



International civil aviation organization

**THE FOURTH MEETING OF PERFORMANCE BASED NAVIGATION
IMPLEMENTATION COORDINATION GROUP (PBNICG/4)**

Bangkok, Thailand, 14 - 16 March 2017

Agenda Item 11: Issues and challenges regarding PBN implementations

STATUS OF KOREAN SBAS PROGRAM

(Presented by the Republic of Korea)

SUMMARY

This paper presents the status of latest KASS (Korea Augmentation Satellite System) program in South Korea. KASS is the Korean implementation of a Satellite-Based Augmentation System (SBAS) for which standards are provided in Annex 10, Volume 1, to the Convention on International Civil Aviation containing Standards and Recommended Practices for Radio Navigation Aids. Annex 10 is published and maintained by the International Civil Aviation Organization (ICAO).

1. INTRODUCTION

1.1 ICAO adopted SBAS in order to design satellite based next generation aviation system and promote performance-based navigation for countries that have joined ICAO. South Korea's government has also started to develop its own SBAS with the goal of providing approach with vertical guidance type I (APV-I) as early as from year 2022.

1.2 This working paper contains the introduction of Korea augmentation satellite system (KASS) program and the latest development status.

2. DISCUSSION

Background

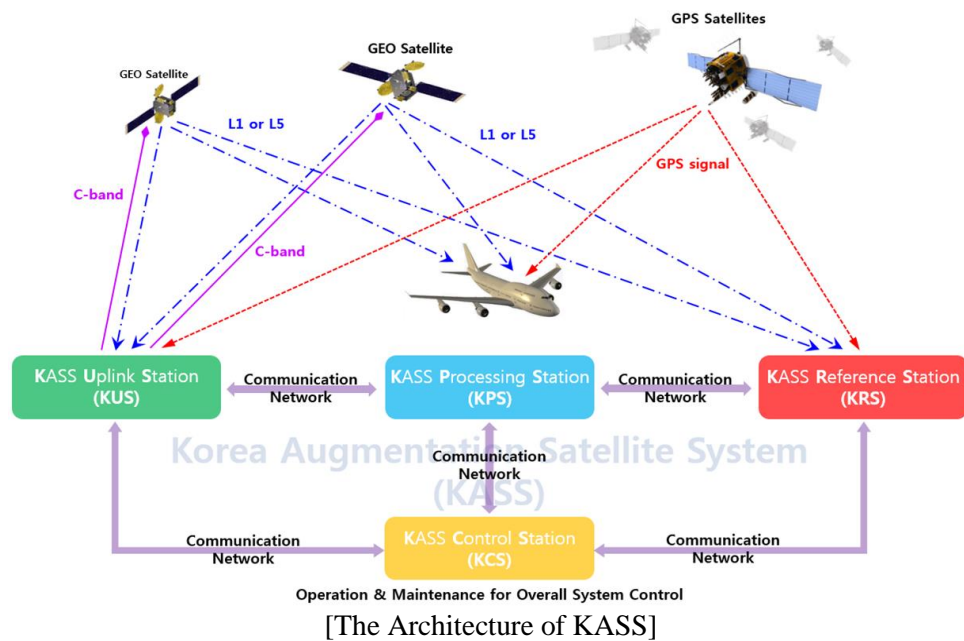
2.1 The KASS (Korea Augmentation Satellite System) is a satellite-based augmentation system (SBAS), equivalent to the United States WAAS, European EGNOS, Japan MSAS and India

GAGAN. KASS provides aircraft with GPS augmentation information to satisfy navigation performance requirements, which are essential to the use of GPS for aircraft operation as a sole means of navigation.

2.2 The KASS will be national navaid system to be owned and operated by the ministry of land, infrastructure and transport (MOLIT) of Korea. KASS will provide improved integrity, accuracy, availability, and continuity of navigation services to users equipped with GPS/SBAS user equipment as compared to navigation based on GPS only. The improved navigation services will support the following phases of flight: en-route (oceanic and domestic), terminal area, non-precision approach (LNAV), departure, and required navigation performance (RNP) operations and to expand the benefits of SBAS to neighbouring countries, non-aviation users including car navigation, LBS, etc.

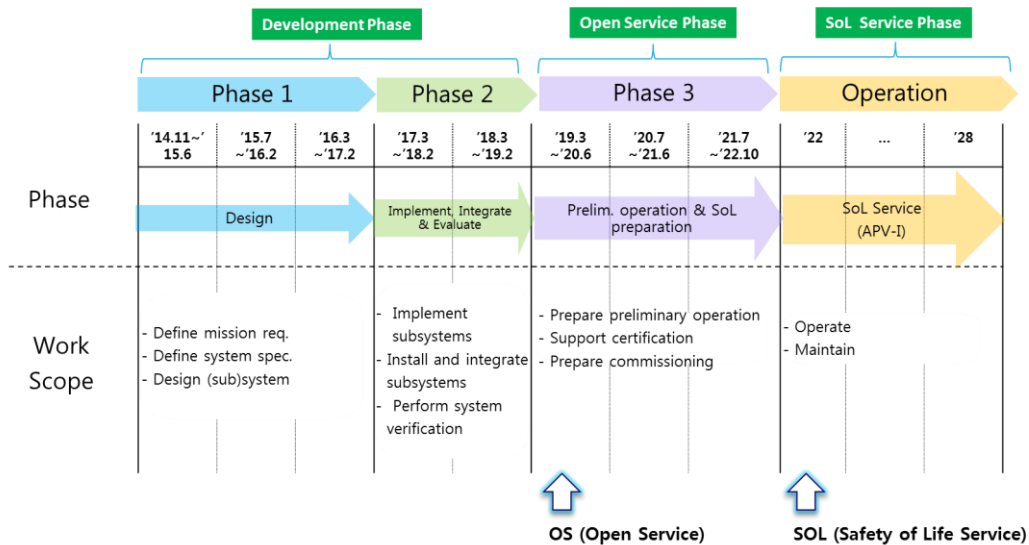
2.3 The KASS program is comprised of the two main goals. The first goal is implemented KASS system for the APV-I service and the other goal is to gain the key technologies such as CAT-I class approach service in Korea peninsula. In other words, the first goal will support GNSS navigation based on the GPS L1 signal (single-frequency SBAS) and achieve the APV-I level of performance meet ICAO Annex 10 standard. The second goal will support navigation based on the combined use of the GPS L1 and L5 signals with the objective to achieve a level of performance consistent with CAT-I test operations.

2.4 The initial configuration of KASS will include 5 or more KASS Reference Stations (KRSs), 2 KASS Processing Stations (KPSs), 2 KASS Control Stations (KCSs), 4 KASS Uplink Stations (KUSs), and 2 KASS GEO satellites. The signal-in-space (SIS) will be broadcast by leased navigation payloads on GEO satellites. Communications between elements of ground segment at different geographic locations will be provided by a redundant diverse and highly reliable dedicated communication network.



Roadmap of KASS Program

2.5 During the time spanning between 2014 and 2022 (8 years, three phase), the KASS will be developed and implemented. Developing the KASS is activity starting from Q4 2014, with an open service (OS) ready by 2020 and safety-of-life (SoL) service commissioned by 2022. The first phase (2014~2017) is conducted to the system design, from the mission level up to the subsystem level. The second phase (2017~2019) is conducted to the preliminary design, the critical design, system implement, integration and evaluation. In the third phase (2019~2022), it will prepare the preliminary operations and support certification.



Current Progress

2.6 The KASS will be jointly develop by domestic contractor and an international contractor which having already experienced in the SBAS domain. The international partner company was selected on October 2016 and the negotiation is going on to select the domestic partner company. The system design review (SDR) was performed on January 2017 and the preliminary design review (PDR) will be performed on April 2017.

PRN Code Assignment Issue

2.7 SBAS IWG (December 2015) meeting raised a concern that the number of pseudorandom noise (PRN) code allocated for KASS and currently available for use was not adequate to support SBAS being developed and proposed for standardization.

2.8 KPO was submitted regular PRN assignment documents to the GPS directorate (SMC/GP) and submitted ITU coordination filing documents in 2016 and will provide a confirmation document for KASS service provision to SMC and acquire PBN code in 2017.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

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- a) note the information contained in this paper and comment as necessary.
