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THIRTEENTH AIR NAVIGATION CONFERENCE

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COMMITTEE A

Agenda Item 2: Enabling the global air navigation system
2.2: Integrated CNS and spectrum strategy

IMPLEMENTATION OF EN-ROUTE WAM IN JAPAN

(Presented by Japan)

EXECUTIVE SUMMARY

This information paper provides the status of wide area multilateration (WAM) for en-route implementation plan in Japan.

1. INTRODUCTION

1.1 As described in ICAO Aviation System Block Upgrade (ASBU) Module B0-84, WAM has features such as low cost, flexible adoption to the topography. Since 2014, the Japanese Civil Aviation Bureau (JCAB) has installed four WAM systems for en-route. The overall goal of this project is to achieve the dual coverage by secondary surveillance radar (SSR) and WAM in the main land area.

2. DISCUSSION

2.1 Installation of en-route WAM

2.1.1 JCAB introduced twenty-one SSR radars for en-route and achieved dual coverage in the land area as shown in the Figure 1 (inside the green line). Since 2014, JCAB has installed four WAM systems for en-route as shown in Figure-1 (the red lines) in the following order.

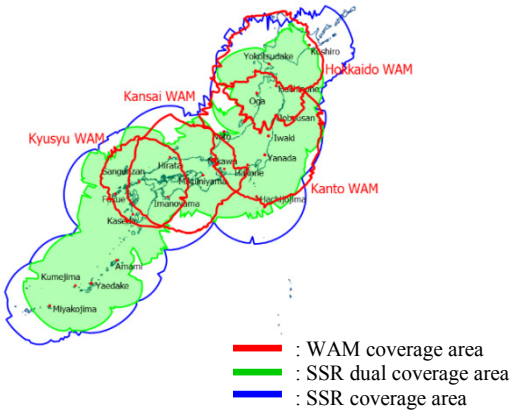

Figure 1. Surveillance coverage in Japan (15 000 ft)

2.1.2 First, JCAB has installed en-route WAM which is constituted dual central processor and twenty stations in Kanto area since 2014.

2.1.3 Second JCAB has installed Kansai WAM which is constituted dual central processor and twenty-one stations since 2016. These two en-route WAM operation will commence in 2018 fiscal year.

2.1.4 Finally JCAB is planning to install Hokkaido WAM which has dual central processor and eighteen stations and Kyusyu WAM which has dual central processor and fourteen stations. In 2021, these four en-route WAM systems will be in operation and JCAB will ensure the dual coverage over the land area by the combination of SSR and WAM systems.

2.2 Benefit of en-route WAM

2.2.1 Installing en-route WAM has the following benefits:

a) high accuracy and high renewal rate of the targets;

b) flexibility of the adaption to the topography;

c) reduction of the overall surveillance cost; and

d) replacement of several existing SSR at the end-of-life.

2.3 Multi radar System

2.3.1 JCAB has also introducing multi radar system (hybrid air-route surveillance sensor processing (HARP) equipment) which aims to improve the targets accuracy by fusing different kinds of sensors such as SSR, WAM and automatic dependent surveillance — broadcast (ADS-B). Now ADS-B is under evaluation, so JCAB is planning to commence the operation by the fusion target data of SSR and WAM systems (except ADS-B) in 2018.

2.4 Utilization of ADS-B

2.4.1 Each en-route WAM station is equipped with ADS-B decode function. HARP is also equipped with ADS-B fusion function. Thus JCAB can evaluate ADS-B in the WAM coverage area while ensuring the targets accuracy. So JCAB will start ADS-B evaluation in the area as the first step. Based on the evaluation result, JCAB hopes to use the ADS-B for fusion target with other surveillance systems in 2024.

2.5 Utilization of DAPs

2.5.1 Each en-route WAM station is also equipped with downlink aircraft parameters (DAPs) function. And JCAB has been upgrading SSR with DAPs function since 2016 at the renewal timing of aging equipment. All SSR will be upgraded to correspond to DAPs until 2029 (refer to Figure 2 and 3). Thus JCAB will have full coverage of DAPs until 2029.

2.5.2 JCAB is planning to use DAPs for following purposes:

a) collect (or calculate) the meteorological information;

b) reduction of radio transmission workload between controller and pilot; and

c) improvement of situational awareness.

2.5.3 JCAB will complete the evaluation to use DAPs and start the operation in 2024.

Figure 2. DAPs coverage
(2020, 20 000 ft)

Figure 3. DAPs coverage
(2029, 20 000 ft)

2.6 **Roadmap**

2.6.1 The roadmap is shown in figure-4.

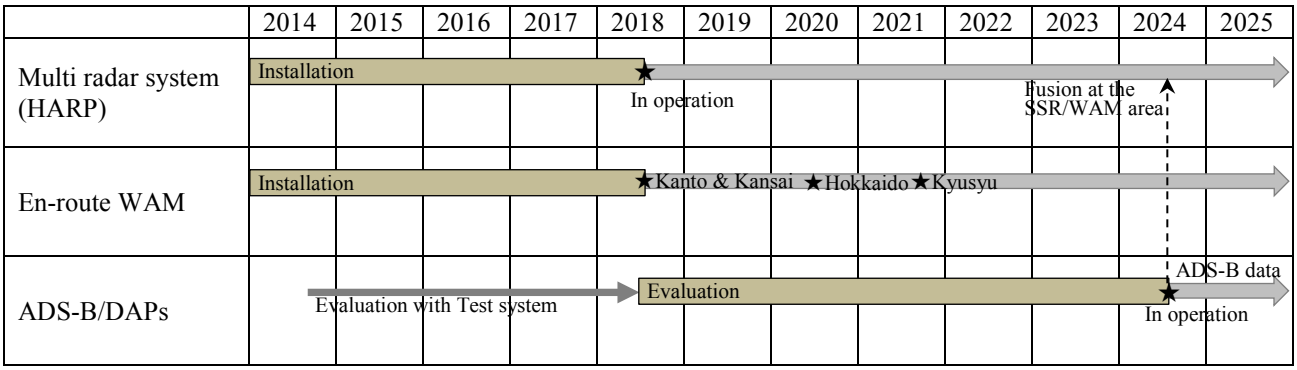

Figure-4: Roadmap

3. **CONCLUSION**

3.1 The Conference is invited to note the information provided in this information paper.

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