International Civil Aviation Organization

The First Meeting of Air Traffic Management Automation System Task Force of APANPIRG (ATMAS TF/1)

Web-conference, 28 – 30 October 2020

Agenda Item 5: Issues and Challenges in implementation

5.7 DAPs applications

APPLICATION OF DAPs DATA IN ATM AUTOMATION SYSTEM

(Presented by China)

SUMMARY

This paper mainly introduces the status quo of application of DAPs data in ATM automation system in China. The application regarding some key data items is explained, while benefits and problems at current stage are stated.

1. INTRODUCTION

1.1 In recent years, China has promoted the application of Mode S radar in ATM automation system in three stages. In the first stage, Mode S elementary surveillance data has been applied in ATM automation system. DAPs data with specific application scenarios are currently underway in the second stage, and the rest will be further studied in the third stage. The application of DAPs data will be more extensive and mature while the technology is under continuous development.

1.2 At present, China is in the second stage. There are 90 sets of ATM automation systems in ATMB of CAAC. All the ATM automation systems have been already capable of Mode S elementary surveillance, and have used ADS-B data to achieve surveillance capabilities comparable to conventional secondary radars. Part of DAPs data have been applied in ATM automation system.

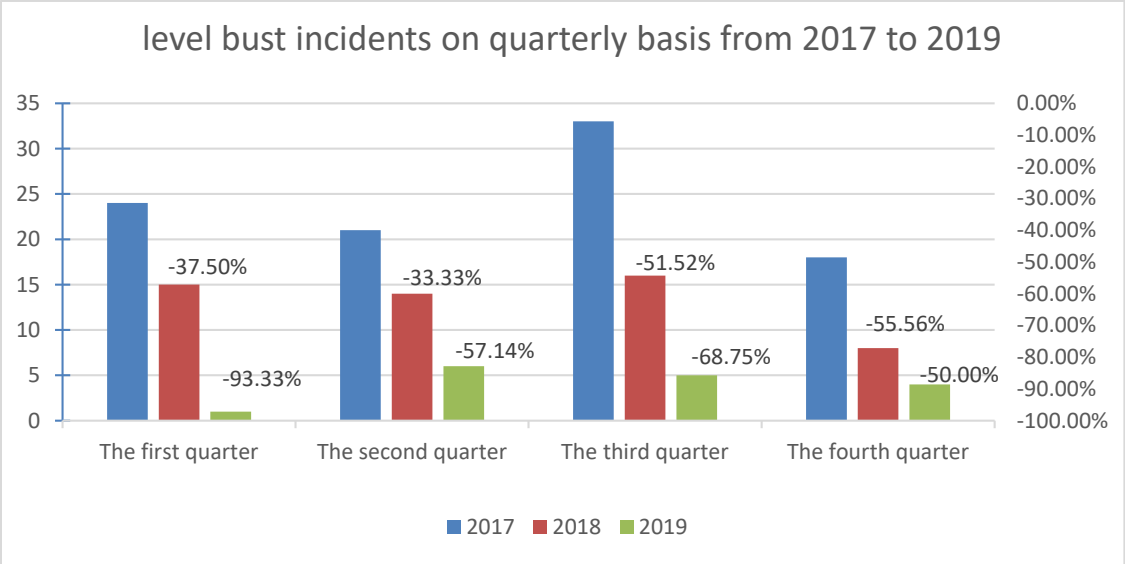
2. SPECIFIC APPLICATION OF DAPS IN ATM AUTOMATION SYSTEM

2.1 24-bit Code Consistency Check. When the 24-bit code of the coupled surveillance track does not match that of the FDR, an ICAO 24-bit code mismatch warning shall be presented to the responsible controller with displaying in the flight callsign label with purple color.

2.2 RA alerting function. ATM automation system can handle the derived data from aircraft, which is received and transmitted through the Mode S Radar, ADS-B station, and WAM sensors. If an airborne collision avoidance system (ACAS) implies resolution advisory (RA), the ATM automation system can provide a visual and aural alarm and indicate pilot intention to the controller.

2.3 Final State Selected Altitude/FSSA alarm function. ATM automation system monitors the Selected Flight Level/SFL (MCP/FCU Selected altitude) and Cleared Flight Level /CFL. A FSSA warning shall be presented to the responsible controller when inconsistency between SFL

and CFL occurs. It can help controller get a better awareness of the intention of the airplanes, discovering the crew's wrong operation in right time, and taking actions timely to avoid the potential conflict. After the application of this function in Guangzhou in January 2018, the number of level bust incidents has declined year-over-year quarterly.



2.4 Downlink Aircraft Parameters window display. The ATM automation system can extract DAPs message from ADS-B, Mode-S radar and WAM sensors, and display in the screen for controllers. The data items that can be displayed mainly include true airspeed, selected altitude, ADS-B status, track angle and trajectory intent status.

3. BENEFITS OF DAPS DATA APPLICATION

3.1 To improve correlation function. Through the unique ICAO 24-bit aircraft address and specific aircraft identification, it enables to enhance the target identification ability and reduce the impact of problems caused by the secondary surveillance code duplication; it looks forward to each aircraft equipped with Mode S or ADS-B equipment being assigned an unique ICAO 24-bit aircraft address. By the way of using the selective interrogation capability of the Mode S SSR, Mode S sensors can first acquire and then selectively interrogate a specific aircraft via its unique ICAO 24-bit aircraft address. This significantly improves the radar's detection and tracking performance, and therefore supports the ability for controllers to monitor and direct aircrafts, as well as the others around it.

3.2 To capture and display aircraft TCAS alarm information in the ATM automation system. The controller can obtain real-time TCAS RA occurrence and termination from the ATM automation system without interfering with the normal TCAS alerting and disengaging procedures.

3.3 To improve track quality. Some data items in DAPs, such as track angle, selected heading, are helpful to improve the ability of track tracking.

3.4 To optimize the performance of existing alarm. For example, the STCA and MSAW alerting capability can be improved by using selected altitude in DAPs.

3.5 Ground and air information consistency monitoring. For example, to prevent flight level bust by comparing the selected altitude inputted by pilot with the clearance flight level inputted by controller; to verify the barometric pressure setting applied in the aircraft with QNH setting in ATM automation system.

3.6 To improve situational awareness of ATC controllers by enabling the direct access to aircraft operation data in ATM automation system, such as Indicated Air Speed, Selected Altitude, and Barometric Pressure Setting, etc.

3.8 To improve surveillance data integrity by reducing synchronous garble, lessening over-interrogations, and simplifying aircraft identification in case of false targets.

4. PROBLEMS WITH DAPS DATA APPLICATION

4.1 In the airspace with insufficient radar coverage, DAPs may not be updated in time.

4.2 Ground and airborne information consistency monitoring function requires proper operation by controllers and pilots. Improper operation of general aviation aircraft or military aircraft by pilot may cause false alarm.

4.3 Some airborne equipment transmits abnormal data, such as all zeros value provided by BDS 3.0 register.

4.4 Airborne avionics need to be upgraded to meet the requirement of enhanced surveillance. According to the statistics, there are still some aircrafts in the Asia-Pacific region that do not support enhanced surveillance.

4.5 ADS-B 1090ES operates on 1090 MHz which is used for Secondary Surveillance Radar at the same time. Interference problem with the same channel becomes more and more prominent in airspace with heavy traffic.

4.6 GPS interference has obvious impact on ADS-B operation.

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

– – – – – – – – – – – – –