International Civil Aviation Organization

Twenty Seventh Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/27) of APANPIRG

Bangkok, Thailand, 28 August – 01 September 2023

Agenda Item 5: Aeronautical Mobile Communications Service and Aeronautical electromagnetic spectrum utilization

5.3 Update on status of datalink applications and VHF capability sharing by States

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LDACS DEVELOPMENT IN CHINA

(Presented by China)

SUMMARY

This paper introduces the progress of L-band digital aeronautical communication system (LDACS) development in China. The national policy supports related to LDACS development are first provided, followed by the description of the LDACS prototype development, APNT development, LDACS compatibility tests and international collaborations. The action by the meeting is finally given.

1. INTRODUCTION

1.1 LDACS is an important data link technology defined in the future communication infrastructure for aviation. In China, the development of LDACS kicked off several years ago. The Chinese government released policies to support the development of LDACS and to include it in the future aviation communication infrastructure. In recent years, China made progress in LDACS prototype development.

1.2 This paper introduces the LDACS development in China. The policy supports from the government are first described, followed by the description of the LDACS prototype development, APNT development, LDACS compatibility tests and international collaborations.

2. DISCUSSION

Policy supports

2.1 To update the civil aviation infrastructure in China, the Civil Aviation Administration of China (CAAC) released *China Civil Aviation System Block Update (ASBU) Development and Implementation Strategy* in 2015. A unified framework for the aviation system chunking upgrade scheme is formulated. In the next year, CAAC released *China Civil Aviation Air Traffic Control Modernization Strategy* facing 2030, which promoted the implementation of ASBU to the height of strategic planning. The Civil Aviation ATM Modernization Strategy (CAAMS) was developed.

2.2 In 2021, CAAC released *Roadmap of the New Generation Aviation Broadband Communication Technology* (referred to as Roadmap hereafter), which clearly proposed to actively promote the exploration and research of LDACS. From then on, technical research and equipment development related to LDACS were carried out. As stated in the Roadmap, the promotion of aviation broadband communication technology is divided into three stages, in which LDACS is considered as one of the main approaches for aviation communication.

LDACS prototype development

2.3 Progress is made in LDACS prototype development. LDACS physical layer simulation is conducted. The physical layer receiving (RX) and transmission (TX) process of forward and reverse links are realized based on Python. Channel coding, decoding, OFDM processing, bit error rate analysis, etc. are achieved. Baseband signal files can be generated for R&D activities, such as compatibility tests with DME, ground station (GS) and airborne station (AS) functionality validation, etc. LDACS GS development is realized based on an SDR+X86 hardware platform, while LDACS AS is realized based on a Frontend+FPGA+ARM architecture. Initial tests are completed. Function tests of acknowledged and unacknowledged mode are conducted.

APNT development

2.4 The development of LDACS Alternative Positioning, Navigation, and Timing (APNT) functionality and LDACS positioning concept is ongoing. The LDACS ranging functionality is being developed following the one-way, two-way and hybrid approaches. The DME, VOR and LDACS integrated APNT algorithms are being studied. The airborne autonomous integrity monitoring algorithm for LDACS single and DME/VOR/LDACS integrated APNT is being investigated.

LDACS compatibility tests

2.5 LDACS is planned to be deployed in the L-band with the forward link assigned between 1110 to 1156 MHz and the reverse link between 964 to 1010 MHz, which is close to or co-channeling with the existing aviation CNS systems, including GNSS L5/E5a/B2a signals, DME and surveillance system. The LDACS compatibility test is one of the key focuses in the ICAO LDACS standardization process recently. Experimental platforms are built for the compatibility test between LDACS, DME and GNSS signals. In addition, theoretical analysis is conducted to identify all kinds of compatibility scenarios between LDACS and surveillance systems. The analysis benefits the conduct of laboratory tests in the follow-on work.

International collaborations

2.6 China actively participated in the ICAO DCIWG, PT-T, TSG/PT-T JWG, NSP GSWG, JWGs, TSG/SSFT Working Group meetings, as well as the EUROCAE WG-82 meetings. China continues to contribute to the standardization of LDACS SARPs and relevant industrial standards, and also welcomes collaborations.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information in this paper.

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