International Civil Aviation Organization

TWENTY SECOND MEETING OF THE COMMUNICATIONS/NAVIGATION AND SURVEILLANCE SUG-GROUP (CNS SG/22) OF APANPIRG

Bangkok, Thailand, 16 - 20July 2018

Agenda Item 4: Aeronautical Communications Service and Aeronautical electromagnetic spectrum utilization

AIRPORT SURFACE OPERATION BASED ON AeroMACS and BDS

(Presented by China)

SUMMARY

Aeronautical Mobile Airport Communications System (AeroMACS) is being developed to provide a new broadband wireless communications capability for safety critical communications in the airport surface domain, providing connectivity to aircraft and other ground vehicles as well as connections between other critical airport fixed assets. This paper presents the development of applications based on AeroMACS in 10 airports in China since 2014, the AeroMACS development in China has progressed from basic system performance testing, D-TAXI assistance application for aircraft and ground vehicles development.

1. INTRODUCTION

AeroMACS is short for Aeronautical Mobile Airport Communications. It is a wireless broadband technology, which supports the increasing need for data communications, meanwhile it also supports the information sharing on the airport surface for both fixed and mobile applications.

Based on the mature WiMAX standard (IEEE 802.16e), AeroMACS operates in the protected and licensed aviation spectrum band from 5091 MHz to 5150 MHz, which has been designated on a worldwide basis by the International Telecommunication Union (ITU) at the World Radio communication Conference in 2007. AeroMACS Tech Manual was approved at the ICAO CP meeting in October 2016, was published in ICAO Annex 10 Volume III at the end of 2016.

AeroMACS is internationally standardized and globally harmonized. It is the only wireless technology that has been validated by EUROCONTROL, Federal Aviation Administration (FAA), and International Civil Aviation Organization (ICAO) to support the safety and regularity of flight.

2. DISCUSSION

2.1 AeroMACS network deployment in China

China State Radio Commission and the Radio Commission of CAAC both support the AeroMACS technology. ADCC (Aviation Data Communication Corporation, CAAC) has been formally authorized with the frequency to cover 110 airports in China since 2017, to setup AeroMACS network and provide service in China. ADCC has already deployed AeroMACS networks in 13 airports, which

includes: Beijing, Chengdu, Tianjin, Shenyang, Xi'an Airport, etc. ADCC is going to set up AeroMACS network in 30 airports by the end of 2019.For example, in Beijing Capital International airport, 14 AeroMACS base stations have been installed, covering airport surface including runways, taxi ways, gate positions.

2.2 AeroMACS applications in China

ADCC has carried out some trial applications in the airports since 2014.

2.2.1 AeroMACS avionics

ADCC and Honeywell did the airport field research on the AeroMACS ground system and the prototype of airborne avionics from 2016. The prototype avionics connected with CMU, FMS and MCDU equipment from Honeywell can communicate with AeroMACS base stations in Chengdu Airport.

2.2.2 D-TAXI assistance system via AeroMACS

The D-TAXI assistance system is based on A-SMGCS system which has the ability to monitor aircraft surface movement in real time using radar, ADS-B, MLAT systems, and match aircraft with flight plan by integrating with ATC automation system. The target of the project is to develop D-TAXI assistance system which is easy to be deployed in the cockpit of the aircraft and the vehicles, following the safety and performance index of ICAO DOC 9830“Advanced Surface Movement Guidance and Control Systems(A-SMGCS) Manual”.

D-TAXI assistance system in cockpit provides surface GIS map of Beijing Airport for the pilot in iPad-based EFB, displaying the position of itself and all related aircrafts in the airport surface simultaneously. It also provides real-time guidance according to the approved taxi route by the ATC tower controller. ADCC redesigned the portable AeroMACS CPE. The new CPE antenna is stuck on the back window of cockpit. The CPE provides Wi-Fi and Bluetooth hotspot which can communicate with EFB, in which installed the D-TAXI App for the pilot.

Phase one of cockpit trial in Beijing Airport was conducted between Oct.1st and 7th in 2017, 56 flights from Air China, China Eastern, Hainan Airline and Shandong Airline attended the D-TAXI system cockpit trial in the period of departure and landing taxi stage. ATC controller totally released 82 taxi routes for the flights, and the pilots received all 82 taxi route data when they use the D-TAXI system via AeroMACS. The performance trial was based on ICAO DOC 9830 A-SMGCS Manual, including safety, coverage and speed.

2.2.3 Surface vehicle surveillance and navigation application based on BDS and AeroMACS

The Central and Southern Regional Administration of CAAC has initiated the demonstration project of the BDS (BeiDou Navigation Satellite System) airport surface operation and application this year and plans to launch the surface vehicle surveillance and navigation application demonstration based on the BDS and AeroMACS technology at Zhangjiajie International Airport, Hunan Province.

Three AeroMACS base stations will be installed in August 2018 to achieve basic coverage of the airport. One BDS ground augmentation station will be deployed to achieve BDS high-precision position service in the whole area of the airport. Mobile terminals combining BDS with AeroMACS will be developed to provide the vehicle of the surface with surveillance and navigation functions. The D-TAXI assistance system mentioned in 2.2.2 will be demonstrated in the future.

2.3 Next Step

ADCC is speeding up AeroMACS network construction in airports, and is going to set up one AeroMACS control center in China. ADCC is cooperating with JEZETEK to do the AeroMACS chip research and to enhance the performance of portable CPE, reduce the power consumption and physical volume. ADCC is working together with Honeywell to promote their search of AeroMACS avionic and antenna. ADCC is collaborating with Chinese airlines to enhance the online functions of EFB via AeroMACS, such as weather App, AMM (Airport Movement Map) and so on.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate.

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