

International Civil Aviation Organization

ICAO

**Twenty Sixth Meeting of the Communications/
Navigation and Surveillance Sub-group (CNS SG/26) of
APANPIRG**

Video Tele-Conference, 5 – 9 September 2022

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

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

VERIFICATION OF AIR TRAFFIC CONTROL SERVICES BASED ON DATA-LINK FOR ALL FLIGHT PHASES IN CHINA

(Presented by China)

SUMMARY

Guided by the thread of communication infrastructure (COMI) and communication service (COMS) in ICAO ASBU, ATMB of CAAC has carried out a series of technical feasibility verifications in Zhengzhou airspace since 2019, with the goal of optimizing the use of China's aircrafts and datalink network and providing fundamental base for full-scale application of Datalink Air Traffic Control Services in China's major airspaces in the future.

1. INTRODUCTION

1.1 In 2019, Air Traffic Management Bureau (ATMB) of Civil Aviation Administration of China (CAAC) launched the project of 'Technology and Application Research to support Datalink Air Traffic Control Services for All Flight Phases'. After three years' research, all verifications have been completed.

1.2 With the support from Henan Air Traffic Management Sub-bureau, Hainan Airlines and other stakeholders, the project is intended to make full use of the existing aircrafts and datalink network to carry out a demonstration of Datalink Air Traffic Control Services while factoring into consideration requirements from Southern Regional ATMB. The output of the project recognizes the feasibility of the key work for promoting datalink service in the future, and has achieved the results as expected.

1.3 In 2021, the Datalink Air Traffic Control Services and emergency communication services based on ACARS ATS protocol was successfully carried out in Zhengzhou to verify if the capacity of the existing A/G datalink system can be expanded to of support full-scale application of Datalink Air Traffic Control Services in China's major airspaces in the future.

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2. DISCUSSION

AVIONIC SYSTEMS

2.1 The verification will be conducted in keeping with the ACARS ATS protocol, supported by all 99+ seats commercial aircrafts registered in China. The benefit is to make a full use of our existing airborne system capabilities while realizing cost efficiency by avoiding unnecessary investment in the upgrading and transformation of airborne systems.

2.2 The project selected two aircrafts from Hainan Airlines, the avionics of which were fully modified, carrying out EFB based visual service verification during the flight. The project realized real-time visual display and auxiliary guidance of Datalink Air Traffic Control Services combined with EFB electronic aeronautical chart in the whole flight phases for the first time.

AIR-GROUND DATA-LINK COMMUNICATION NETWORK

2.3 The project conducted verification work based on the existing Chinese VDL MODE2 data link communication network, which is compatible with ACARS. At present, more than 50% of the Chinese aircraft with more than 99+ seats support VDL MODE2, and 100% supports ACARS. VDL MODE2 network has covered the airspace of major Chinese airports and routes in central and eastern China. The VDL MODE2 network is planned to cover the major transport airports and routes in China by 2025. The ACARS network has covered the main transport airports and routes in China.

ATC INFORMATION SYSTEM

2.4 According to the requirements of air traffic control operation, the verification focused on Datalink Air Traffic Control Services include but not limited to estimated RTA and delay time, estimated use frequency, diversion suggestions, estimated arrival and departure procedures, estimated runway, estimated arrival and departure taxiing routes, estimated stand, and emergency communication reminders.

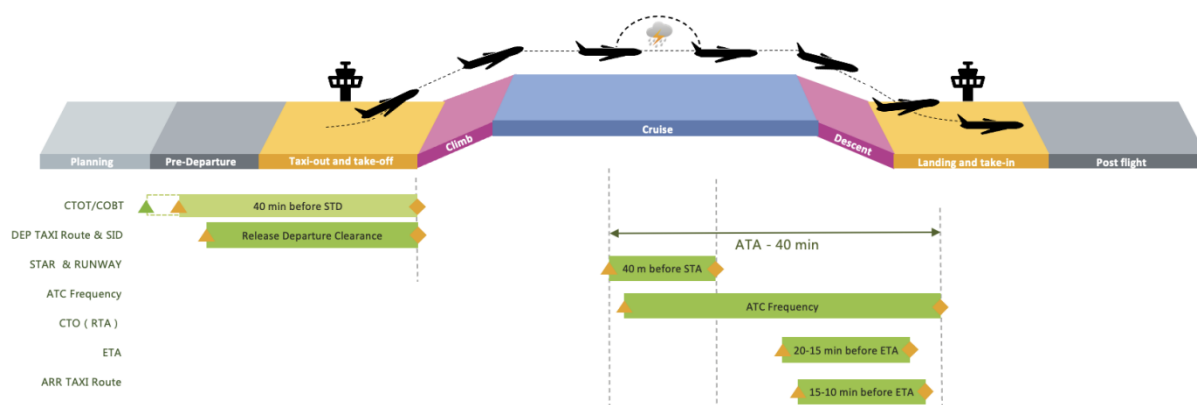


Figure 1. Verification scheme of Datalink Air Traffic Control Services for All Flight Phases

2.5 The system was deployed in the Air Traffic Control (ATC) ground system in Zhengzhou, and automatically/manually provides all kinds of Datalink Air Traffic Control Services to the Multi-function Control Display Unit (MCDU) and Electronic Flight Bag (EFB) of designated flight and the receiving status of the airborne equipment and the ‘ACCEPT’ status when flight crew review information in MCDU will be updated to ATC ground system in real-time.

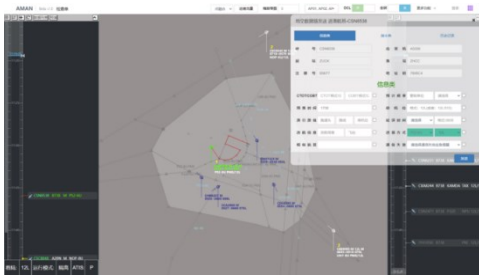


Figure 1 Ground-controlled approach system



Figure 2 Tower controller ground system

2.6 Datalink Air Traffic Control Services pushed by the project is displayed in text at airborne MCDU terminal and in graphics at the EFB terminal for aircrew. Meanwhile, the system can provide visual-aided guidance of flight path during all flight phases based on the aircraft current position, route and ATC's flight information based on data link.



Figure 4 Datalink Air Traffic Control Services in MCDU

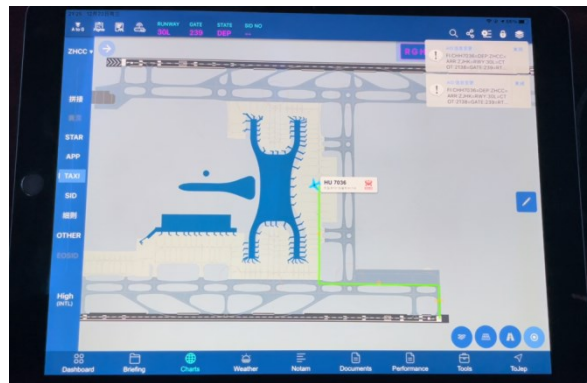


Figure 5 Datalink Air Traffic Control Services in EFB

2.7 The project has carried out routine flight verification tests in Zhengzhou airspace (flight level below 7800 meters) for 10 months, involved nearly 37000 flights. Henan ATMB sent more than 500 prompts of Datalink Air Traffic Control Services every day. In that case, daily use of voice communication in the airspace is expected to decrease 1.39 hour while keeping an equal operation quality, reducing at least 500 hours per year.

2.8 The project established the interface between A-G datalink network and ATC information system, which is proved to be applicable to ATC systems including ATC automation system, Electronic Flight Strip and AMAN.

SERVICE PERFORMANCE

2.9 Through the analysis of VDL MODE2 network message during the flight verification (flight altitude 0-7800 meters) of the project, the average delay of one-way ground-air communication is 4.03 seconds, and the percentage of lost message is 3.8%.

2.10 According to ED120, ED122, ED228A and other relevant standards, the project carried out the required communication performance (RCP) evaluation for the flight verification data based on the capability of Chinese ground-air data link network and the aircraft avionics system, and the actual requirement of air traffic control operation, based on the data analysis, the project preliminarily put forward the RCP evaluation method to different flight stages and different air traffic control service,

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which will be the basis for the formulation of the RCP specification of digital air traffic control services of China.

2.11 Follow up work plan

a) The ATMB of CAAC will continue carry out the operation verification of the mixed use of ACARS ATS and CPDLC data link services in Haikou, advancing the research and planning of COMS thread proposed by ICAO ASBU.

b) Based on the experimental verification results, the ATMB of CAAC will continue to accelerate the full-scale application of Datalink Air Traffic Control Services in China’s major airspaces in the future.

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.
