International Civil Aviation Organization

Ninth Meeting of the Surveillance Implementation Coordination Group (SURICG/9)

Bangkok, Thailand, 07 - 10 May 2024

Agenda Item 7: Update on surveillance activities and explore potential cooperation opportunity

UPDATE THE ACTION PLAN FOR SURVEILLANCE IN CHINA

(Presented by China)

SUMMARY

This paper updates the current status of sensors and some activities of surveillance implementation in China.

1. INTRODUCTION

1.1 This paper updates the quantity of various surveillance sensors as of the end of 2023, as well as the surveillance sensors which are planned and under-construction.

1.2 It also introduces the progress of the optimization and adjustment of ADS-B implementation and the trial operation of Wide Area Multilateration (WAM) systems in terminal areas.

2. DISCUSSION

Surveillance Status

2.1 **Surveillance Radars:** Currently, there are 30 primary and secondary combined radars in service, 122 standalone secondary radars, and 13 movable secondary radars. Among all secondary radars, 114 have Mode S capabilities, and 90 radars are operating in Mode S according to the operational needs of their locations. In the next few years, there are more than 87 radars will be constructed, including 3 primary and secondary combined radars and 84 standalone secondary radars.

2.2 **ADS-B:** The Civil Aviation Administration of China (CAAC) manages the national ADS-B system with a tiered network structure. As of now, excluding some early experimental UAT mode ADS-B ground stations, there are 341 ADS-B ground stations in service, with 337 produced by domestic manufacturers. There are currently 36 ADS-B level-3 data stations, 8 level-2 data centers, and 1 level-1 data center. The level-3 data center is responsible for aggregating data from ground stations on a provincial region basis, the level-2 data center for aggregating data from level-3 data stations on a regional basis, and the level-1 data center for aggregating data from the 8 level-2 centers.

2.3 **SMR:** There are currently 49 surface movement radars (SMR) in service in China, with 48 in the X-band and 1 in the Ku-band. The Ku-band radar has become seriously outdated and is included in the renewal plan. SMRs have covered 27 busy airports in 23 cities. In the next few years, SMRs are under deployment at 25 airports, such as Haerbin, Fuzhou, Xiamen, Haikou, etc.

2.4 **MLAT:** At present, MLAT system is mainly used in airports with complex surface operating environments. It is implemented with SMR to monitor the airport activity areas, optimize ground taxiing, and improve operating efficiency. There are 13 operational MLAT systems at 12 airports including Beijing, Xi'an, Chongqing, Wuhan, Changsha, and Zhengzhou and there are more MLAT systems under installation at 20 airports including Qingdao, Shenzhen, etc.In the near and middle term, MLATs will be built and expanded in over 30 airports..

SURVEILLANCE IMPLEMENTATION

2.5 Progress of National ADS-B Implementation Optimization and Adjustment

2.5.1 In 2022, China unveiled an implementation plan aimed at optimizing and adjusting ADS-B systems based on previous research findings. By mid-2023, all ADS-B ground stations and data centers had completed the necessary adjustments as outlined in the plan. Ground stations primarily focused on standardizing the output rules for optional data items, while data centers modified the pre-processing functions of ADS-B data and refined filtering rules for abnormal data. Detailed adjustments are documented in the SURICG/7 report, see IP11 Study on Optimization and Improvement of ADS-B Application in China.

2.5.2 In the latter half of 2023, CAAC conducted a national ADS-B data quality statistical analysis and discovered inconsistencies between the ADS-B data and the optimization adjustment plan in certain regions. Following analysis in collaboration with relevant manufacturers, it was determined that the description of the output rules for data item 090 in the plan lacked precision, resulting in misunderstandings among ground station manufacturers regarding the output rules for data item 090 and among data center manufacturers regarding the filtering rules for abnormal data. Consequently, CAAC revised significant portions of the optimization adjustment plan prone to ambiguity.

2.5.3 In the first quarter of 2024, manufacturers of ground stations and data centers adjusted their software versions in accordance with the updated optimization adjustment plan and conducted comprehensive functional testing. Following this, CAAC will schedule a nationwide software upgrade at an appropriate time to address previously identified issues..

2.6 WAM in Terminal Area Trial Operation

2.6.1 To better cope with the heavy-traffic, high-density operational environment in the terminal area, improve the refresh rate, accuracy, and continuity of surveillance performance in the terminal area, and enhance the situational awareness of air traffic controllers, China has been continuously promoting the research and verification of WAM technology in terminal areas in recent years.

2.6.2 China has deployed 5 WAM receivers in the Beibu Gulf area of the Sanya FIR to verify the surveillance effect on high-altitude targets in the ocean area (flight routes W169, V41) and the blind-spot filling effect for radar, while also verifying the surveillance effect on low-altitude general aviation aircraft in this area. By fusing WAM, radar and ADS-B data, the advantages of WAM technology, such as high precision and rapid refresh rate, are fully reflected in various aspects such as horizontal position accuracy, emergency warning delay, and position data delay.

2.6.3 In the latter half of 2023, China also carried out verification for the access of WAM data to the ATC automation system in Shanghai terminal area. During this verification, the controllers could choose the surveillance data independently as they wish, and the system showed good performance in terms of the continuity of integrated flight tracks, refresh rate, horizontal position accuracy, and the automatic correlation success rate of flight plans.

2.6.4 Through the verification, China also found a few issues, such as the ATC automation system not handling smoothly in the edge areas of WAM coverage, occasional aircraft position jumps, and the determination and filtering standards for abnormal data by the ATC automation system are not yet perfect. Subsequently, China will continue to conduct research about them to resolve existing operational issues.

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.

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