

International Civil Aviation Organization



**AUTOMATIC DEPENDENT  
SURVEILLANCE – BROADCAST SEMINAR  
AND FOURTEENTH MEETING OF  
AUTOMATIC DEPENDENT  
SURVEILLANCE – BROADCAST (ADS-B)  
STUDY AND IMPLEMENTATION TASK  
FORCE (ADS-B SITF/14)**



Christchurch, New Zealand, 14 – 17 April 2015

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**Agenda Item 5: Development of Asia/Pacific Regional ADS-B implementation plan and sub-regional ADS-B implementation plan**

**THE INSTALLATION OF MULTI RADAR SYSTEM IN JAPAN**

(Presented by Japan)

**SUMMARY**

This paper presents the surveillance upgrade plan in Japan. JCAB has roadmap, whose name is CARATS and which targets the renovation toward 2025. Based on the CARATS, JCAB is installing Multi radar, which is kind of fusion processing system with SSR, WAM, and ADS-B. In this paper JCAB reports the installation plan and evaluation plan focusing on ADS-B

**1. INTRODUCTION**

1.1 About the road map, CARATS

Japan Civil Aviation Bureau (JCAB) drafted the "long-term vision about a future aviation traffic system" in September 2010, which sets the target and the direction of renovation towards 2025. To achieve and realize the long term vision, collaboration work with various stakeholders concerning aviation fields are indispensable, so JCAB named the plan as "Collaborative Action for Renovation of Air Traffic Systems, briefly CARATS." These are some of the targets and the directivity of the renovation of the CARATS.



- Improvement of current safety level by 5 times
- Improvement of services level (punctuality and reduction of flight time) by 10%
- Realization of trajectory based operation
- Promotion of performance based operation, etc

Based on the direction of these renovations, JCAB studied and selected 55 measures, which would become necessity to achieve the target, and drew up the each roadmap of the measures. The CARATS is based on the ICAO global ATM operation concept and working together with the NextGen in the U.S. and the SESAR in Europe, and sets the target assumed in 2025.

1.2 Subject in surveillance field

Currently double or triple SSR coverage has been secured in continental area in Japan, but JCAB has problem to assign II code to all SSR stations and it is difficult to install data link function such as DAPs which is expecting to contribute the sophisticated ATC function. JCAB decided to install Multi radar to solve the problem and provide the sophisticated surveillance function.

2. Installation plan

2.1 Installation of multi radar system

JCAB reported the surveillance upgrade plan in en-route at former SITF or CNS/SG APANPIRG meetings. In the plan, currently double or triple SSR coverage has been secured in continental area in Japan, JCAB will install WAM, whose receiver stations are capable to decode ADS-B, and replace the current configuration, SSR+SSR, to new configuration, SSR+WAM+ADS-B. By evaluating the new configuration, the plan continues to degenerate portion of the SSR in the inland area to secure the single SSR coverage at least. (See Fig.1, Fig.2)

Multi radar system enables to improve target tracking for refresh rate and accuracy by fusion process of surveillance data. And it will start the operation in 2018.



Figure 1; Image of introduction of multi radar

Figure 2; Planning of Multi-radar coverage  
Radar coverage area (Blue),  
WAM coverage area (Red)



2.2 About the utilization of aircraft derived data

By reducing the number of SSR, JCAB will enable to assign II code for all SSR station, and will use DAPs function by SSR or WAM. DAPs data will be used as ATC support information or conformance monitor which monitors between ATC order and setting in the aircrafts.

2.3 About of ADS-B information

The content data from ADS-B consists of two kind of information, position information used for surveillance for ATC and the other information used for ATC support function or metrological information. JCAB is introducing the both. The study situation of ADS-B data utilization of Japan are summarized in Table 1, by classified on the basis of airspace and signal content of ADS-B.

	Continental areas (Covered by SSR and WAM)	
Kind of ADS-B contents	ADS-B (Position data)	ADS-B (Other data)
Utilization	Usage as surveillance data if the aircraft is capable of ADS-B →Improvement of target tracking accuracy	Usage as ATC support function and acquiring meteorological information
Possibility for mixed operation of ADS-B capable aircrafts and non ADS-B aircrafts	Possible for mixed operation	Mixed operation is possible only for the usage as ATC support function. Mandate is effective for the usage as ATC information when the demand increase in future.
Remarks	It will contribute to shorten the separation in future.	

Table 1; Utilization of ADS-B data

2.4 About the utilization of ADS-B information in continental area

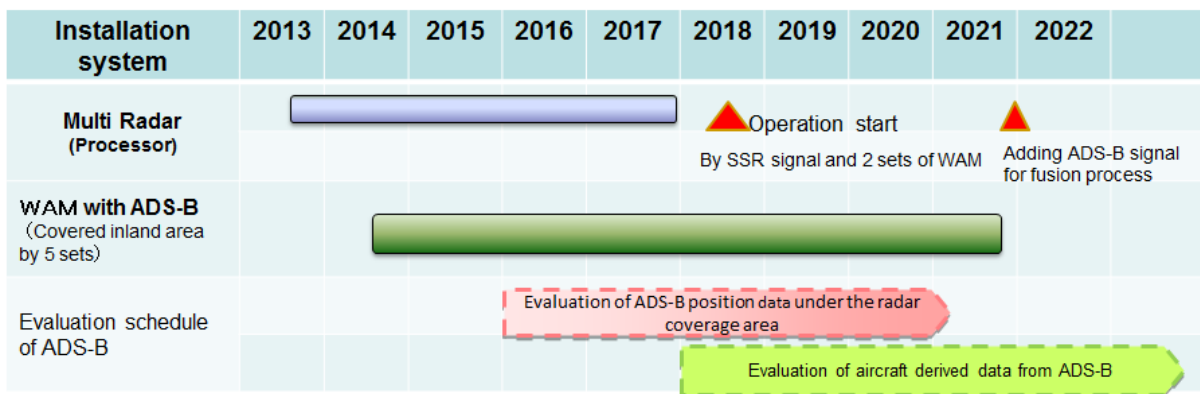
In the inland area of Japan, JCAB is going to improve accuracy, reliability, and quality of surveillance data, by processing both ADS-B position information and other surveillance signal from SSR or WAM as fusion. This configuration will enable to upgrade flexibly when we move to next generation surveillance environment in future, which mainly use ADS-B signal to shorten the ATC separation.

And the other aircraft derived data from ADS-B has a potential to acquire the valuable data, which will enable to receive data more frequently than SSR such as RA information. JCAB will take advantage of the information as ATC support information.

- 2.5 How to proceed ADS-B introduction, evaluation plan  
 The evaluation plan for the introduction of ADS-B is table 2.

First we will start the ADS-B position information under the radar coverage in 2016, and will decide navigation performance category and ADS-B version for target. Until 2021 ADS-B will be used as one of the surveillance system for fusion target under the radar coverage area. About the evaluation of aircraft derived data from ADS-B will start in 2018.

After these evaluation starts, JCAB will contribute for the activity for introduction of ADS-B such as information sharing of white list or black list in Asia pacific region.



**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 matters as appropriate.

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