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AGENDA ITEM 4: AIR NAVIGATION

**VALIDATION AND APPLICATION OF ALL-PHASE
DATALINK ATC SERVICE BASED ON AIR-GROUND
DATALINK IN CHINA**

(Presented by the People's Republic of China)

INFORMATION PAPER

SUMMARY

This paper presents a series of All-Phase Datalink ATC Service validation and application activities carried out in China since 2019. These activities fully use the ACARS ATS capabilities of avionics system supported by nearly 100% >99-seat aircraft in China, in order to reduce the cost challenges for airlines and accelerate the development of Datalink ATC Services.

Validation and Application of All-Phase Datalink ATC Service Based on Air-Ground Datalink in China

1. INTRODUCTION

1.1 According to the ICAO ASBU plan and relevant plans of CAAC, data link services are the focus of the air navigation technology. Aircraft Communication Addressing and Reporting System Air Traffic Service (ACARS ATS) and Controller Pilot Data Link Communication (CPDLC), as two common datalink ATS technology currently in use, can be used to transmit various types of information between controllers and pilots, which will significantly reduce the workload of controllers and pilots, mitigate the shortage of voice communication frequency resources, and enhance the operation safety. Since 2019, China has successfully carried out flight validation of All-Phase Datalink ATC Service based on compatible FANS 1/A and ACARS ATS protocols in Zhengzhou, Guangzhou, Haikou, Shanghai and other areas. The validation covers Datalink-Flight Information System (D-FIS) which are defined in Doc 9694, emergency communication, similar call sign alerts based on datalink, dangerous weather warning, etc., which will support the technical feasibility of the near-term (to 2027) planning goal of fully leveraging the existing system capacity of China to provide datalink emergency communication and information services in major airspace, and to explore the development path of datalink-voice hybrid application in China in the forthcoming "All-Phase Datalink-Based ATC Service Planning and Implementation Roadmap" (hereinafter referred to as the Roadmap).

1.2 In 2024, China will promote the trial program of datalink-based similar call sign alerts in some control areas, to research and validate the on-demand transmission of flight-related similar call sign alert information relying on the existing automatic ground control systems in various regions and the datalink technology.

1.3 In 2024, China will carry out datalink-voice hybrid flight validation on the basis of all phases of flights in Xinjiang, China, and has already completed the design of the flight validation plan, which involves 34 categories, >120 commonly used datalink-based ATC advance instructions and flight-related auxiliary information, covering tower, approach and area, to explore the datalink-voice hybrid operation in all phases of flights in China and the ATC-airlines-airports collaboration mode.

2. DISCUSSION

Avionics System

2.1 At present, more than 50% of the aircraft with more than 99 seats in China support VDL Mode 2, and 100% support ACARS; as for the application of on-board datalink-based control protocol, the existing on-board system capabilities of China are fully explored and utilized to carry out validation based on the ACARS ATS protocol supported by all aircraft with more than 99 seats in China while including FANS 1/A protocol compatibility as well, so as to reduce unnecessary investment in the upgrading and reconstruction of the on-board system.

2.2 Relying on the ground ATC system, various kinds of datalink-based control information and emergency communication information are automatically/manually sent to the Multi-Function Control Display Unit (MCDU) at the on-board end of the targeted flight crew.

Air-Ground Data Link Network

2.3 Regarding the air-ground datalink network, the above validation is based on China's existing VDL Mode 2 and compatible with ACARS Air-Ground Datalink network. The VDL Mode 2 network covers major airports and air routes in the central and eastern parts of China and is planned to realize the coverage of major transport airports and air routes around China by 2025. The ACARS network has already covered major transport airports and air routes in China.

ATC Information System

2.4 Regarding the validation of Datalink Flight Information Service (D-FIS), efforts has been made in utilizing the existing ATC system to carry out the automatic on-demand flight auxiliary information push based on the existing ATC system, such as approach procedures and runways for landing, in Zhengzhou and Guangzhou since 2019, and the services have been in operation on a regular basis in these two cities of China.

2.5 Regarding the validation of datalink-based similar call sign alerts, the existing major automatic ground ATC system in all regions of China have been equipped with the function of similar call sign alert. The promotion of trial datalink-based similar callsign alertprogram will be launched this year in some ATC areas, with upgrading and modification on the basis of the existing automation system, so as to realize the automatic identification of similar call sign within sectors and automatic push of digitized similar call sign alert information to the targeted flight crew.

Validation Results

2.6 Regarding the validation of datalink-based dangerous weather warning in air routes, efforts has been made in upgrading the existing ATC system based on the actual needs of ATC units to realise the information push of flight-related turbulence and other air route dangerous weather warning to relevant aircrew. The services have been in regular operation in the airspace of Zhengzhou, China, since September 1, 2023, with a daily average of 13.13 copies of datalink-based air route dangerous weather warning information being sent out.

2.7 Since May 1, 2021, the trial operation of datalink-based similar call sign alert has been carried out in Zhengzhou, China, with a daily average of 169.70 pieces of datalink-based similar call sign alert message being sent out. According to statistics, relying on the datalink-based similar callsign alert services, an average of about 38 minutes of voice calls can be saved per day, which effectively reduces the workload of air traffic controllers and aircrew and improves flight safety.

2.8 Starting from August 1, 2022, the Datalink-Flight Information Service (D-FIS) and emergency communication services have been in regular operation in the airspace of Guangzhou, with a daily average of 191.94 copies of datalink-based flight auxiliary information being sent out, which significantly enhances the efficiency of ATC operation. In the future, according to ICAO's plan, China will gradually migrate to FANS 1/A and B2 applications in phases and eventually support TBO.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

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