



International Civil Aviation Organization

**NINETEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION  
AND SURVEILLANCE SUB-GROUP (CNS SG/19) OF APANPIRG**

Bangkok, Thailand, 20 – 24 July 2015

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**Agenda Item 6: Surveillance**

**6.2 Review surveillance strategy**

**THE ADS-B INTRODUCTION PLAN IN JAPAN WITH INSTALLATION OF MULTI  
RADAR**

(Presented by Japan)

**SUMMARY**

This paper presents the surveillance upgrade plan in Japan. Japan Civil Aviation Bureau (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**

JCAB developed long term vision called “CARATS” to renovate current Japanese air traffic system. CARATS describes performance targets to be achieved and the direction of the renovation of the CARATS.

Examples of performance targets are:

- Improvement of current safety level by 5 times
- Improvement of services level (punctuality and reduction of flight time) by 10%

And examples of the direction are:

- Realization of trajectory based operation (4DT)
- Enhancement of performance based operation, etc

Based on the direction of the 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 operational concept and working together with the NextGen in the U.S. and the SESAR in Europe, and sets the target assumed in 2025.

For the introduction or promotion of the roadmap, JCAB discussed with ATC providers, regulator, and operators about the future operation.

**1.1 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 there is a difficulty to install data link function using Mode-S techniques 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 CNS/SG APANPIRG meetings. In the plan, currently double or triple SSR coverage has been secured in continental area in Japan. JCAB is going to 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

### 2.2 About the utilization of aircraft derived data

There are about 21 en-route radar to cover the continental area in Japan and 39 terminal radar. But there are not enough II code and some of the radar are forced to operate by Mode A/C.

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.

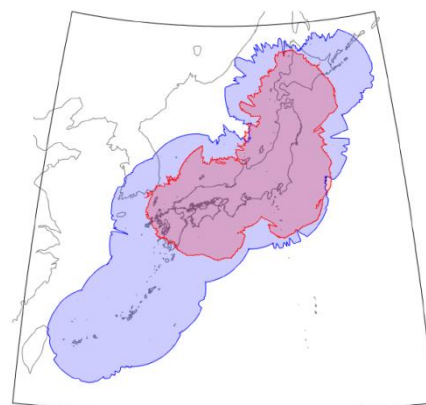


Figure 2; Planning of Multi-radar coverage  
Radar coverage area (Blue),  
WAM coverage area (Red)

### 2.3 About the kind 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.

### 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.

Table 1; Utilization of ADS-B data

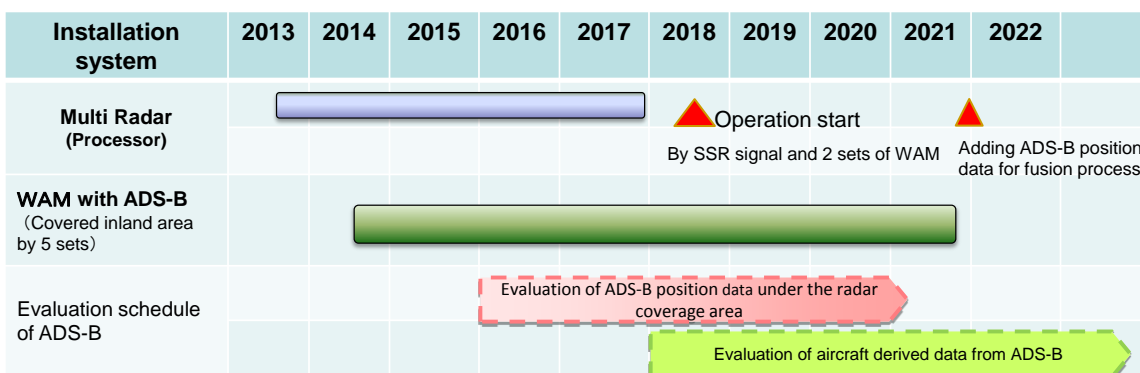
	Continental areas (Covered by SSR and WAM)	
Kind of ADS-B contents	ADS-B (Position data)	ADS-B (Aircraft Derived data)
Utilization	Usage as surveillance data if the aircraft is capable of ADS-B →Improvement of target tracking accuracy	Usage as ATC support function and acquiring meteorological information
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.	

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.

Table 2; Utilization of ADS-B data



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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