International Civil Aviation Organization

Eleventh Meeting of the Air Traffic Management Sub-Group (ATM/SG/11) of APANPIRG

Singapore, 2 – 6 October 2023

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

DATA LINK SERVICE PROGRESS IN GUANGZHOU

(Presented by China)

SUMMARY

This paper presents the experimental operation of data link service (DLS) in Guangzhou Air Traffic Control Center (GZATCC), and proposes to improve the relevant standards and procedures of data link service and promote the interoperability between ATS providers and aircraft operators, so as to enhance safety and efficiency of Data Link Service operations.

1. INTRODUCTION

1.1 The increasingly growing traffic demand in GZATCC, especially after COVID-19, has led to a surge in the amount of RT communications, resulted in radio frequency congestion, increased ATCO workload, and a spike in the risk of human errors.

1.2 DLS can realize the issuance of ATC clearance with low timeliness requirements through air-ground data exchange. Its application is helpful to reduce air-ground voice communication, relieve radio frequency congestion, reduce ATCO workload, and reduce the possibility of human errors related to call sign confusion, thus improving the safety level and operation efficiency.

1.3 This paper presents the experience of DLS pilot operation of in GZATCC, and addresses relevant problems encountered during the operation.

2. DISCUSSION

Trial operation in GZATCC

2.1 The first phase of the DLS trial operation in Guangzhou Terminal Control Area started on November 1, 2022. However, due to the influence of the thunderstorm season and general aviation activities in Guangzhou, the airspace conditions in the terminal area are becoming increasingly complex, resulting in intermittent trial operations.

2.2 ATC operates DLS on the self-developed AMAN system of Middle and South Regional ATMB CAAC, data messages, including landing runway designators and STAR, can be sent to the flights landing Guangzhou airport about five minutes before entering Guangzhou Terminal Area. The flight crew are required to acknowledge the reception of the data message on ACARS by sending back a reply message in a timely manner, and the ground AMAN HMI displays pertinent information, indicating whether the data exchanges are successful, thus forming a complete loop of data link communications.

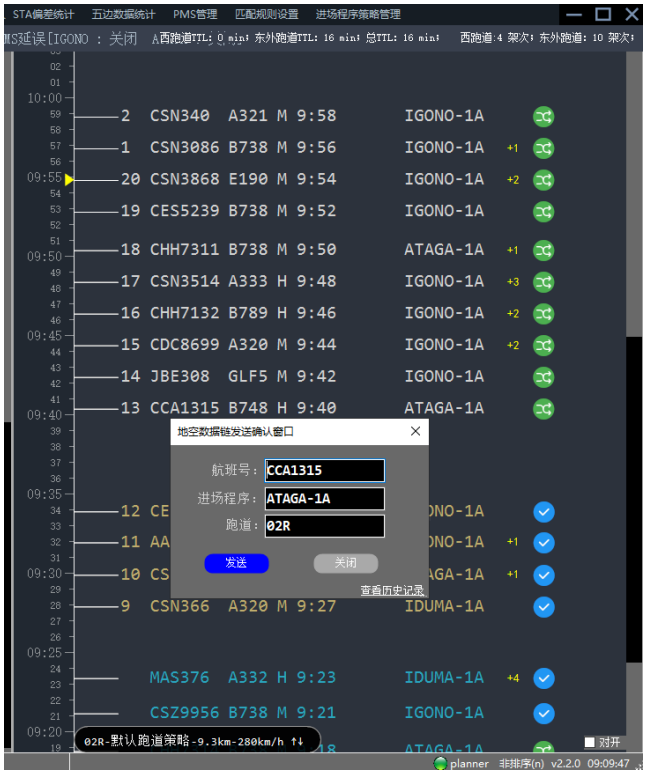

Figure 1: Self-developed AMAN system operating DLS

2.3 Until May 31, 2023, a total of 58,918 data messages were sent (282 daily), 96.69% of which were sent successfully, with an average latency of 2.27s, and for those flights need satellite communication switching in the oceanic area, , the average latency increase to 11.34s. According to the statistics, 77.31% of the data messages sent were replied from pilots, showing that most of pilots responded to DLS in compliance with the designated procedures, we expect this number to increase continuously through further publicity with the pilot community.

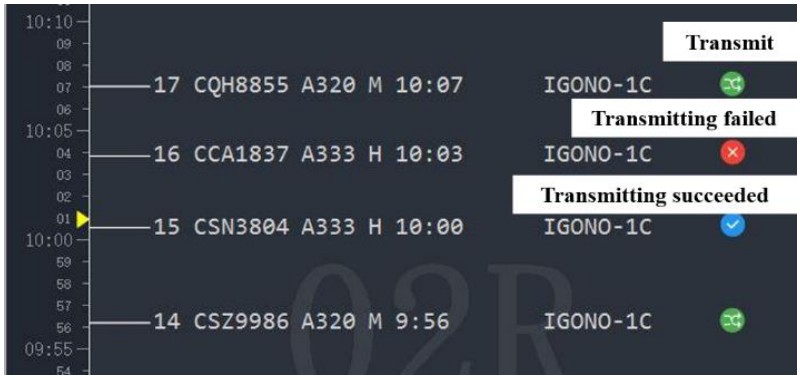

Figure 2: Legend of Data Link status

2.4 The application of DLS had assisted the controllers in managing traffic more efficiently at **peak hours** as air-ground voice radio transmissions were shortened, reduced workload for both controllers and pilots and increased capacity accordingly.

Problems during the operation

2.5 During the trial DLS operation, the following problems were noted:

a) a lack of standard phraseology for controllers to inquire and acknowledge the reception of DLS messages.

b) a confusion for flight crew between ACARS data link instruction messages and other content, such as Pre-Departure Clearance.

c) differences in data link message formats in different areas, causing possible misunderstanding among pilots.

d) incorrect and/or incomplete data messages received by flight crew due to technical issues.

e) pilots fail to confirm the received message in a timely manner for being unfamiliar with the procedure，which further causes the controllers' uncertainty about the successful reception and execution of the data clearances

Statements	TMA	ACC	TOTAL	PERCENTAGE (%)
Transmitting failed	36	142	178	0.3
Transmit to Data Company	829	1189	2018	3.43
Transmit to airborne equipment failed	1243	575	1818	3.09
Transmit to airborne equipment succeeded but not replied from the crews	5414	2008	7422	12.6
Aircraft out of service	1933		1933	3.28
Replied by the crews	29960	15589	45549	77.31
TOTAL	39415	19503	58918	

Table 1: GZATCC DLS DATA (2022-11-01 TO 2023-05-31)

Conclusion

2.6 DLS in GZATCC is still in a trial operation phrase, and the service is only limited to the issuance of simple ATC clearances such as landing runway designators and STARs to ZGGG inbound traffic.

2.7 GZATCC is planning to expand the service to the issuance of some other instructions with long sentence requirements such as the ILS clearance after giving the heading and altitude instructions, and seek for deeper cooperation with airlines.

2.8 It is hoped that other ATM bodies that have implemented or will implement data link ATC services can share relevant experiences.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Invite the meeting to note the practices of DLS in GZATCC.

b) Encourage relevant parties to share more experience in addressing the technical issues in the application of DLS.

c) Advise ICAO to organize the development of relevant guidance materials for the provision and use of the Data Link Services.

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