International Civil Aviation Organization

Eighth Meeting of the Surveillance Implementation Coordination Group (SURICG/8)

Bangkok, Thailand, 6 – 9 June 2023

Agenda Item 7: Report on surveillance ground system and avionics performance monitoring and improvement in compliance

1030/1090MHZ OCCUPANCY MONITORING AND EVALUATION PROJECT IN JAPAN

(Presented by JCAB)

SUMMARY

The 1030/1090 MHz radio frequencies are used for a variety of purposes, and there is concern that the signal environment may deteriorate in the skies over Japan. The Japan Civil Aviation Bureau (JCAB), as an air navigation service provider, evaluates, monitors and analyzes the signal environment at 1030/1090 MHz. NPAC has started the activity for this purpose.

1. INTRODUCTION

1.1 Japan Civil Aviation Bureau (JCAB) established the Network Performance Assessment Center (NPAC) in 2020 for the mission of centrally monitoring, analyzing and assessing service levels of CNS as the core of CNS performance management, which is an important key to realize PBO(Performance Based Operation).

1.2 NPAC surveillance team has analyzed the performance of surveillance systems consist of multi-radar configurations and recently started 1030/1090MHz Occupancy Monitoring evaluation project. This paper reports the status of the project.

2. DISCUSSION

2.1 The 1030/1090 MHz frequency band is used by a wide variety of applications. It is important to protect the 1030/1090 MHz spectrum in order to avoid the excess utilization. ICAO introduced how to measure and analyze RF at chapter 13 of Appendix M in Doc9924 Aeronautical Surveillance Manual. Electronic Navigation Research Institute (ENRI) had several times evaluated 1030/1090MHz occupancy rate in the Japanese airspace in their research, and the results were reported to JCAB to share the present situation especially in the congested airspace.

2.2 There is concern about the impact on the signal environment in the airspace over Japan due to the future increase in aviation demand. Therefore in 2022, we decided to establish a scheme to ensure that surveillance service can be used normally in congested airspace by monitoring the frequency occupancy not approaching dangerous levels. NPAC established a monitoring structure of 1030/1090MHz signal environment by the technology transfer from ENRI. The measurement procedure

for the monitoring is in accordance with Doc9924 Aeronautical Surveillance Manual and is described in Appendix M 13.3.7.1.1 Method1.

2.3 ENRI had conducted measurements using the experimental aircraft. JCAB also used flight inspection aircraft to acquire the data following ENRI's measurement method. The positional information and RF data are acquired by the flight inspection aircraft, and then analyzed and compiled by NPAC. (Figure1) The analysis software is developed on LabVIEW software, which is used measurement. Because the environment for collecting data differs between the ENRI's experimental aircraft and JCAB's flight inspection aircraft, we received the technical transfer necessary to modify the program. The numerical conversion in the analysis software is done by simply accumulating the signal amount from the recorded 1030/1090MHz spectrum data. (Figure2)

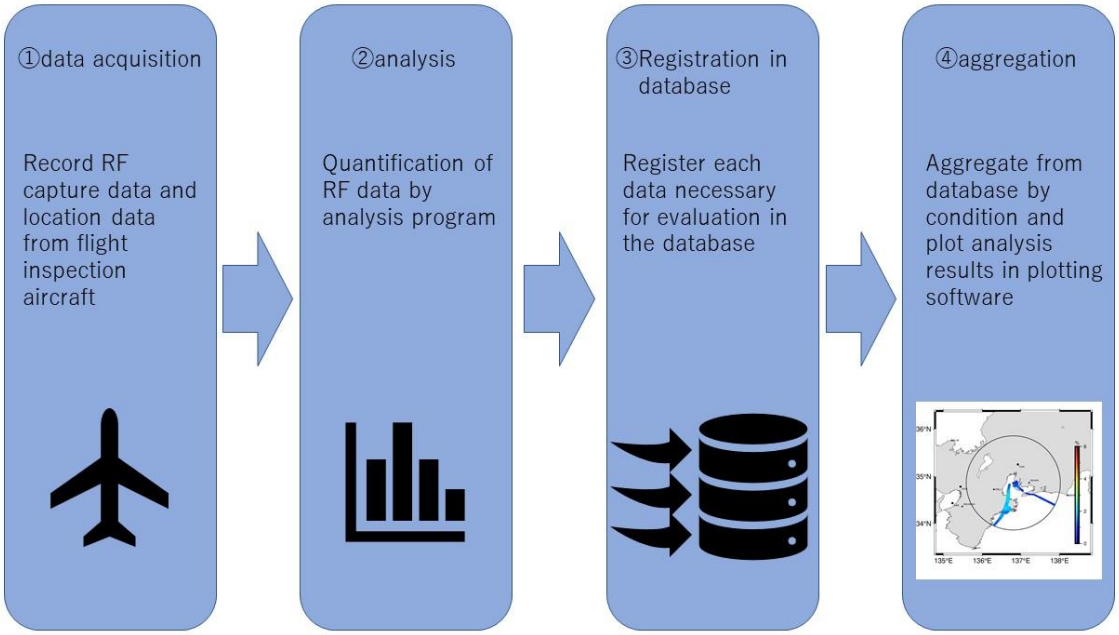

Figure1 : Flow of 1030/1090MHz signal acquisition and analysis

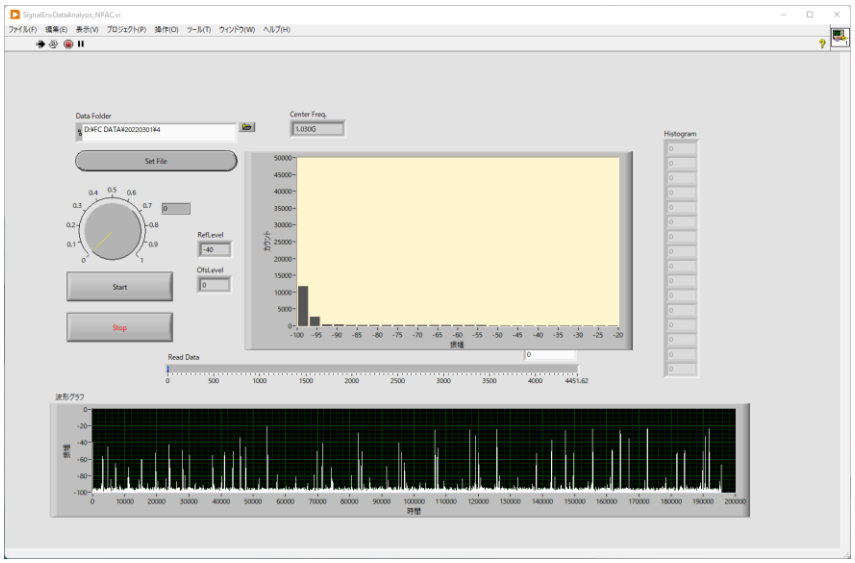

Figure2 : Analysis tool based on LabVIEW

2.4 An RF capture device was installed on the flight inspection aircraft and trial evaluation started in October 2022. Data was collected at several locations. (Figure3, Figure4)

Figure3 : Flight inspection aircraft (C700)

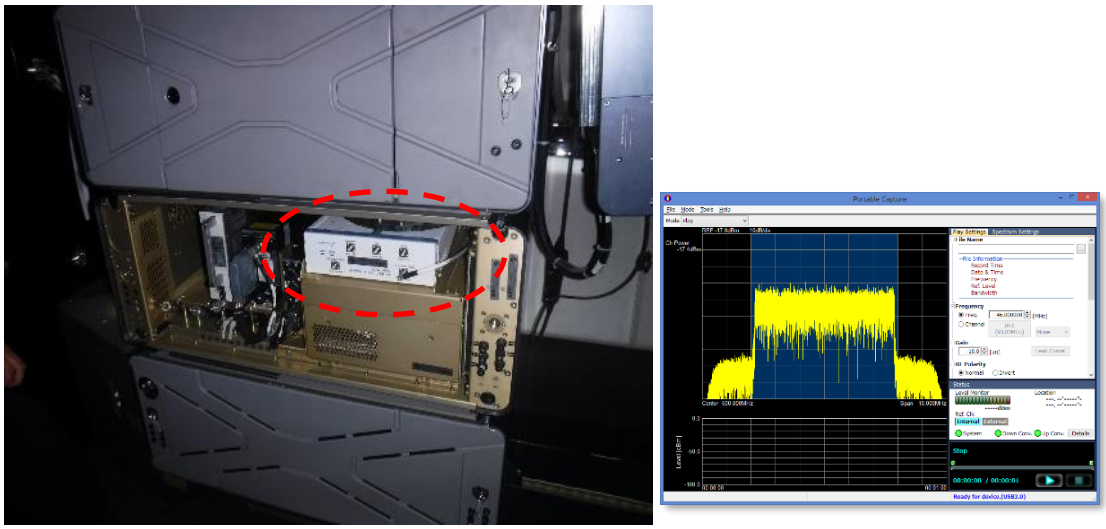

Figure4 : Equipment for data acquisition

2.5 After the trial evaluation, NPAC started evaluation activity from April 2023. Figure5 shows the actual analysis results in Nagoya area and we can confirm the occupancy rate is about 2%. NPAC is going to coordinate data collection with flight inspection team so that we can evaluate congested airspace such as Tokyo for a long period of time and regularly.

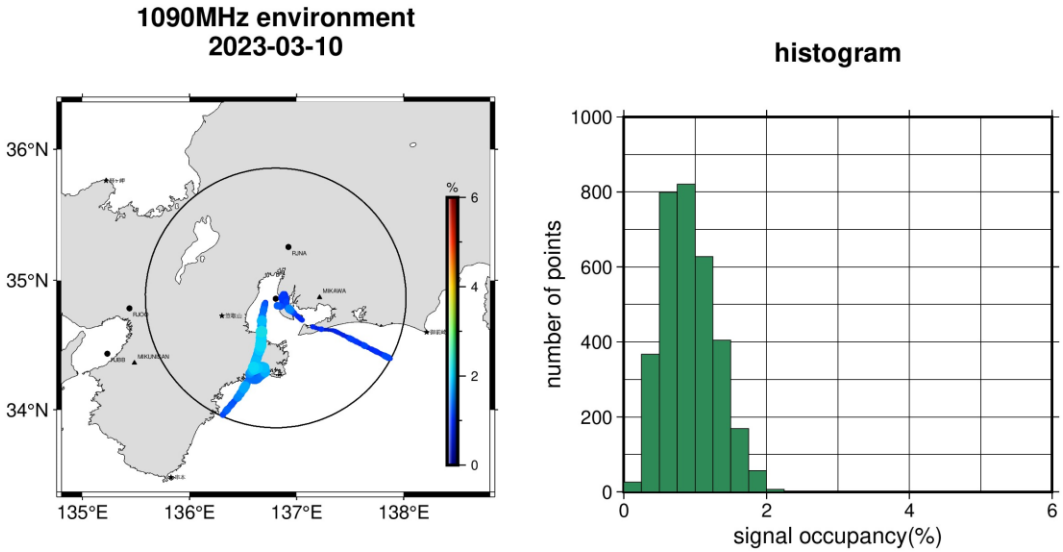

Figure5: 1090MHz occupancy ratio on the sky around Nagoya

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) provide the information of relevant activities in other countries, if there are

c) discuss any relevant matter as appropriate

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