

International Civil Aviation Organization



ICAO

**Sixth Meeting of the Surveillance Implementation
Coordination Group (SURICG/6)**

Video Teleconference, 24 – 27 August 2021

Agenda Item 8: Update on surveillance activities and explore potential cooperation opportunity

THE UPDATE ACTIVITY OF ATC SURVEILLANCE IN CHINA

(Presented by China)

SUMMARY

This paper represents the current status of surveillance system business in China and the latest development.

1 Introduction

1.1 At present, the CAAC ATMB has widely deployed primary surveillance radars (PSRs), secondary surveillance radars (SSRs) and Automatic Dependent Surveillance-Broadcast (ADS-B) equipment for air surveillance. These surveillance facilities are applied to identify and track targets in En-route area and/or in approach control area.

1.2 For the purpose of airport surface surveillance, Surface Movement Radars (SMRs) and Multilateration (MLAT) systems have been used in major airports.

2 Surveillance radar

2.1 Operational Radars

Currently, there are 30 sets of primary/secondary co-mounted radars and 110 sets of secondary surveillance radars in service for civil aviation in China. Among them, 78 are Mode-S radars.

2.2 Radars under construction

1) At present, a total of 69 sets of radars are under construction, among which 9 sets are primary/secondary co-mounted radars and the rest 60 sets are secondary surveillance radars.

2) For the 9 sets of primary/secondary co-mounted radars, 7 sets of them are replacements of previous sites while 2 sets of them are newly built.

3) For the 60 sets of secondary surveillance radars, 18 sets of them are replacements of previous sites while 42 sets of them are newly built.

4) As we finish all the undergoing constructions, we will have a total of 32 sets of primary/secondary co-mounted radars and 152 sets of secondary surveillance radars in service for civil aviation in China.

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3 ADS-B*The National ADS-B Project*

3.1 ADS-B surveillance network of The CAAC ATMB has a hierarchical architecture with the devices of ADS-B ground stations, level-3 data stations, level-2 data processing centers and level-1 main data processing centers in the network.

3.2 Currently, we have installed 332 ADS-B ground stations, 36 level-3 local data processing stations, 8 level-2 regional data processing centers and 1 level-1 national data processing center in China. 1 set of ADS-B ground station is now under construction.

3.3 At January 2018, Urumqi ACC implemented the ADS-B OUT operation, which is the first area of the ADS-B used in ATC formalization in China.

3.4 By the end of May 2019, the whole national ADS-B project had finished the final acceptance activity, and the initial operation of national ADS-B service started in October of 2019.

ADS-B Mandate in China

3.5 The ADS-B mandate had also been finished and published in October 2020, in a separated AIC (Aeronautical Information Circular)(Nr.09/19) named “Implementation of ADS-B Control Services”, included in the Integrated Aeronautical Information Package of China. The highlighted information are as follows:

3.6 The implementation will include 2 phases according to the airspace surveillance coverage capabilities, the Phase I started from October 10, 2019; and the Phase II will start on December 31, 2020.

3.7 Phase I: from October 10, 2019

✧ ADS-B control services will be provided in APP where radar control services are not available;

✧ ADS-B control services will be provided in control areas above 8400 m (inclusive) where radar control services are not available; and

✧ Radar control services will be provided, using integrated surveillance data of ADS-B and radar, in control areas above 8400m (inclusive) where radar control services are available.

3.8 Phase II: from December 31, 2020

✧ ADS-B control services will be provided in APP and ACC where radar control services are not available;

✧ Radar control services will be provided, using integrated surveillance data of ADS-B and radar, in APP and ACC where radar control services are available; and

✧ ADS-B equipment will be used at the tower of transport airports to display flight movements.

3.9 For aircraft flying within ADS-B control airspace, the requirement of ADS-B equipage is equivalent to or above Version 0 (DO-260). For Phase I, aircraft being operated by foreign airlines or by Hong Kong, Macao, and Taiwan airlines are exempted. For Phase II, all aircrafts flying in the ADS-B control airspace shall comply with the requirement.

3.10 For aircraft not complying with the requirement, an application for authorization from the Operations Management Center of ATMB of CAAC must be filed, and a waiver from CAAC shall be obtained prior to the operation.

3.11 Aircraft operator complying with the ADS-B equipage requirements shall indicate the correct ADS-B designator in Item 10 of the flight plan.

3.12 Hong Kong Special Administrative Region, Macao Special Administrative Region and Taiwan Province of the People's Republic of China are separately responsible for publishing the AIPs of the regions within their jurisdiction.

4 Promote the Mode S DAPs Data Application

4.1 With deployment of Mode S Radar and ADS-B surveillance network, CAAC carried out the research and trial work to promote Mode S and DAPs data application for civil aviation.

4.2 Before 2018, only the Elementary Surveillance (ELS) function of mode S radars were put into application, because of the limited capability of ATM automation systems. Since 2018, more and more ATM automation systems are capable of processing Enhancement Surveillance (EHS) messages from mode S radars.

4.3 Based on the experience and development of new technology application of the Mode S, Civil Aviation of China tried to make positive contribution to the Mode S implementation and operation for the Asia Pacific Region. The development of the Mode S Downlink Aircraft Parameters Implementation and Operation Guidance Document (Mode S DAPs IGD) has been undertaken by Civil Aviation Administration of China and Hong Kong Civil Aviation Department, and other APAC states.

4.4 In March 2019, The Mode S DAPs IGD edition 1.0 was submitted for endorsement after Mode S DAPs WG/2, and published in the CNS SG/23. China revised the document and circulated it to the members of the Working Group for comments. Then Edition 2.0 was released in 2020, during CNS SG/24. The revised draft (Edition 3.0) has been approved by Mode S DAPs WG/4, and now is prepared and proposed to be endorsed by this meeting(SURICG/4).

5 Surface Movement Radar(SMR)

5.1 SMR deployment

1) At present, The CAAC ATMB has built and put into operation 37 sets of SMRs in 20 busy airports in 18 different Chinese cities, including Beijing, Tianjin, Shenyang, Dalian, Shanghai, Nanjing, Hangzhou, Xiamen, Guangzhou, Shenzhen, Zhengzhou, Wuhan, Changsha, Chengdu, Kunming, Chongqing, Xi'an and Urumqi.

2) In the cities of Harbin, Fuzhou, Xiamen, Qingdao, Haikou, Guilin, Guiyang and Chengdu, Newly-built SMRs are now under construction to further enhance local airport surface surveillance capability and guarantee ATC safe operation there.

3) As we finish the constructions above, a total of 28 busy airports in 26 different Chinese cities will have SMRs existence.

5.2 According to the principles for SMR deployment, airports that meet the following conditions shall install SMRs:

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- 1) Daily take-offs and landings of more than 300 flights, or there are two or more runways;
- 2) Be required to implement low visibility operations;
- 3) The layout of the runway, taxiway, and aircraft stands is complex, and results in more potential conflicts.

5.3 Multilateration (MLAT) deployment

- 1) At present, MLAT system is mainly used in airports with complex surface operating environments. They are equipped with SMRs to monitor the airport activity areas, optimize ground taxiing, and improve operating efficiency.
- 2) 12 sets of MLAT systems have been deployed and put into operation in busy airports in 11 different Chinese cities including Beijing, Tianjin, Harbin, Zhengzhou, Wuhan, Changsha, Sanya, Guilin, Chongqing, Xi 'an and Urumqi.
- 3) The CAAC ATMB is now building new MLAT systems in 17 busy airports in the following 14 Chinese cities, including Beijing, Shanghai, Nanjing, Hangzhou, Fuzhou, Xiamen, Qingdao, Shenzhen, Guangzhou, Chengdu, Kunming, Guiyang, Xining and Urumqi.
- 4) After all the projects under construction are completed, 26 busy airports in 23 cities will have MLAT deployments.

6 The Roadmap of Surveillance Technology and Application in China

6.1 In “The Technical Policy of Civil Aviation Surveillance System” approved by CAAC on Dec. 7, 2018, The Roadmap of Surveillance Technology and Application was presented as a relatively detailed guidance for all useable/available surveillance technology applications in various ATC operation scenarios.

6.2 The detailed contents are presented in Appendix-1.

7 ACTION BY THE MEETING

7.1 The meeting is invited to discuss about:

- 1) Note the information contained in this paper; and
- 2) discuss any relevant matter as appropriate

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Appendix 1 to IP/20

Near Term(2025)		Mid-Term(2030)
Radar	<ul style="list-style-type: none"> ● Continues to install and upgrade Mode S SSRs in radar control area to guarantee the timely, continuous, accurate and reliable service according to the ATC requirements; ● Further implementation of Mode S SSR data link applications and start to conduct Mode S SSR networking research. 	<ul style="list-style-type: none"> ● Maintain the existing scale and number of SSRs according to the short-term plan and SSRs work with other surveillance methods like ADS-B; ● Adjust the deployment of Mode S SSRs or build new ones with the change of air route and/or approach control areas to satisfy the ATC demands; ● Realize a fully comprehensive surveillance system integrated with SSRs and ADS-B equipment; ● Promote the networking implementation of Mode S SSRs.
ADS-B	<ul style="list-style-type: none"> ● Push forward the research on ADS-B related technology and support the application of these new findings, making ADS-B control operations fully available in all ATC area in China; ● Provide ADS-B data services to airports, airlines, aviation-related enterprises, industrial regulators, research institutions and the ordinary people; ● Promote the construction and operation of ADS-B to make ADS-B control operation covers the whole China airspace, according to China's low-altitude airspace management and reform work plan; ● Encourage ADS-B OUT applications based on the BeiDou Navigation Satellite System. 	<ul style="list-style-type: none"> ● As the internationalization of BeiDou standard proceed, the CAAC ATMB will steadily integrate the BeiDou Navigation Satellite System into its comprehensive surveillance system. As a secure and precise GNSS source, the BeiDou Navigation Satellite System will make ADS-B applications more secure, always-available, accurate and reliable; ● Continues to learn from the practical international experience about ADS-B IN and conduct ADS-B IN trials in certain specific airspace; ● Make research on Flight Information Service-Broadcast (FIS - B) as an essential part of ADS-B IN applications and realize Air-Air surveillance based on FIS - B trials and practical surveillance demands.
MLAT 、 SMR	<ul style="list-style-type: none"> ● Use solid-state SMR with MLAT integration as the means for airport surface surveillance. 	<ul style="list-style-type: none"> ● According to daily operations in busy airports, deploy more SMRs and MLAT systems and upgrade the existing ones if needed; ● Be open to the introduction of brand-new surveillance technology to safeguard the safe operation of airport surface movement.

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