International Civil Aviation Organization

Twenty Eighth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/28) of APANPIRG

Bangkok, Thailand, 01-05 July 2024

Agenda Item 6: Navigation

6.3 GNSS Interference and Mitigation Measures

IMPORTANCE OF MONITORING GNSS SIGNAL INTERFERENCE

(Presented by Republic of Korea)

SUMMARY

This papers presents recent GPS signal interference cases in parts of the Incheon FIR and actions taken at the ICAO Council to raise awareness among member states about interference affecting GNSS.

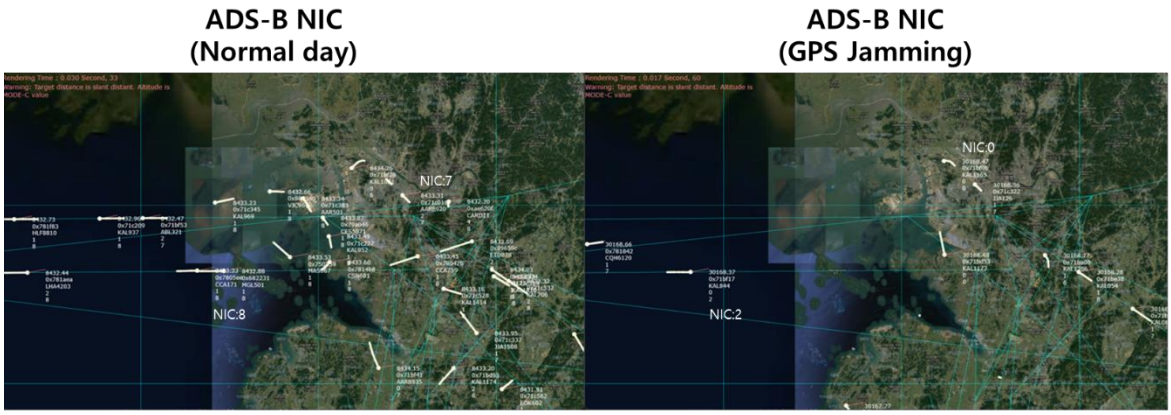
1. INTRODUCTION

1.1. From May 29 to June 3, 2024, within the Incheon Flight Information Region (FIR), near Incheon Airport, we received reports of 500 incidents of GPS anomalies and Ground Proximity Warning System (GPWS) alerts from pilots.

1.2. Korea attended the 232nd ICAO Council Session (June 10 - 21, 2024) and presented cases of aviation safety threats due to interference in Incheon FIR and neighboring FIRs, including details on the sources and signal strength of interference, demanding immediate cessation measures, resulting in resolutions and letters from the ICAO Council to the concerned states.

2. DISCUSSION

2.1. GPS jamming incidents occurred in 2011 (106 cases), 2012 (1,016 cases), and 2016 (1,007 cases). During the Council-208th session in 2016, cases were reported and actions were requested to cease and desist. Despite extensive efforts by ICAO, member states, international organizations, and industry, such incidents continue globally, with an increasing trend. As pictures, aircraft with degraded ADS-B Navigation Integrity Category (NIC) due to GPS signal interference suspended ADS-B broadcasts, detectable by maintenance monitoring systems.



<Picture: ADS-B NIC value comparison>

2.2 GNSS is fundamental to the Communications, Navigation, Surveillance / Air Traffic Management (CNS/ATM) system, recognized as critical infrastructure for Performance-Based Navigation (PBN) and ADS-B implementation. It reduces reliance on conventional navigation systems, accommodates increasing air traffic, and supports efficient airspace management, airport operations, and effective CNS/ATM maintenance. GNSS systems including SBAS are vital systems also utilized in non-aviation sectors for public safety.

2.3 In 2020, Korea completed installation of 11 ground receivers for monitoring and controlling aircraft flying within Incheon FIR using ADS-B. By December 2024, an additional 3 receivers will be installed, followed by mandatory ADS-B implementation after safety evaluation. Korea also developed the Korea Augmentation Satellite System (KASS) to correct GPS L1 broadcasts in flight paths, terminals, and airport approach areas starting from December '23, and has been continuously monitoring its performance.

2.4 In responding to GNSS threat situations, despite efforts to develop new technologies utilizing GNSS and maintain ground-based conventional navigation systems under the Global Air Navigation Plan (GANP), challenges persist.

2.5 Regular monitoring and analysis in the APAC region are necessary for cases of GNSS interference such as jamming and spoofing affecting CNS/ATM, occurrence locations, causes (broadcast systems, military exercises, intentional interference, space weather, etc.), and effects (ADS-B, GBAS, SBAS, GPWS/EGPWS warnings). Based on these monitoring and analysis results, it is essential to clarify safety in PBN implementation among regional countries, address issues in aircraft monitoring, and propose improvements.

- GNSS Radio Frequency Interference type - Jamming, Spoofing, Weather, etc
- Location : FIR, Coordinates
- Effects : ADS-B, GBAS, SBAS, GPWF(EGPWS) warning, etc
- Aircraft : Type, Civil or general aviation,

2.6 Furthermore, based on monitoring and analysis results of GNSS signal interference in the APAC region, establishing effective systems for exchanging aviation information necessary for

implementing ADS-B, SWIM, PBN implementation timing decisions for air routes, terminals, and airport approaches, and monitoring and controlling aircraft would be effective.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information presented in this paper;

b) fully comply with the Convention on International Civil Aviation by states;

c) agree on the need to monitor, analyze, and share GNSS RFI effects in the APAC region with member states and relevant stakeholders;

d) request to establish a new study group under CNS SG in the APAC region; and

e) discuss any relevant matters as appropriate.