International Civil Aviation Organization

Eleventh Meeting of the Aeronautical Communication Services Implementation Coordination Group (ACSICG/11)

Bangkok, Thailand, 19 - 22 March 2024

Agenda Item 5: AMS and Datalink communication

SPACE-BASED VERY HIGH FREQUENCY (VHF) COMMUNICATION SERVICES

(Presented by Singapore)

SUMMARY

This paper is to update the meeting on the progress of the technical and regulatory studies of space-based VHF communications (voice and data) in the frequency band 117.975-137 MHz.

1. INTRODUCTION

1.1 Space-based VHF communication is a concept in which aircraft operating in remote regions and oceanic areas provide communications from the aircraft to air traffic control (ATC) via satellite. This concept, when implemented, is expected to support air traffic management and flight operations in oceanic and remote airspace and will complement current aviation use of satellite-based navigation and surveillance technologies.

1.2 While currently there are other long-range communication systems, such as HF and SATCOM, available to facilitate communications between aircraft and ATC in remote and oceanic airspace, the performance of these current systems are not adequate to safely support close aircraft-to-aircraft separation in a similar fashion as to what is being applied in dense airspace where terrestrial VHF communications infrastructure is predominant. Therefore, this leads to constraints in airspace capacity and efficiency in oceanic and remote areas, where it is not possible nor practical to deploy VHF terrestrial infrastructures.

1.3 With the space-based VHF communication concept, it will be just like another VHF station in the sky, but with a larger footprint than terrestrial stations.

2. DISCUSSION

2.1 Space-based VHF communications is envisaged to extent the coverage of the following aeronautical VHF communication services using satellite as a platform:

- Voice is the most critical VHF communication application in terms of safety and dependability.
- Datalink is commonly used for ACARS and VDL Mode 2 applications.

2.2 The following objectives were considered in the design of the space-based VHF system:

- No change to aircraft avionic equipment.
- No change to terrestrial base stations configuration located in flight information regions (FIRs) which do not make use of the space-based VHF service.
- No or minimal change to terrestrial base stations configuration in FIRs with space-based VHF service.
- No or minimal change to operational aspects for pilots and controllers.

International Telecommunication Union ("ITU")

2.3 Space-based VHF frequency allocation was an Agenda Item 1.7 for the World Radiocommunication Conference 2023 ("WRC-23").

2.4 In December 2023, WRC-23 approved the use of the frequency band 117.975-137 MHz to be allocated for aeronautical mobile-satellite (R) service ("AMS(R)S"), enabling satellite-aircraft communications in the VHF frequency spectrum.

Future VHF Subgroup ("FVSG")

2.5 In Oct 2020, the formation of Future VHF Subgroup ("FVSG") was approved under the Data Communications Infrastructure Working Group of the Communications Panel ("CP-DCIWG") to facilitate global/regional adoption and implementation of space-based VHF communications.

2.6 A new job card was created and approved by Air Navigation Commission (ANC) in Mar 2023 with defined timeline to review the ICAO provisions, such as Annex 10 Volume 3, and provide necessary technical inputs, materials to support and guide the implementation of new aeronautical satellite VHF communication technologies. The latest meeting report of FVSG is attached below

FVSG/7 Meeting Report (Appendix A)	 FVSG 7 Meeting Report_final.docx

Frequency Spectrum Management Panel ("FSMP")

2.7 A space-based VHF Correspondence Group (CG) was also setup in December 2023, to develop frequency planning and channel allocation/coordination processes for space-based VHF operations. More details can be found in the attachment below.

Space-based VHF Correspondence Group (Appendix B)	 FVSG7_IP02-satellite_ based_CG.pdf

2.8 For reference, the FSMP group developed a set of questions and answers (Q&As) containing information on technical and operational topics such as doppler shift, latency, interoperability, satellite coverage, frequency coordination, co-existence with terrestrial system and preliminary concept on the communication handover. The list of Q&As is attached below.

Questions and Answers (Q&A) - AMS(R)S Concept (Appendix C)	 FSMP-WG15-IP05_Attachment_CG-SV_Q

Proof-of-Concept (PoC) Demonstration

2.9 Currently, there are two companies working in parallel to the launch prototype satellites with VHF payload for PoC demonstrations between 2023 and 2025. The companies are Skykraft, an Australian space services company and Startical, a joint venture of Enaire and Indra.

2.10 Both companies are planning to launch a constellation of satellites specifically designed for ATM to provide space-based VHF communications as well as ADS-B surveillance services with global coverage.

2.11 To conduct the PoC demonstration, there will be a need for ICAO regional office to assign appropriate VHF frequencies so that verification tests could take place.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained within this paper;

b) support the ICAO activities on space-based VHF at the FVSG and FSMP;

c) support the frequency assignments for proof-of-concept demonstration when the need arises; and

d) discuss any relevant matter as appropriate.

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