58th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 4: AIR NAVIGATION

DEVELOPMENT AND OPERATIONAL VALIDATION RESULTS OF THE REPUBLIC OF KOREA'S MULTILATERATION SURVEILLANCE SYSTEM (MLAT)

(Presented by the Republic of Korea)

INFORMATION PAPER

SUMMARY

The Republic of Korea has developed and successfully operationalized a Multilateration Surveillance System (MLAT) as part of its efforts to enhance aviation safety and overcome the limitations of traditional radar systems. This next-generation technology complies with international standards, including those set by ICAO, and has undergone rigorous testing, including operational validation at regional airports. The results demonstrate high levels of accuracy and reliability, particularly for low-altitude aircraft in mountainous areas. The anticipated benefits of this MLAT system include improved aviation safety by eliminating radar blind spots, enhanced surveillance in challenging terrains, autonomous monitoring of various aircraft types, specialized coastal aviation surveillance, and cost-effective system replacement. Overall, Korea's MLAT system represents a significant step forward in advancing aviation surveillance technology and ensuring safer and more efficient air travel.

DEVELOPMENT AND OPERATIONAL VALIDATION RESULTS OF THE REPUBLIC OF KOREA'S MULTILATERATION SURVEILLANCE SYSTEM (MLAT)

1. INTRODUCTION

1.1 MLAT is a surveillance system incorporated as one of the components of ASBU (Aviation System Block Upgrades) under ASUR-B0/2, aiming at enhancing aviation safety by addressing the limitations of radar, in line with the ICAO Global Air Navigation Plan (GANP).

1.2 The Republic of Korea expects significant improvements in its air traffic surveillance system and enhanced aviation safety through the revolutionary development of MLAT technology, which is considered particularly effective for monitoring mountainous terrains in the country. This next-generation aircraft surveillance technology has the potential to address low-altitude aircraft control and eliminate blind spots in aircraft monitoring within airports, ushering in a remarkable advancement in the aviation traffic surveillance system.

2. DISCUSSION

2.1 Korea embarked on the development of MLAT systems in 2013 to meet both ICAO standards and RTCA/EUROCAE technical standards. The system was built and developed at a pilot training airport, and operational validation was conducted at regional airports where civilian aircraft operate.

< Figure 1. MLAT Interface and Testbed Environment >

- Compliance with International Standards
  - MOPS for 1090 MHz Extended Squitter ADS-B and TIS-(RTCADO-260)
  - MOPS for Mode S Multilateration Systems for A-SMGCS (EUROCAE ED-117)
  - MOPS for Secondary Surveillance Radar Mode S transponders (EUROCAE ED-117)
  - Software Integrity Assurance Considerations for CNS/ATM (EUROCAE ED-109A)
- R&D Period: June, 2013 ~ August 2023
- Performance Testing: Ground Testing, Low-Speed/High-Speed Flight Testing, Integration with ATM (Air Traffic Management) Systems.

2.2 During the operational validation tests at regional airports where civilian aircraft operate, Wi-Fi communication was utilized between the receiver and the master system. The emphasis was placed on reviewing surface elevations and obstacle clearance surfaces in the maneuvering areas,

including runways, to calculate antenna heights for the receiver, thereby enhancing position accuracy.

Vehicle/CL601-3R (CTLS-LAS)

Taxiing Way

(Maneuvering Area)		
7.5m	98.97% (95% over)	
12m	99.83% (99% over)	
20m	100% (99% over)	
(Airborne Targets)		
0~2.5Nm	Within20m	100%
2.5~5Nm	Within40m	100%

< Figure 2. Ground & Flight Test of MLAT >

Month	Signal Continuity				Signal Accuracy	
	Acquired Data	Missing Data	Acquisition Rate	Signal Dropout Rate	Detection Rate	False Detection Rate
Jan	1,209,591	2	99.999835%	1.7 x 10^-6	99.8288%	1.7 x 10^-3
Feb	2,332,787	-	100%	-	99.9948%	5.2 x 10^-5
Mar	2,332,781	-	100%	-	99.9993%	7.3 x 10^-6
Apr	2,591,797	-	100%	-	99.9995%	5.4 x 10^-6
May	2,419,174	-	100%	-	99.9965%	3.5 x 10^-5
June	2,524,983	-	100%	-	100.00%	0
Cumulative	**13,132,700**	**2**	**99.999985%**	**1.5 x 10^-7**	**99.9824%**	**1.76 x 10^-4**

< Table 1. MLAT Surveillance quality (Signal Continuity/Accuracy >

2.3 Korea has successfully developed and implemented an MLAT system that complies with ICAO and international technical standards, as demonstrated through operational validation in actual airport environments. Through the development and deployment of the next-generation aircraft surveillance system, MLAT, Korea anticipates the following benefits for the aviation surveillance system:

- Enhanced aviation safety by eliminating radar shadow areas.
- Improved low-altitude aircraft surveillance in mountainous regions.
- Autonomous monitoring of nearby civil aircraft, including training aircraft.
- Specialized coastal aviation surveillance and flight information management beyond civil aircraft, including military purposes.
- Cost-effective replacement of aging MLAT systems and the establishment of new surveillance systems for budget savings in the future.”

3. ACTION BY THE CONFERENCE

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

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