



ICAO

*International Civil Aviation Organization***Seventh Meeting of the Surveillance Implementation  
Coordination Group (SURICG/7)**

Video Teleconference, 24 – 27 May 2022

- Agenda Item 8:** Update on surveillance activities and explore potential cooperation opportunities
- a) States/Administrations

**UPDATE THE ACTION PLAN FOR SURVEILLANCE IN CHINA**

(Presented by China)

**SUMMARY**

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

**1. INTRODUCTION**

1.1 At present, CAAC has widely deployed primary surveillance radars (PSR), secondary surveillance radars (SSR) and ADS-B equipment for air surveillance. These surveillance facilities are applied to identify and track targets in En-route area and approach area.

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

1.3 With the wide implementation of various surveillance technologies, CAAC has accumulated practical experiences in this regard. CAAC is now conducting research and putting into practice ADS-B based ATC operations, Mode S DAPs applications and radar clustering etc.

**2. SURVEILLANCE STATUS****Surveillance Radar**

2.1 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 sets are Mode S secondary radars. A total of 44 sets of radars are under construction, among which 2 sets are primary/secondary co-mounted radars and the rest 42 sets are secondary surveillance radars. When the planned deployment is finished, China will have a total of 32 sets of primary/secondary co-mounted radars and 153 sets of secondary surveillance radars in service for civil aviation.

**ADS-B**

2.2 ADS-B surveillance network of CAAC has a hierarchical architecture with the devices of ADS-B ground stations, level-3 local data processing stations, level-2 regional data processing centers, and level-1 national data processing centers in the network.

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2.3 Currently, China has installed 329 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.

**SMR**

2.4 To date, CAAC has built and put into operation 37 sets of SMR 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.

2.5 In the cities of Harbin, Fuzhou, Qingdao, Haikou, Guilin, and Guiyang, SMRs in 14 airports are now under construction to further enhance local airport surface surveillance capability and guarantee ATC safe operation there.

2.6 When the constructions above are completed, there are a total of 28 busy airports in 26 different Chinese cities that will have SMR existence.

**MLAT**

2.7 At present, MLAT systems are mainly used in airports with complex surface operating environment. They are equipped with SMR to monitor the airport activity areas, optimize ground taxiing, and improve operating efficiency.

2.8 A total of 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.

2.9 CAAC is now building new MLAT systems in 17 busy airports in 14 Chinese cities, including Shanghai, Nanjing, Hangzhou, Fuzhou, Xiamen, Qingdao, Shenzhen, Guangzhou, Chengdu, Kunming, Guiyang, Sining etc.

2.10 After all the projects under construction are completed, 30 busy airports will have MLAT existence.

**3. SURVEILLANCE IMPLEMENTATION****ADS-B Application for ATC Operation**

3.1 The initial operation of ADS-B based ATC Operation Implementation has been carried out since October 2019 in a step-by-step approach.

3.2 The detailed Phased-Plan for ADS-B ATC Operation are:

**Phase 1, from October 10, 2019:**

- ADS-B control operation should be implemented in the APP area without Radar control ability;
- ADS-B control operation should be implemented in En-route area upper 8400m without Radar control ability;

- Radar/ADS-B mixed control operation should be implemented in En-route area upper 8400m with Radar control ability.

**Phase 2, from December 31, 2020:**

- ADS-B control operation should be implemented in All areas without Radar control ability;
- Radar/ADS-B mixed control operation should be implemented in All areas with Radar control ability;
- All transportation airport towers should equip ADS-B facility to receive and display ADS-B trajectory;
- Enhance ADS-B facility specifically for low airspace;
- Trail and initial-utilize ADS-B IN technology to adopt Air-Air surveillance and separation ability/benefit.

**Mode S DAPs Implementation**

3.3 Together with the wide deployment of Modes S Radars and ADS-B, CAAC actively carries out research on Mode S DAPs applications.

3.4 Research areas mainly include BDS SWAP Recognition (SURICG/6 - IP/19), DAPs-based Upper Air Wind Speed Estimation (DAPs WG/5–IP/09), DAPs application in Safety Net of ATMAS (ATMAS TF/2 - IP/06) and DAPs Extraction Strategy Research (DAPs WG/3 - IP/06).

3.5 Based on the experience and exploration effort in Mode S field, CAAC has undertaken the development work of the Mode S Downlink Aircraft Parameters Implementation and Operation Guidance Document (Mode S DAPs IGD) for the Asia Pacific Region, together with Hong Kong China, Singapore, and other APAC member states.

3.6 In March 2019, The Mode S DAPs IGD edition 1.0 was submitted for endorsement after DAPs WG/2, and published in the CNS SG/23. From then on, this IGD has being modified and updated consequently, the Edition 2.0 was released in 2020 during CNS SG/24, and the Edition 3.0 was approved by DAPs WG/4 and Forth Meeting of Surveillance Implementation Coordination Group (SURICG/4).

3.7 In Mode S DAPs WG/5 held from 23 to 25 March 2022, CAAC presented the revised draft (Edition 4.0) of the Mode S DAPs IGD. The main amendment to this edition is add the guidance material of ADS-B DAPs, including the introduction of ADS-B DAPs and its application, the description of ADS-B DAPs data and contrast items between Mode S SSR DAPs and ADS-B DAPs, content of ADS-B DAPs extraction using Mode S extend squitter etc.

**II conflict Analysis and II/SI Mixed Operation**

3.8 With the consideration of ever-increasing number of Mode S radars deployed in China and its neighboring countries and regions, CAAC has launched surveys on II conflict (DAPs WG/5 - IP/07) and II/SI mix operation capabilities (SURICG/5 - IP/18).

3.9 Next, if China confirms the existence of II code conflict with neighboring countries, we will actively apply to ICAO APAC for coordination.

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**Radar Clustering**

3.10 In April 2021, CAAC launched Mode S Clustering trials, aiming to evaluate its feasibility in China and further promote SCN applications based on corresponding conclusions (DAPs WG/5-IP/08).

3.11 The Mode S SCN trials in China is planned to be carried out in three stages. At the first stage, CAAC will use radars of the same radar manufacturer to conduct cluster trials. At the second stage, CAAC will use radars of different radar manufacturers to conduct cluster trials. According to the trial results, CAAC will formulate a formal technical specification for Mode S SCN implementation in China for the third stage.

3.12 As the trials and evaluations are completed, CAAC is open to share our experience in the APAC region.

**A-SMGCS**

3.13 Until May 2021, 24 airports in China have installed A-SMGCS with Level-II function.

3.14 In order to take advantage of A-SMGCS for enhancing the safety and efficiency of airport operation, CAAC issued “The Suggestions on Promoting Deployment and Application of A-SMGCS” on April 24, 2019. In this circular, considering the importance and effectiveness of the Stop Bar light, all airports with A-SMGCS are suggested to install the Stop Bar.

3.15 Further, for large busy airports with multi-runways, when newly-built or reconstruction & expansion, this circular suggested to equip the Taxiing Guidance, Stop Bar and Runway Status lights as Level-IV requirement in these large airports.

3.16 Following the above suggestions, the first Level-IV A-SMGCS has been put into operation in Beijing Daxing Airport.

**4. SURVEILLANCE ACTION PLAN**

4.1 “The development plan for CNS” approved by CAAC in 2021 was presented as a relatively detailed guidance for all useable/available surveillance technology applications in various ATC operation scenarios.

4.2 The detailed contents are presented in Appendix.

**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

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Appendix A to IP/13

<b>Near-Term (2025)</b>		<b>Long-Term (2030)</b>
<b>Radar</b>	<ul style="list-style-type: none"> <li>● Continues to install and upgrade Mode S SSR in radar control area to guarantee the timely, continuous, accurate and reliable service according to the ATC requirements;</li> <li>● Further implementation of Mode S SSR data link applications and start to conduct Mode S SSR networking research.</li> </ul>	<ul style="list-style-type: none"> <li>● Maintain the existing scale and number of SSR according to the short-term plan and SSR work with other surveillance methods like ADS-B;</li> <li>● Adjust the deployment of Mode S SSR or build new ones with the change of air route and/or approach areas to satisfy the ATC demands;</li> <li>● Realize a fully comprehensive surveillance system integrated with SSR and ADS-B equipment;</li> <li>● Promote the clustering implementation of Mode S SSR.</li> </ul>
<b>ADS-B</b>	<ul style="list-style-type: none"> <li>● Push forward the research on ADS-B related technology and support the application of these new findings, making ADS-B ATC operations fully available in all ATC area in China;</li> <li>● Provide ADS-B data services to airports, airlines, aviation-related enterprises, industrial regulators, research institutions and the ordinary people;</li> <li>● 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;</li> <li>● Encourage ADS-B OUT applications based on the BeiDou Navigation Satellite System.</li> </ul>	<ul style="list-style-type: none"> <li>● As the internationalization of BeiDou standard proceed, CAAC 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;</li> <li>● Continues to learn from the practical international experience about ADS-B IN and conduct ADS-B IN trials in certain specific airspace;</li> <li>● 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.</li> </ul>
<b>MLAT &amp; SMR</b>	<ul style="list-style-type: none"> <li>● Use solid-state SMR with MLAT integration as the means for airport surface surveillance.</li> </ul>	<ul style="list-style-type: none"> <li>● According to daily operation in busy airports, deploy more SMR and MLAT systems and upgrade the existing ones if needed;</li> <li>● Be open to the introduction of brand-new surveillance technology to safeguard the safe operation of airport surface movement.</li> </ul>