57TH CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 4: AIR NAVIGATION

KOREA AUGMENTATION SATELLITE SYSTEM (KASS) PROGRAMME

Presented by Republic of Korea

SUMMARY

This paper presents the status of the Korean Augmentation Satellite System (KASS) Implementation programme. After the certification of its services and the confirmation of stability, the KASS service will be extendable beyond Incheon FIR. To facilitate a collaborative GNSS implementation in APAC, member states can consider an implementation of GNSS services with a good cooperation with the service states include Republic of Korea.

KOREA AUGMENTATION SATELLITE SYSTEM (KASS) PROGRAMME

1. INTRODUCTION

1.1 In keeping with ICAO Global Plan Initiatives, Republic of Korea implements the Korea Augmentation Satellite System (KASS) programme, as SBAS. SBAS service has been introduced by several countries in the world that are transitioning from ground based air navigation system to Global Navigation Satellite System (GNSS) and are introducing as a redundancy of conventional ground-based navigation systems. Also, in some area, SBAS roles a major service in other industry using GPS.

1.2 Republic of Korea had a planning research in 2012 advanced research, research planning, analysis and feasibility research in 2013. ROK have started KASS programme in 2014. The KASS Program is led by KASS Program Office (KPO) under Korea Airspace Research and Institute (KARI). KPS is developing the ground systems with Korea Electronic Research and Institute (ETRI) and Thales Alenia Space France (TASF).

2. DISCUSSION

2.1 SBAS consists of ground segment, satellite segment and user segment. KASS Ground segment and satellite segment are;

a) Ground segment

- 7 KRSs (KASS Reference Stations)

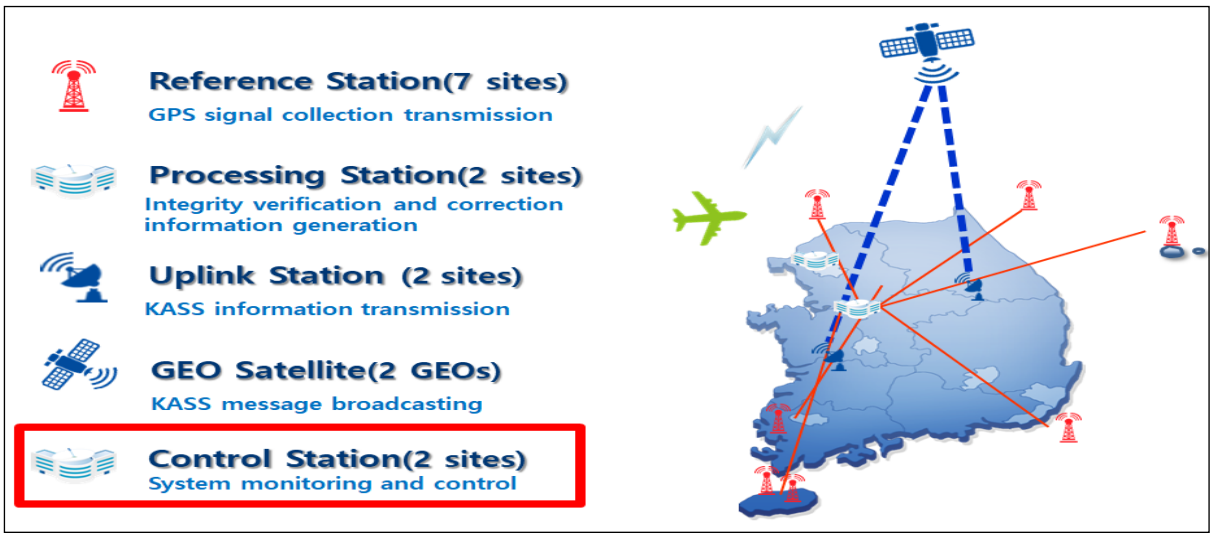
- 3 KUSs (KASS Uplink stations)

- 2 KCSs (KASS Control Stations)

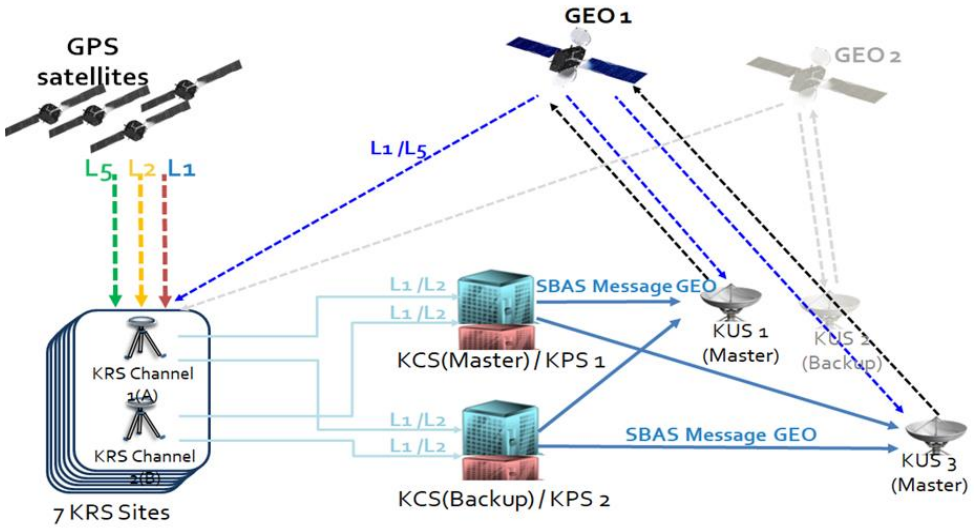
- 2 KPSs (KASS Processing Stations)

b) Satellite segment

- 2 GEOs (Two leased)



[Figure 1. KASS system]



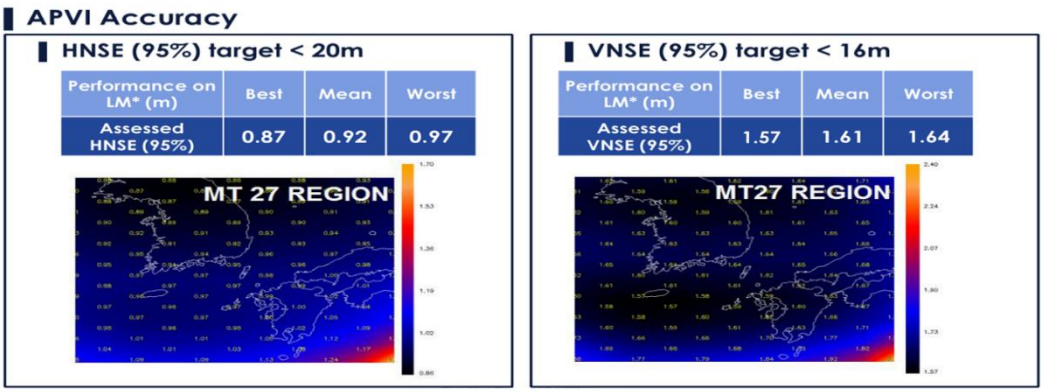
[Figure 2. KASS operational concept]

2.2 Most Ground systems are installed and under the test. The first KASS payload (transponder) in hosted on MEASAT-3d, a Geostationary satellite manufactured by Airbus and owned by the Malaysian satellite operator MEASAT. The first GEO satellite was lifted off on Jun 23 (KST) at Guiana Space Center in Kourou, French Guiana to begin delivery of services. The Second GEO satellite will be launched in early of 2025.

2.3 To operate the stable KASS, the Aviation Satellite Navigation Center opened at Air traffic management Office under MOLIT. The Aviation Satellite Navigation Center will oversight the KASS operation and management and the KASS service provider will be selected and operate the system.

2.4 After the first GEO reaching on its orbit, KASS stability tests will be completed and the overall performance of the systems will be reviewed in 2022. In the end of 2022, KASS will give an open service. In December 2023, the system will be certified for Approach with vertical guidance (APV-1) operation as the seventh SBAS in the world.

2.5 KASS performance is simulated as Figure 3. It shows us 95% less 20m in horizontal, 95% less 16m in vertical. KASS is designed to achieve APV 1. ROK will get third GEO and maintain three GEOs at least in the future. With these three GEOs, ROK will study continue and upgrade the system, CAT-I service will be given within Incheon FIR.



[Figure 3. APV-I Simulation]

2.6 KASS will give information high level integration for aviation. The aircraft equipped with SBAS receivers will be able to use KASS signal in Incheon FIR for en route navigation and approach operation with vertical guidance. Some runways in Korea without ILS can adopt the APV-1 service and KASS APV-1 will give redundancies in many airports during the ILS out of service.

2.7 Also, KASS signal can be used in the other industry, like Drone, Navigation, Rail, Ocean, etc. MOLIT shares KASS Programme with related organization, research & institutes, companies and universities.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

a) note the Republic of Korea's effort for implementation of Space Based Augmentation System (KASS) over South Korean Airspace by December 2023.

b) note the KASS capability to extend its coverage beyond Incheon FIR that would harmonize and be a driver for GNSS implementation Programmes within the region to provide seamless Air Traffic Management.

3.2 APAC States and Administrations are invited to consider collaborating with SBAS service States including Republic of Korea to implement GNSS-based services supporting seamless Air Traffic Management.

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