59th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

Cebu, Philippines
14 to 18 October 2024

AGENDA ITEM 4: AIR NAVIGATION

GNSS SPOOFING IN OCEANIC AIRSPACE

(Presented by Civil Aviation Bureau of Japan)

SUMMARY

This paper requests the consideration by the DGCA for mitigating risks of GNSS/SBAS spoofing from the surface of the sea and possible regional collaborative actions.

GNSS SPOOFING IN OCEANIC AIRSPACE

1. INTRODUCTION

1.1 Japan Civil Aviation Bureau (JCAB) has established the Network Performance Assessment Center (NPAC) since 2020 for the central monitoring, analyzing and assessing service levels of CNS. In 2021, NPAC has detected multiple cases of the degradation of on-board GNSS performance for around 40 aircraft on multiple routes near the southeastern offshore of Hokkaido in the Oceanic airspace from September 22 to October 12. Please refer to the WP/198 titled "Mitigation of GNSS vulnerabilities" presented by Japan at 41st session of the ICAO Assembly for the detail. (JCAB investigated the cause of the event; unfortunately, the cause was not able to be identified.

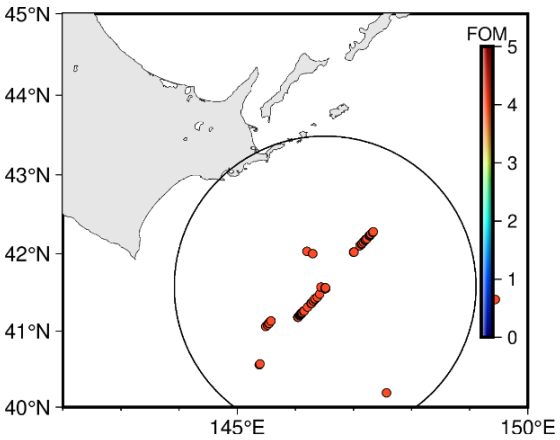

Figure 1. ADS-C degradation area

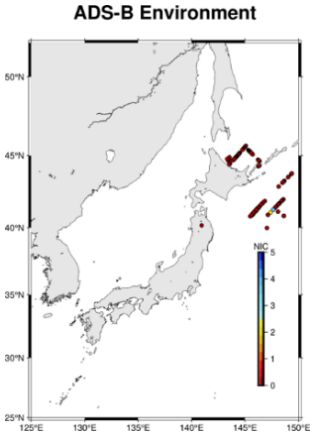

Figure 2. ADS-B degradation area

1.2 This paper requests the consideration by the DGCA for mitigating risks of GNSS/SBAS spoofing from the surface of the sea and possible regional collaborative actions.

2. DISCUSSION

2.1 Not only Japan but also States in the APAC regions could be encountered risks of GNSS spoofing in Oceanic airspace. Using spoofing devices intentionally or unintentionally from the surface of sea will affect the aircraft flying over the surface. Therefore, Oceanic airspace is not risk-free airspace for jamming/spoofing, especially on high sea where flag states play a critical role in managing their vessels.

2.2 The GNSS is primary senser for navigation and ATC surveillance in the Oceanic airspace. Performance based horizontal separation minima (PBHSM) is applied to the Performance Based Navigation (PBN) and Performance Based Communication and Surveillance (PBCS) approved aircraft with GPS/ADS-C/CPDLC capabilities in the several Oceanic airspaces for which NAVAIDs and RADAR services are less supported. The North Pacific route (NOPAC) is under restructuring based on these separation minima as ongoing project between JCAB and FAA. Hence this intends that the Oceanic ATC and flights depend on GNSS capabilities significantly for their safety and efficiency, especially on routes with high air traffic density. Even in the Oceanic airspace with low air traffic density, GPS/ADS-C is practically the main capabilities of Aircraft Tracking (AT) that is required under Global Aeronautical Distress & Safety System (GADSS) designed for effective search and rescue (SAR) operations.

2.3 The increasing risks of GNSS jamming and spoofing are global and regional urgent issues. Recently, spoofing technique targeting against GNSSS/INS capable aircraft are also reported, and furthermore, spoofers and/or spoofing devices may be on board. spoofing events will lead the

controller to apply inappropriate separation to the aircraft and cause aircraft's loss of navigation unconsciously and consequently they may cause serious distressed situations. Likewise, GNSS loss or spoofing events will lead to false warning of the enhanced ground proximity warning systems (EGPWS) which might cause unnecessary aircraft mauver that will disturb maintained aircraft separation.

2.4 If the number of spoofing events keeps growing, it may no longer be able to maintain safety and resiliency in the Oceanic airspace.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

a) acknowledge that GNSS spoofing will devastate the safety and resiliency of operations in the Oceanic airspace;

b) stress the importance of monitoring and reporting GNSS spoofing events;

c) encourage States to share possible spoofing events occurred in the APAC region through the APANPIRG activities.

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