

**55th CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGIONS**

*Denarau Island, Nadi, Fiji
22 — 26 October 2018*

AGENDA ITEM 4: AIR NAVIGATION

**ENHANCING AERODROME SURFACE OPERATION BY
AEROMACS AND BDS**

Presented by the People's Republic of 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 13 airports in China since 2014, and the trial using AeroMACS and BDS which further enhance the aerodrome surface operation, the AeroMACS development in China has progressed from basic system performance testing, D-TAXI assistance application for aircraft and ground vehicles development.

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1. INTRODUCTION

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

1.2 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 Radiocommunication Conference in 2007. AeroMACS Tech Manual was approved at the ICAO CP meeting in October 2016, published in ICAO Annex 10 Volume III at the end of 2016.

1.3 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

2.1.1 Both China State Radio Commission and the Radio Commission of CAAC support the AeroMACS technology. ADCC (Aviation Data Communication Corporation, CAAC) has been formally authorized with the frequency to cover 110 airports and provide service in China. ADCC has already deployed AeroMACS networks in 13 airports including Beijing Capital International airport, in which, 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 studies on the AeroMACS ground system and the prototype of avionics from 2016 in Chengdu airport. The prototype avionics connected with CMU, FMS and MCDU manufactured by Honeywell can communicate with AeroMACS base stations.

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 the ATC automation system.

2.2.3 D-TAXI assistance system in cockpit provides the pilot with surface GIS map of airport 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 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 the D-TAXI App for the pilot is installed.

2.2.4 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 phase 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.

2.2.5 *Surface vehicle surveillance and navigation application based on BDS and AeroMACS*

Following the guidance of the ATM Regulation Office of CAAC, 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.

2.2.6 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 **Future Plan**

2.3.1 ADCC is speeding up AeroMACS network construction in airports and is going to set up one AeroMACS control center in Beijing. ADCC is cooperating with its partners 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 the research 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.

2.3.2 Practice proved that the D-TAXI assistant application base on AeroMACS and BDS has good application effect and great popularization and application value, CAAC is promoting the application via AeroMACS in the Asia Pacific Region. CAAC is working on publishing D-TAXI assistance application regulations and guidance materials. CAAC is willing to provide support for the promotion of AeroMACS applications in Asia Pacific region.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) note the information contained in this paper; and;
- b) push the application of AeroMACS in Asia Pacific according to the specific needs of various countries; and;
- c) expedite development of standards and guidance materials for AeroMACS to ensure that a harmonized approach to be adopted.

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