International Civil Aviation Organization

Twenty Eighth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/28) of APANPIRG

Bangkok, Thailand, 01 July -05 July 2024

Agenda Item 6: Navigation

6.4 Other navigation related matters

SOUTHERN POSITIONING AUGMENTATION NETWORK (SouthPAN) PROGRAM UPDATE

(Presented by Australia)

SUMMARY

This paper presents a summary of the Southern Positioning Augmentation Network (SouthPAN) program, which will provide a SBAS aeronautical radio navigation service to Australia and New Zealand by 2028.

1. INTRODUCTION

1.1 The Southern Positioning Augmentation Network (SouthPAN) is a SBAS that is being developed by the Australian and New Zealand governments. When complete, it will support En-route, Terminal, Non-Precision Approach (NPA), and Approach with Vertical Guidance (APV) flight operations across Australia and New Zealand. The service is currently broadcasting Early Open Services on the L1 and L5 navigation signals. More information on SouthPAN can be found at www.ga.gov.au/southpan and www.linz.govt.nz/southpan.

2. DISCUSSION

SouthPAN Navigation Services

2.1 SouthPAN commenced service delivery on 26 September 2022 and provides a number of Early Open Services as follows:

- L1 SBAS Open Service (on the L1 navigation signal and as a Data Access Service), augmenting the L1 C/A GPS signal;

- Dual-Frequency Multi-Constellation (DFMC) SBAS Open Service (on the L5 navigation signal and as a Data Access Service), augmenting the L1 C/A and L5 GPS signals, and the E1 and E5a Galileo signals; and

- Precise Point Positioning (PPP) Via SouthPAN (PVS) (on the L5 navigation signal and as a Data Access Service), augmenting the L1 C/A and L5 GPS signals, and the E1 and E5a Galileo signals.

2.2 The L1 SBAS and DFMC SBAS Open Services are marked as not-for-use by aviation, through the use of Message Type 0. This prevents aircraft from using the SBAS navigation signals.

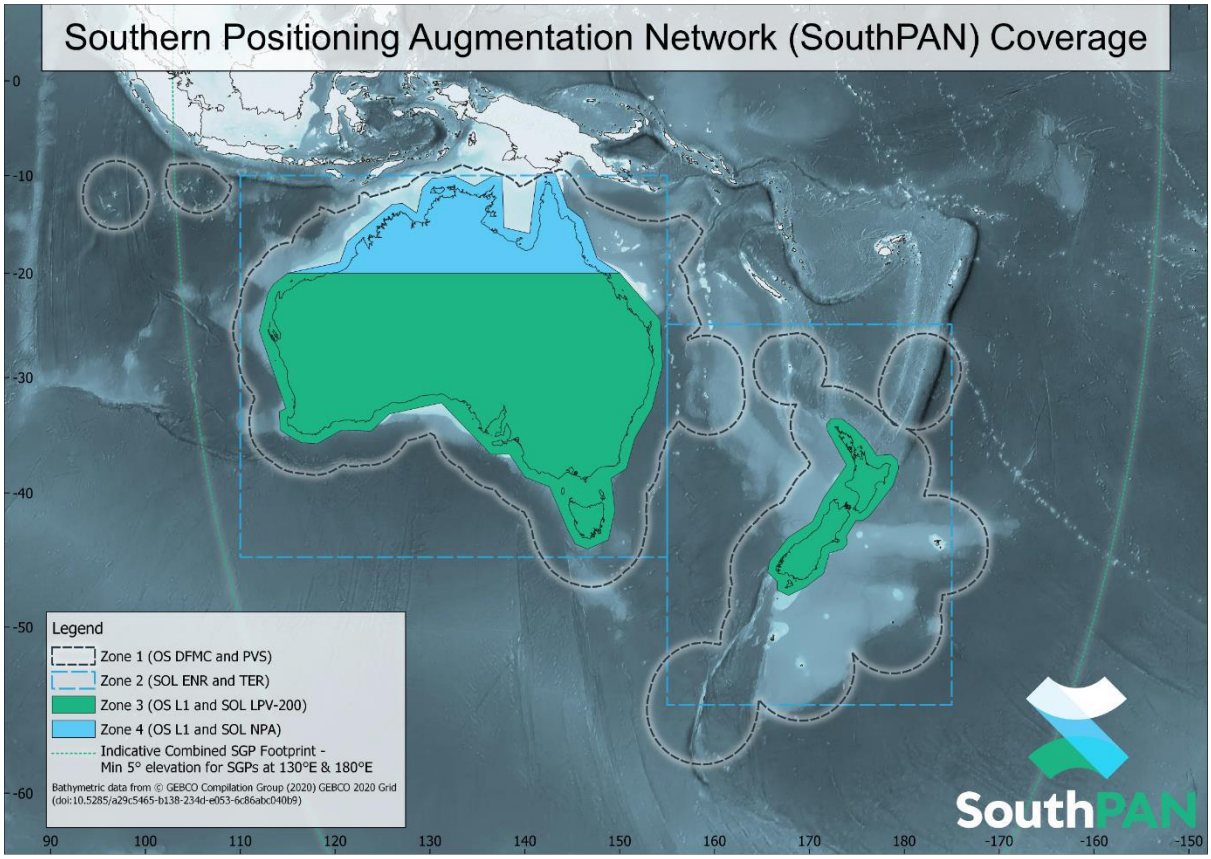
2.3 The L1 SBAS service will be available for use by aviation in 2028. There will be a limitation on the service north of approximately 20° South latitude due to ionospheric activity. The actual Service Volume will be maximised and determined during the design process.

2.4 There are currently no plans to certify the DFMC SBAS service for use by aviation. This may be the subject of a future government decision based on the availability and adoption of avionics by aircraft and airlines flying in Australia and New Zealand.

2.5 More detail on individual services can be found on the GA and LINZ websites, including the Service Definition Documents (SDD) for the Signals-in-Space and the Data Access Services. The SDDs describe the target levels of performance and how users can access the services.

2.6 The target Service Area is depicted in Figure 1. SouthPAN will support Vertical Protection Levels of less than 35 metres within the green area.

Figure 1 - SouthPAN Service Volume



Instrument Flight Procedures

2.7 Locations where Localizer Performance with Vertical Guidance (LPV) and Lateral Navigation/Vertical Navigation (LNAV/VNAV) (SBAS) instrument flight procedures are published will depend on a number of factors including runway lighting, approach lighting, traffic rates, aircraft types, and other extant navigation services.

Program Update

2.8 The Preliminary Design Review was completed in February 2023 and the Critical Design Review is scheduled for completion in Quarter 4 2024. Site selection for the GNSS Reference Stations (GRS) is largely complete, with one requiring re-survey to validate the acceptability of the Radio Frequency environment and site logistics.

2.9 The sites for the two Uplink & Processing Centres have been established and site civil works has commenced. The two Uplink & Processing Centres have been established near Armidale in New South Wales, Australia, and near Invercargill in New Zealand. Additional infrastructure will be incorporated over the next three years to achieve the high availability required for an Aviation Radio Navigation Service (ARNS).

2.10 The SouthPAN Safety Risk Management Panel (SRMP) has been established and is comprised of government and industry experts, leveraging their experience on other successful SBAS programs including WAAS and EGNOS. The purpose of the SRMP is to validate that integri ty and performance requirements will be met by the L1 SBAS safety computer algorithms.

2.11 A contract for the first new satellite (SouthPAN GEO Payload—SGP) was awarded to industry in May 2023—SGP-01 and will transmit using the L1 and L5, as well as a novel L5b navigation signal for non-aviation services. A procurement for SGP-02 is currently underway.

2.12 The current satellite is Inmarsat 4F2, which replaced 4F1 as the active satellite on 20

November 2023. This change was coordinated with the PNT Spectrum Management Office of the USSF, in accordance with the PRN Code Assignment Process document.

2.13 Inmarsat 4F1 was relocated in early 2024. GA and LINZ subsequently applied for the use of a second PRN code and received assignment of PRN 124 from the PNT Spectrum Management Office on 18 April 2024.

2.14 A preliminary probabilistic analysis has identified potential challenges with meeting the ICAO Annex 10, Volume I Continuity of Service navigation performance requirements for specific types of approaches with vertical guidance enabled by SouthPAN. This is primarily due to the inability to deploy GNSS Reference Stations to the west of Australia, south of Australia and the east of New Zealand (oceanic areas). This impacts the ability to effectively characterise the ionosphere in coastal regions resulting in inflated Grid Ionosphere Vertical Error (GIVE) values. Australia has established a Technical Working Group to establish a clear understanding of the effect of a lower level of Continuity of Service for SBAS enabled approaches with vertical guidance to the Australian aviation industry and any specific operational mitigations that may be required at locations that may not meet the Continuity of Service performance requirements.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the current status of the SouthPAN program; and

b) discuss any issues as appropriate.

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