ENHANCING AERODROME SURFACE OPERATION BY AEROMACS AND BDS

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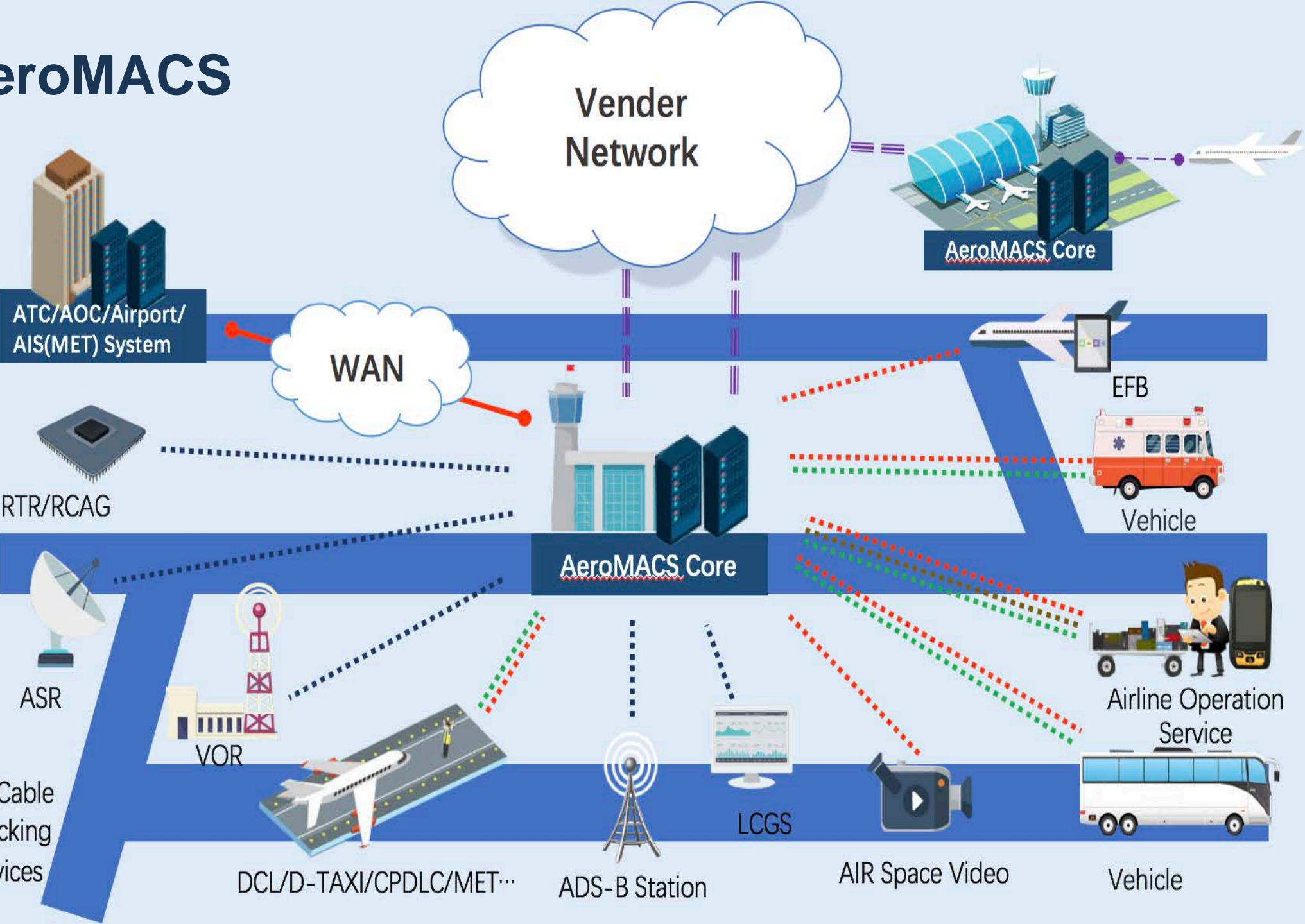
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AeroMACS Technology

Aeronautical Mobile Airport Communications(AeroMACS) is based on the mobile wireless and it is the international standard of future aviation mobile communication system. It can cover the aerodrome surface and it is the data communication system between the aircraft and the ground for improving the efficiency of the aerodrome operation.

AeroMACS operates in the reassigned **5091 MHz to 5150 MHz for Global use.**

• 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.

• 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 ITU at WRC/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.

• AeroMACS is internationally standardized and globally harmonized. It is the only wireless technology that has been validated by EUROCONTROL, FAA, and ICAO to support the safety and regularity of flight.

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AeroMACS

Vender Network

AeroMACS Core

ATC/AOC/Airport/ AIS(MET) System

WAN

RTR/RCAG

AeroMACS Core

EFB

Vehicle

ASR

VOR

Airline Operation Service

DCL/D-TAXI/CPDLC/MET···

ADS-B Station

LCGS

AIR Space Video

Vehicle

Wireless Cable
Asset Tracking
Data Services
VOIP

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# AeroMACS Network Deployment in China

- Since 2017, Radio Commission of CAAC has formally authorized AeroMACS frequency in **110** airports in China.

- AeroMACS networks has already been deployed in **13** airports including Beijing Capital International Airport.
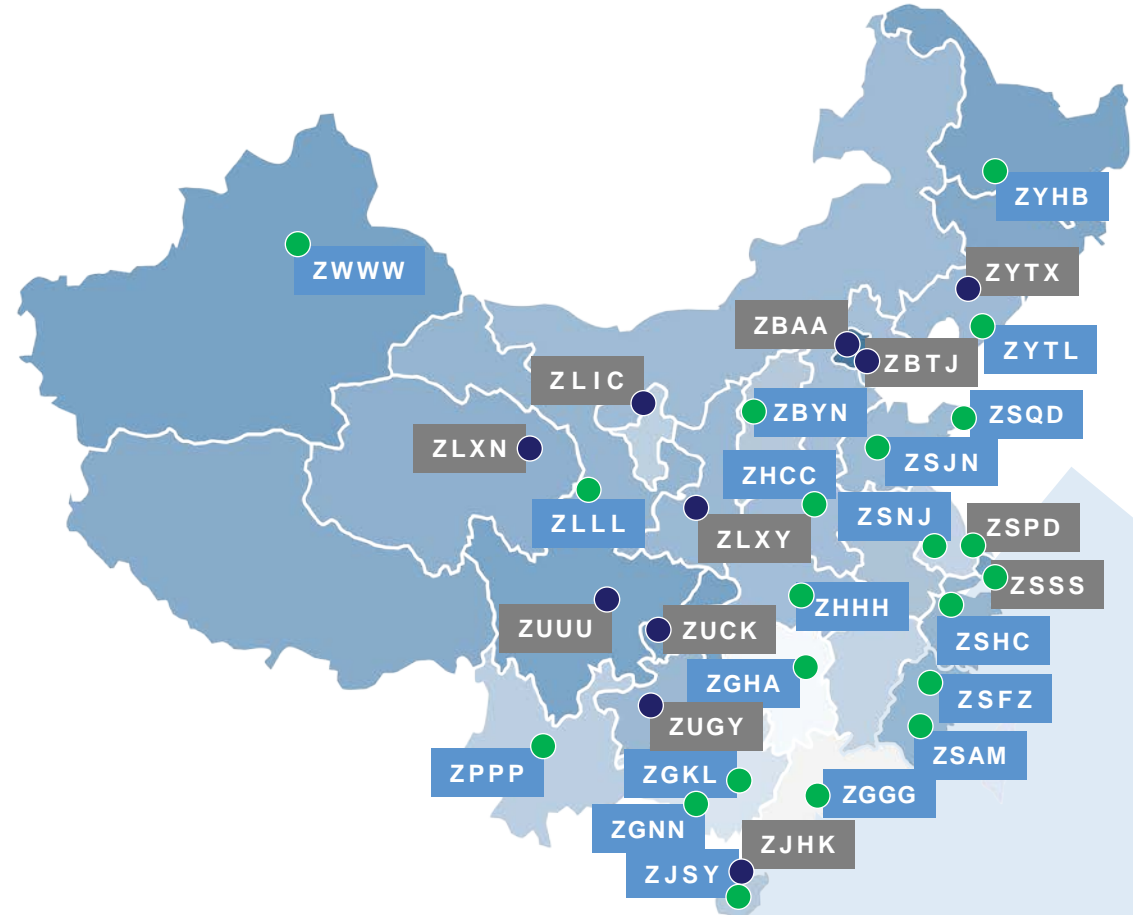
AeroMACS in Beijing Capital Airport

- **14** AeroMACS base stations was installed in Beijing Capital Airport.

- Covering airport surface including runways, taxi ways, gate positions.
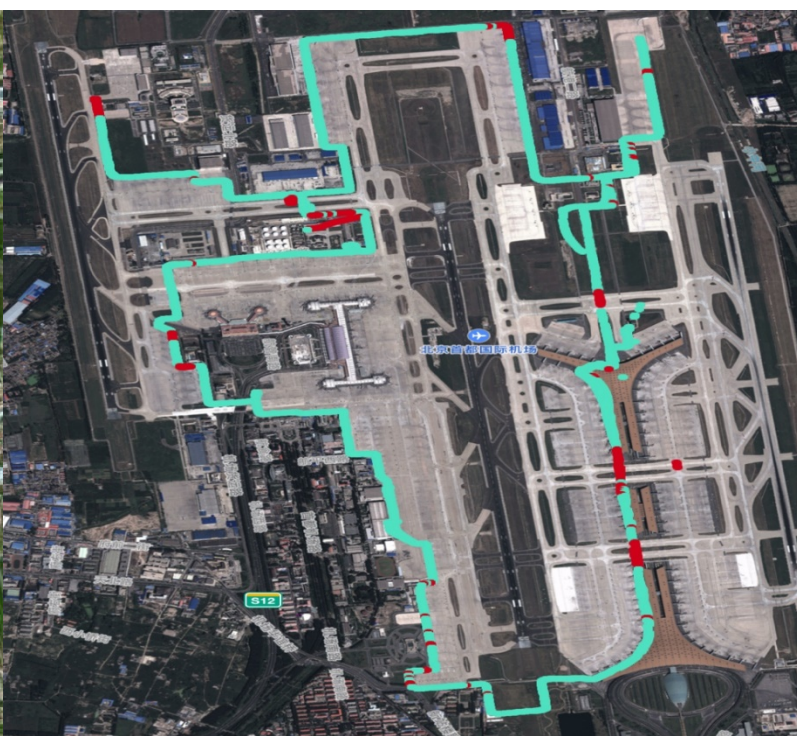
Part TWO

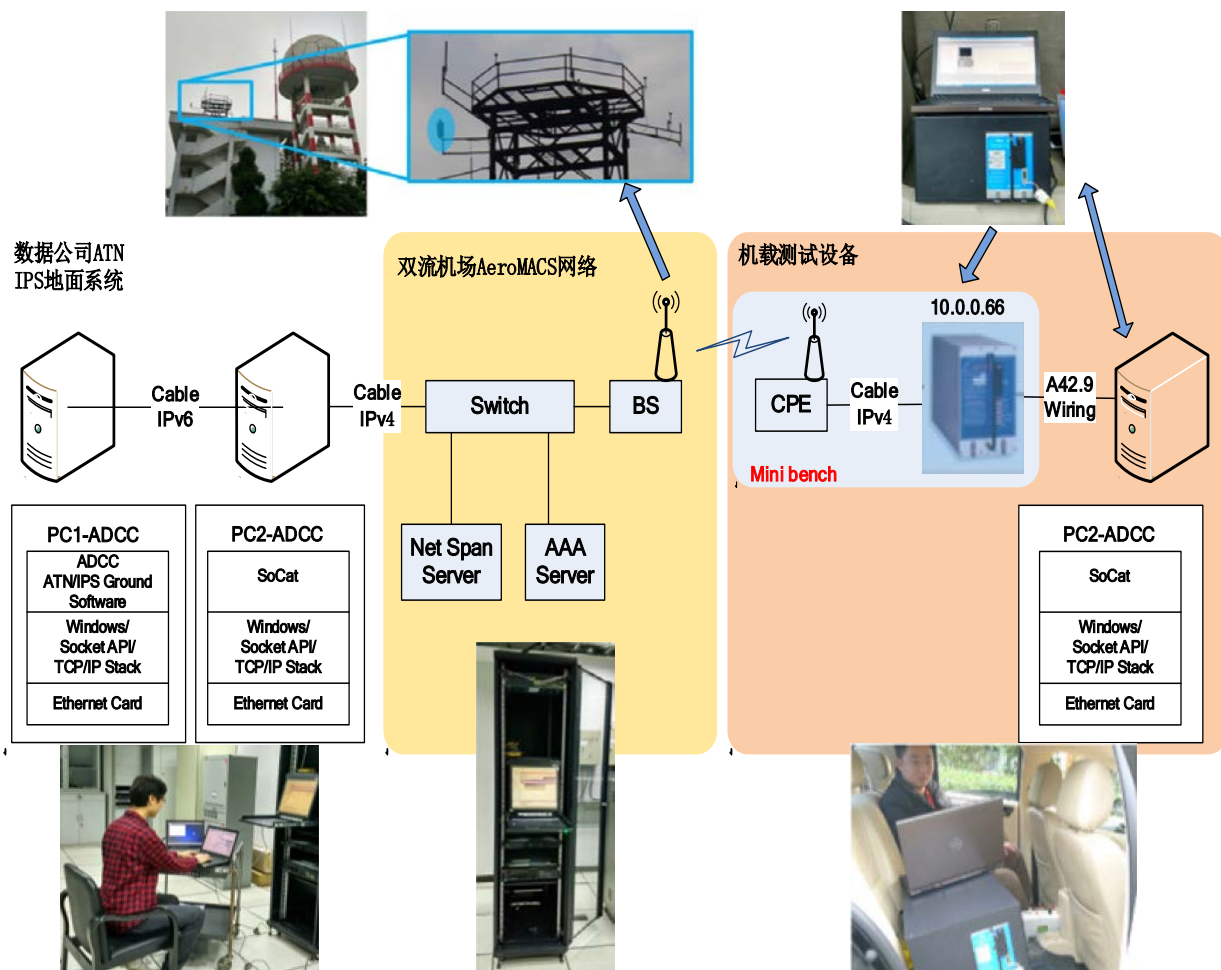**AeroMACS**

Applications in China

AeroMACS Avionics

- Airport field studies was conducted on the AeroMACS ground system and the prototype of avionics from 2016 in Chengdu airport.

- With the support of an avionics manufacturer, the prototype avionics connected with CMU, FMS and MCDU can communicate with AeroMACS base stations.
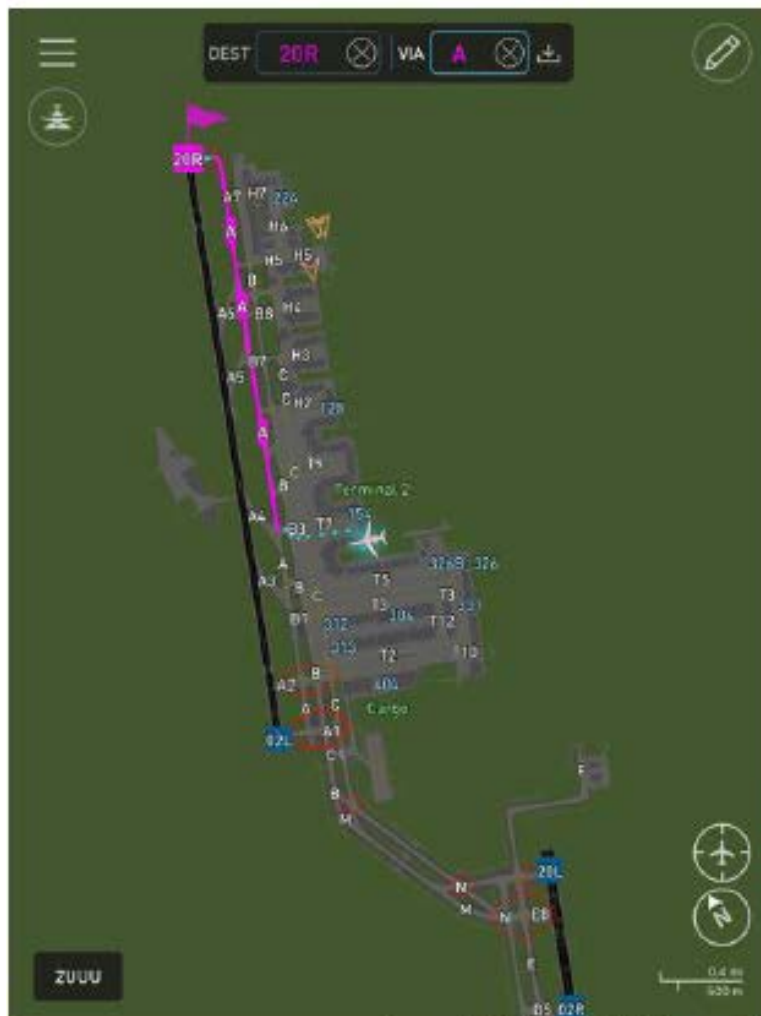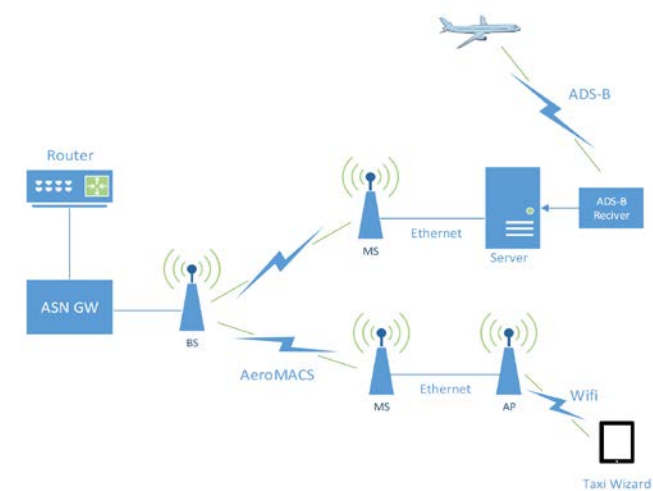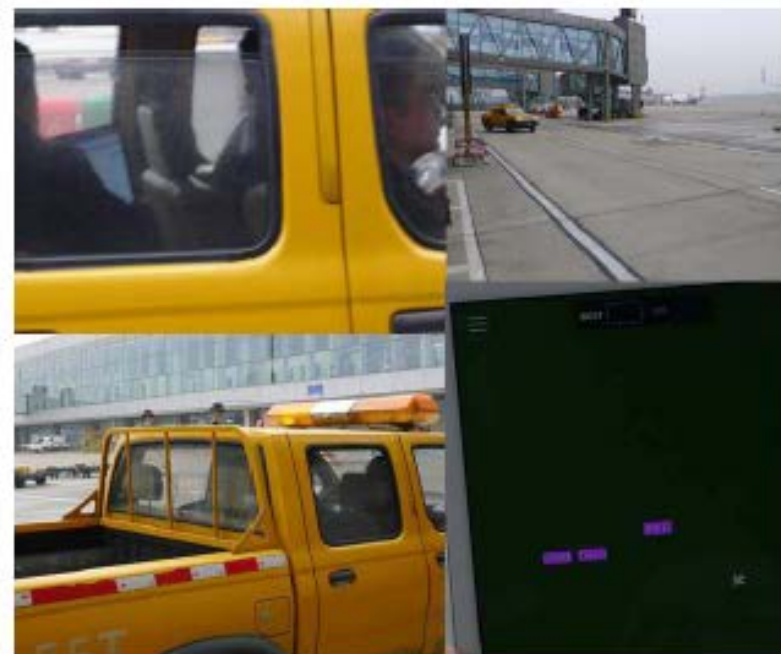

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AeroMACS Applications in China
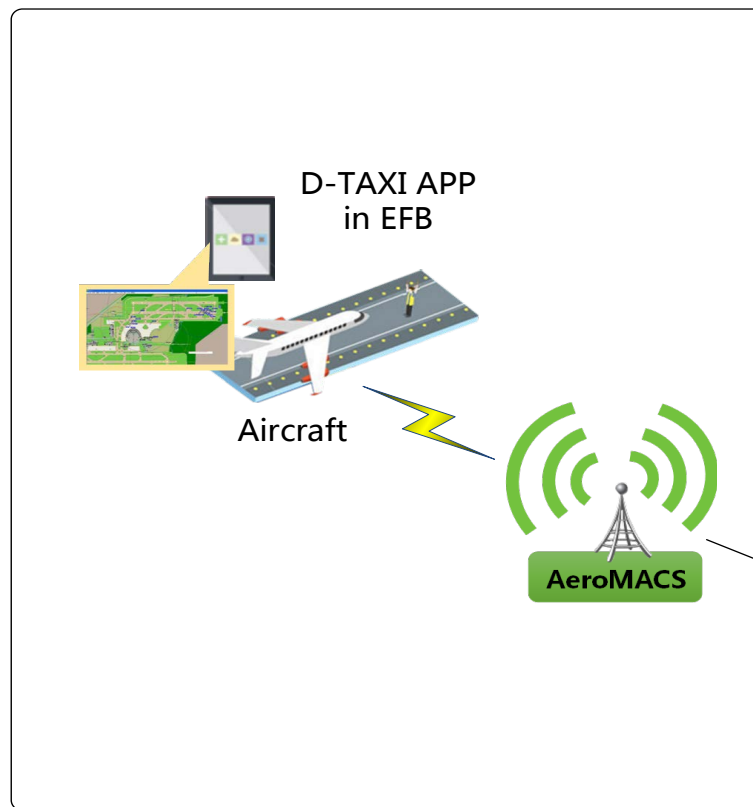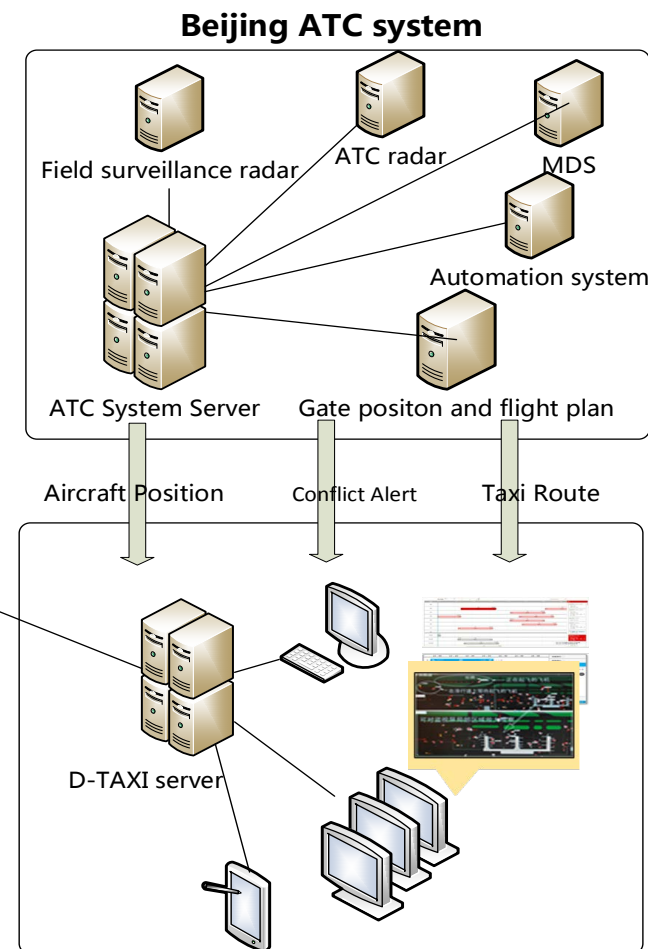
D-TAXI assistance system via AeroMACS

- 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.

Beijing ATC system

D-TAXI APP in EFB

Aircraft

AeroMACS

Field surveillance radar   ATC radar   MDS

Automation system

ATC System Server   Gate positon and flight plan

Aircraft Position   Conflict Alert   Taxi Route

D-TAXI server

D-TAXI base on AeroMACS in Beijing Airport

D-TAXI system in Beijing Tower

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The same situational awareness of controllers and pilots in the airport surface area

- 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.
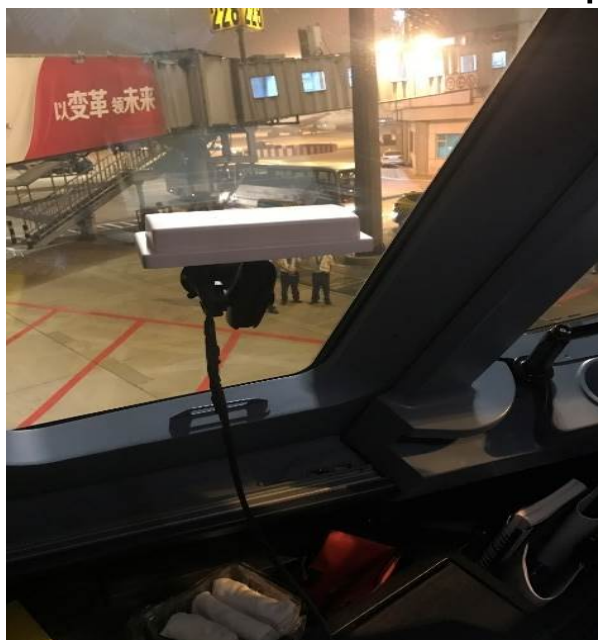
AeroMACS Applications in China

D-TAXI assistance system in cockpit trial progress in Beijing Capital Airport

▪The portable AeroMACS CPE was redesigned for the trial.

▪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.

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AeroMACS Applications in China

## D-TAXI assistance system in cockpit trial at Beijing Capital Airport

- 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.

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Surface vehicle surveillance and navigation application based on BDS and AeroMACS

- AeroMACS also helps to fulfill basic surface movement guidance and control for medium-sized and small airports. Following the guidance of the Air Traffic Regulation Office of CAAC, the Central and Southern Regional Administration of CAAC has initiated the demonstration project of the BDS based 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.

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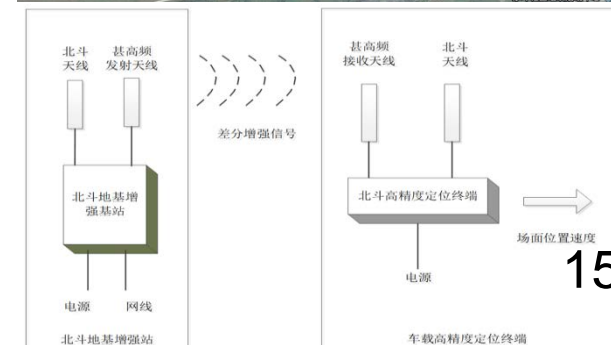
Surface vehicle surveillance and navigation application based on BDS and AeroMACS

- 3 AeroMACS base stations has been installed in August 2018 to achieve basic coverage of the airport.

- 1 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.

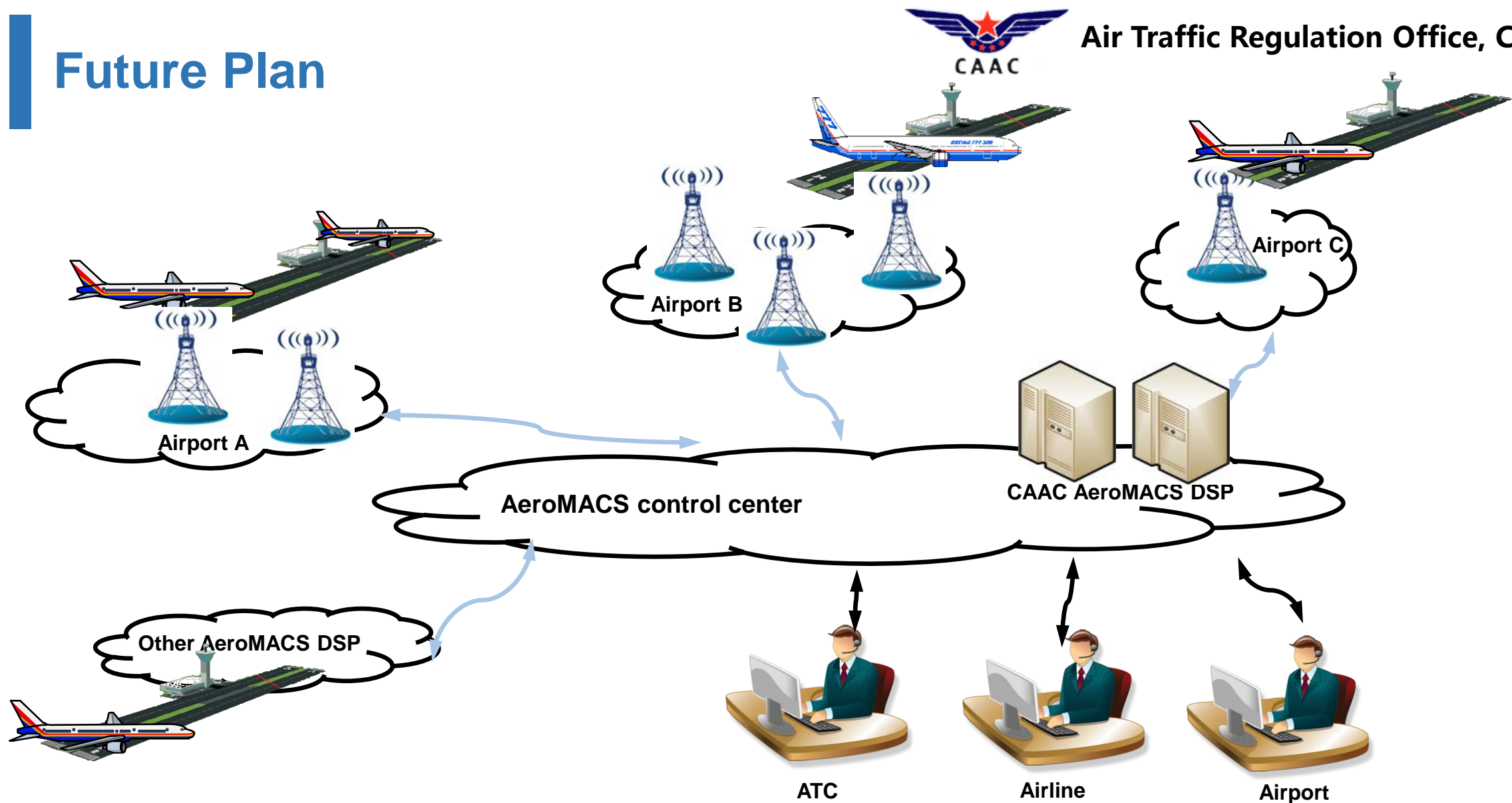- The D-TAXI assistance system will be demonstrated in the future.

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Part THREE

Future Plan

Future Plan

With the support of domestic manufacturers, CAAC is speeding up AeroMACS network construction in airports and is going to set up one AeroMACS control center in Beijing.
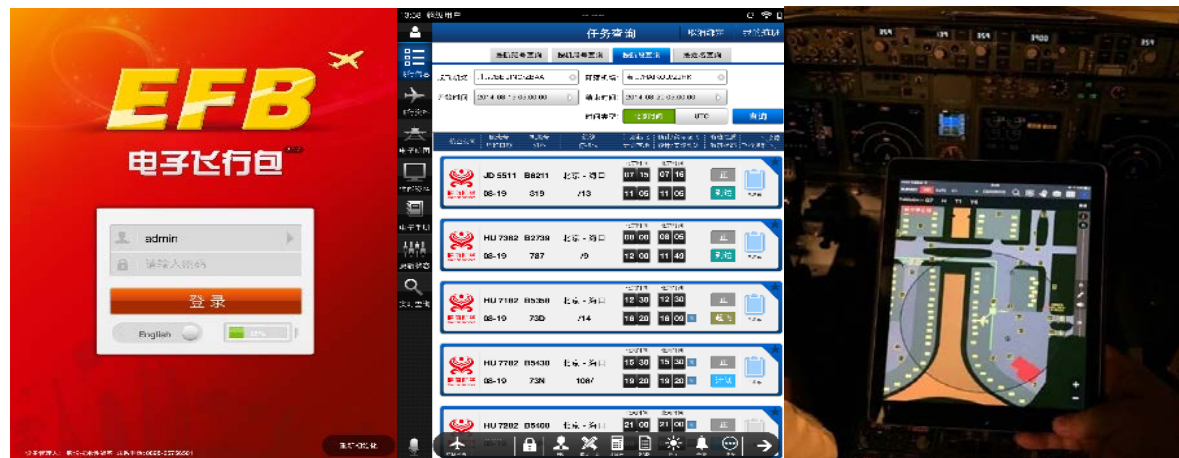
Module set

Router

- AeroMACS chip research will be conducted to enhance the performance of portable CPE, reduce the power consumption and physical volume.

- The research of AeroMACS avionic and antenna will be promoted and the online functions of EFB via AeroMACS, such as weather App, AMM (Airport Movement Map) , will be enhanced in collaboration with industries and airlines.

3 Part

Future Plan

- 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.

Actions

- Push forward the application of AeroMACS and GNSS to enhance aerodrome surface operation in Asia Pacific region according to the specific needs of various countries; and

- Propose ICAO to develop guidance materials for aerodrome surface operation based on AeroMACS and GNSS, to ensure that a harmonized approach to be adopted.

Thanks for Your Attention