International Civil Aviation Organization

EIGHTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION AND SURVEILLANCE SUG-GROUP (CNS SG/18) OF APANPIRG

Asia and Pacific Regional Sub-Office, Beijing, China
(21 – 25 July 2014)

Agenda Item 5: Aeronautical Mobile Service (AMS)

5.3) Other AMS related issues

STATUS OF AEROMACS TRIAL IN CHINA

(Presented by China)

SUMMARY

This paper presents AeroMACS development and implementation activates in China.

1. INTRODUCTION

1.1 Aeronautical Mobile Airport Communications System (AeroMACS) is a new airport surface data link based on the IEEE 802.16e-2009 standard specified to airport environment. This system is recommended by the ICAO ACP WG-T in its meeting in October 2007. The proposed spectrum for AeroMACS was enabled through actions taken at the 2007 ITU World Radio Communication Conference (WRC-2007) to allow new aeronautical mobile route services (AM(R)S) in the MLS Extension Band (5091-5150 MHz). AeroMACS can seamlessly cover the entire airport surface and provide aircraft and other facilities on it with an aeronautical broadband mobile service. AeroMACS is a key enabler for the new generation ATC, AOC service which guarantee the safe, secure and efficient airport operation.

2. CAAC IMPLEMENTATION ACTIVITIES AND STATUS

The AeroMACS development is actively being pursued in China supported by CAAC/ATMB.

2.1 Frequency Coordination

Under the leadership of ATMB of CAAC, ADCC, who is the major aviation ground telecommunication network supplier in China, has tracked AeroMACS evolution for couple of years. ADCC has been approved for use in the 5120-5130MHz frequency range and intended to implement a demonstration at 3-5 of Top 20 airports to promote this new technology in China.

2.2 Test Bed Description

ADCC build an AeroMACS prototype demonstration system at CHENGDU airport for running some applications on it, testing and assessing performance. Figure 1 shows a diagram of the AeroMACS test-bed installed at CHENGDU airport.

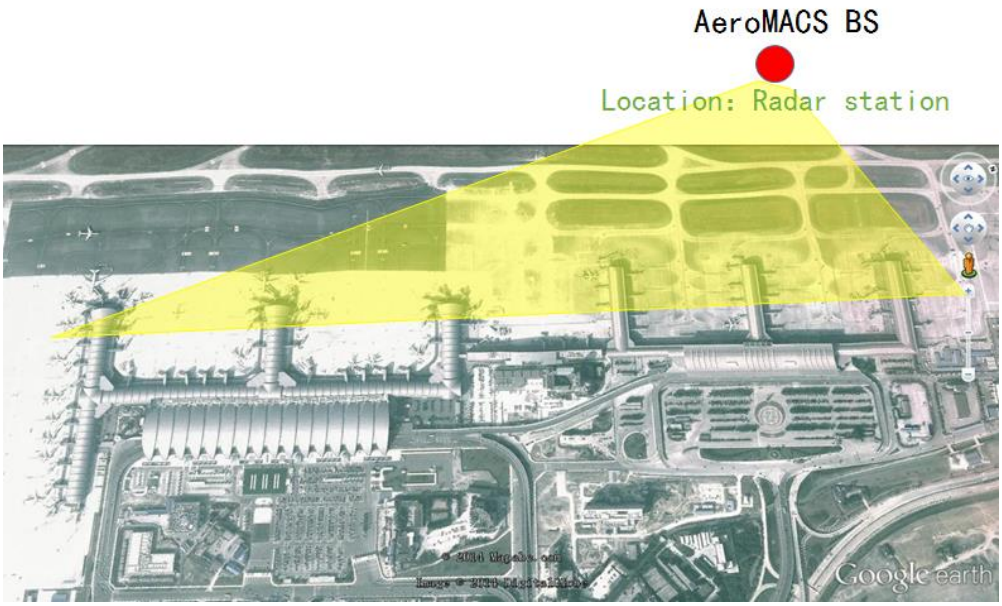

Figure 1 ChengDu AeroMACS prototype Test Bed

The BS was mounted on the tower of Radar station Building, there is only one BTS sector that are directed to the runway and airport bridge. The BSs are linked to core servers located in CAAC Southwest Regional Administration Building by fiber network. The network doesn't include Access Service Network - Gateway (ASN–GW), it only use AAA server to provide user authentication and authorization for security.

Figure 2 ChengDu AeroMACS BS Location

Mobile terminal tests were conducted primarily using the CAAC/SRA Vehicle for drive tests on airport runways, taxi-ways. The equipment installed inside the car includes an AeroMACS MRT terminal, a laptop computer with network test software, and the power supply. Figure 3 shows the modified car and one dual polarized test antenna mounted on top of the car.

Figure 3 ChengDu AeroMACS testing car

The AeroMACS prototype BS parameters are as described in Table 1. Built-in BTS antennas provide two high-gain directive patterns with X polarization to support dual-channel second-order diversity MIMO operation for improved link sensitivity.

Table 1 Base Station Parameters

Transmit power	27dBm maximum
Channel bandwidth	5MHz,10MHz
Antenna configurations	X-Polar Smart Switching Directional
MIMO mode	2×2 MIMO, Adaptive Matrix A&Matrix B
Downlink/Uplink ratio	29/18
Hybrid automatic repeat request(HARQ)	Enabled
AAA server	Enabled
PKMv2, EAP-TTLS security	Enabled
Modulation	Up to 64-QAM rate 5/6

2.3 Drive tests result

AeroMACS drive tests route are illustrated in Figure 4 with the drive paths overlaid. These drive paths provide line-of-sight (LOS) and non-line-of-sight (NLOS) link conditions for service from the base stations with moderate drive speeds.

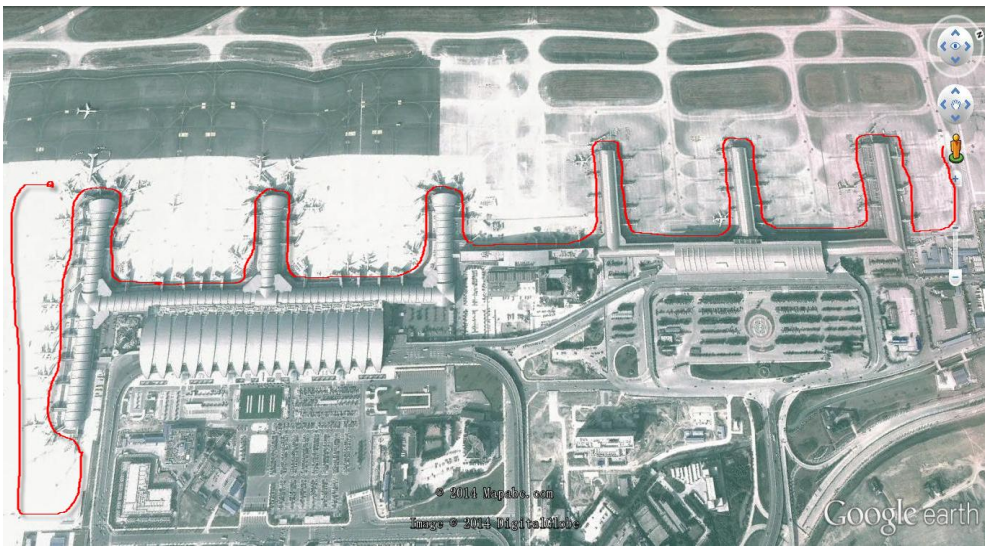

Figure 4 drive test paths

Figure 5 that shows the Received Signal Strength Indication (RSSI) plot of the ChengDu airport surface. The data is generated by RF test software with actual routes from GPS readings taken during tests.

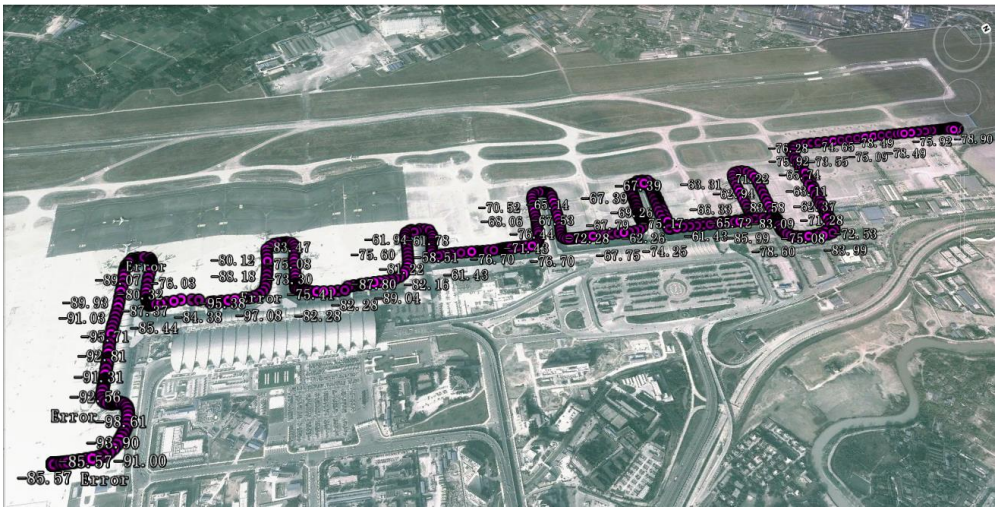

Figure 5 RSSI result

The throughput performance results obtained during the drive testing. Figure 6 shows the average data throughput performance.

Figure 5 Testing of throughput

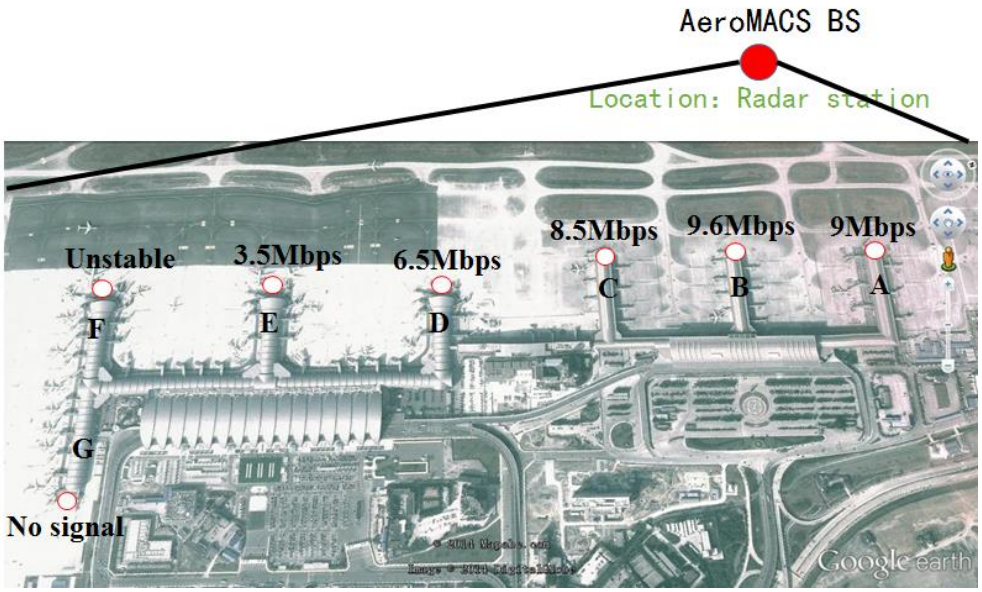

Figure 5 throughput test result

The feasibility of AeroMACS for safety critical applications was also demonstrated. The application chosen to validate the AeroMACS technology was a Departure Clearance service (DCL), the applications testing of AeroMACS was performed using similar airport surface and runway routes. Figure 6 illustrates DCL client downloading data from DCL ftp server.

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 matters as appropriate.

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