivery operation to foreign anchored ships
		GS Caltex	Marine oil-sample delivery operation between oil tanker and lab
2022	Urban Route Discovery	LX	Acquisition of national territory information and provision of address-based drone delivery service by discovering safe drone route
	Airport & Special Facility	Korea Airport Corporation	Real-time monitoring of drone flight based on UTM system for NAVAIDs inspections
		KT	Real-time trajectory and weather information sharing through UTM system and HAPS(Helicopter Automatic Positioning System) interoperability
	Public	Korea Water Resources Corporation	UTM based inspection of nationally important facilities such as dams, water intake facilities, etc.
		HancomInspace	Blood delivery process demonstration by UTM
	Private	Sistech	UTM based flight and monitoring for long-distance/duration inspection of highway
	Free Offer	Marine Drone Technology	UTM based flight in marine area testing flight approval, flight information monitoring and identification

2.3   Phase 2 focuses on UTM concept of operation, including USS and FIMS operators, connecting each systems based on protocol standards, and legislation for standardization. FIMS will be developed as a gateway to connect UTM operators with existing air traffic management systems (ATM). Also, it is planned to upgrade Phase 1 USS system, and research and develop FIMS-USS interconnection and USS- USS linking standards. The appropriateness of government, public and private entities for operators of FIMS and USS, the scope of UTM service delivery, data exchange between USS, and the establishment of USS registration standards will be researched.

2.4   In phase 2, R&D team will upgrade the UTID developed in Phase 1 to support safe and efficient flight and monitoring within the UTM system. Technology for security to prevent the leakage of identification information will be established and the UTID will be lightened ($128g \rightarrow 75g$). Also, the existing LTE network methods will be developed along with the identification of broadcasting methods to be advanced into a complex identification device combining network and broadcast methods. This will reduce the load on the drones and ensure the reliability of communications, providing secure environment where UTM system can operate in a safe manner.

2.5   In line with research and development being carried out for UTM commercialization, the Korean government is also providing active support for establishing systems and policies for developing and operating the UTM ecosystem in a timely manner. In Korea, the Act on Promotion of Utilization of Drones and Creation of Infrastructure (hereinafter referred to as 'Drone Act') stipulates the definition and operator of the UTM system, and also provides a legal basis for fee collection and designation and operation of drone flight routes. In addition, the "2nd Drone Industry Development Basic Plan" announced in June 2023 designated UTM development as an essential task necessary for operation of drones and presented a practical plan for commercialization. In addition, mandatory installation of identification devices (Remote ID) and standards for communication protocols are being prepared. In preparation for the commercialization of UTM, plans are also being reviewed to establish standards for UTM operators and delegate the flight approval authority held by the state regulators to UTM operators.

2.6   In preparation for the emergence of multiple USS, the government is working to prescribe definitions and standards for the types of service provided by USS. Also, it is necessary to come up with standards for certifying USS operators, similar to the current ones for air traffic certification of Korea. Moreover, government-led support measures can be considered to help boost the UTM industry and encourage participation in USS.

2.7   In addition, a USS (UTM Service Supplier) Consultative Body consisting of state, public entities and private operators has been launched in 2020 with a goal of facilitating demonstrations and discovering ideas with drone production and utilization operators in Korea. By providing such platform for sharing research outcomes and enabling demonstrations, it aims to create and promote industrial ecosystem for UTM service business.

2.8   At the ICAO level, it is recommended that the Organization discuss the roles and responsibilities of each stakeholder as well as requirements, procedures and automation system needed to interoperate UTM and ATM, along with measures to use low-altitude airspace for UTM.

3.   ACTION BY THE CONFERENCE

3.1   The Conference is invited to note the information contained in this Paper.

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