RASG-PA Safety Issue Alert

GNSS (GPS) Interference Events – Advisory for Operations in Northern South America, Adjacent Caribbean FIRs and Eastern Pacific Ocean

RSIA-03A

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Subject: Advisory on GNSS (GPS) Interference Events – affecting Operations in the northern portion of South America, the Adjacent Caribbean FIRs, and eastern portions of the Pacific Ocean.

Threat: The alert addresses the increasing number of GNSS (GPS) interference events (jamming and/or spoofing) reported within this region, in recent weeks. The events may temporarily degrade navigation, surveillance, and communication systems, potentially affect aircraft performance-based navigation (PBN) operations, and reduce situational awareness.

Intended Audience: This Safety Alert is intended for air operators, flight crews, dispatchers, ANSPs, and aerodrome operators involved in flight operations across the identified area. This Advisory also provides guidance for Civil Aviation Authorities and regional safety bodies responsible for operations within the identified area.

Background

In recent weeks, airlines and air navigation service providers (ANSPs) have reported an increasing number of GNSS (Global Navigation Satellite System) interference events affecting aircraft operations across the region. The occurrences have been reported within the Maiquetía (Venezuela), Piarco (Trinidad and Tobago), San Juan Oceanic (Puerto Rico), Curaçao, Georgetown (Guyana), and Paramaribo (Suriname) FIRs. Additionally, the FAA has issued NOTAMS informing US civil operators of associated safety risks/concerns for overwater portions of the Mexico (MMFR), Central American (MHTG), Panama (MPZL), Bogota (SKED) and Guayaquil (SEFG) Flight Information Regions (FIRs), the entirety of the Mazatlan Oceanic (MMFO) FIR and in a portion of the unassigned eastern Pacific Ocean (XX01).

These reports describe temporary or intermittent losses of GNSS signals, occasionally accompanied by navigation alerts (NAV UNABLE RNP, FMS POSITION LOST), ADS-B dropouts, or loss of datalink synchronization. The disruptions have been observed in both the en-route and terminal phases of flight, generally at cruising altitudes, and lasting from a few seconds to several minutes.

Reports from operators indicate that GNSS signal losses have, in some instances, been accompanied by the simultaneous loss of transponder data or ADS-B connectivity, resulting in a temporary loss of ATC surveillance services. Multiple occurrences have been observed, within affected sectors, on consecutive days. The signals generally return to normal for the aircraft once they exit those areas. While several FIRs have issued NOTAMs advising possible interference, similar disruptions have been reported in adjacent airspace where no NOTAM has been published. It is important to emphasize that the absence of a NOTAM does not imply that interference is not occurring.

Although no safety incidents or accidents have been attributed to these events, the growing frequency and geographical spread of reports make this an emerging safety concern requiring continued monitoring and a coordinated response.

The situation prompted coordination among ICAO's South American (SAM) and North American, Central American and Caribbean (NACC) Regional Offices, , the Regional Aviation Safety Group of Pan America (RASG-PA together with CANSO's CADENA network, and several regional safety partners, to facilitate information sharing, support investigations, and promote harmonized operational guidance for the region.

Operational Implications

GNSS interference, whether caused by intentional jamming, unintentional emissions, or other sources, can affect several key systems used in modern aviation. Reports from operators in this region have highlighted the following operational impacts:

- Loss of navigation accuracy: temporary or total loss of GNSS position data may cause the flight management system (FMS) to revert automatically to DME/DME or inertial navigation, sometimes triggering multiple alerts in the cockpit.
- Degradation of the Terrain Awareness and Alerting System Integrity: interference and spoofing compromise EGPWS/GPWS by either inducing a loss of signal—forcing a reversion to "Basic GPWS" and disabling *Look-Ahead Terrain Database and Geometric Altitude* functions, or by injecting deceptive PNT data that triggers hazardous nuisance alerts (e.g., "PULL UP" at cruise) or suppresses legitimate warnings; these failure modes necessitate immediate procedural intervention (e.g., *TERRAIN OVRD*) to mitigate the "startle effect" and the increased risk of Controlled Flight Into Terrain (CFIT).
- Performance-Based Navigation (PBN) degradation: aircraft may lose RNP capability, forcing flight crews to discontinue RNP approaches or depart from planned routes requiring GNSS positioning.
- Reduced situational awareness: interference can interrupt ADS-B transmissions, limiting ATC's ability to track aircraft and increases controller workload.
- Impact on flight efficiency: rerouting and altitude changes may be required to avoid affected areas, increasing fuel consumption and flight time.
- Crew workload and communication load: troubleshooting, reconfiguring navigation sources, and coordinating alternative clearances with ATC significantly increase cockpit workload.
- Potential risk in critical phases: during approach or departure, GNSS signal loss may cause deviations from lateral or vertical paths, emphasizing the need for alternate procedures.

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Safety Considerations and Regional Context

GNSS interference is not a new phenomenon. Its geographical migration toward areas in the South American and Caribbean region, has introduced new challenges. Historically, most GNSS anomalies have been concentrated near conflict areas in the eastern Mediterranean, eastern Europe, or Middle East. However, the current trend in the Caribbean and northern South America FIRs underscores the need for heightened regional vigilance.

Airlines operating between South America, the Caribbean, and North America have noted clusters of events when crossing or approaching the northern coast of the South American continent. Some carriers have implemented temporary operational advisories to their flight crews and are instructing dispatchers to verify NOTAM coverage before flight planning. Others have activated internal monitoring systems to collect positional data and correlate interference patterns.

To support regional coordination and information sharing regarding the ongoing GNSS interference events, the ICAO North American, Central American and Caribbean (NACC) and South American (SAM) Regional Offices have activated the regional Contingency Coordination Team (CCT). The CCT serves as a standing mechanism to facilitate communication among affected States, air navigation service providers, and industry partners. The CCT will assist in the implementation of mitigation measures; support the harmonization of advisories; and ensure the availability of accurate, consolidated, and timely information for collaborative decision-making. The CCT remains available through the ICAO Regional Offices in Mexico City and Lima for any coordination or follow-up related to this matter.

The cooperation between operators and ANSPs is critical to maintain situational awareness and avoid the issuance of conflicting or delayed information.

Recommended actions:

To Air Carrier Operators and Flight Crews:

- Pre-flight: Ensure that flight planning tools include the latest NOTAMs related to GNSS degradation within the region. Review availability

of conventional navigation procedures (ILS, VOR/DME) for destination and alternates.

- In flight: When experiencing signal loss, monitor navigation cross-checks between GNSS, DME/DME, and inertial systems. If the aircraft reverts to degraded modes, inform ATC and coordinate vectors or alternative clearances.
- Post-flight: File detailed safety reports, including time, position, flight level, and system messages, to assist in regional data analysis.
- Training: Brief crews on recognizing GNSS interference symptoms and implementing company contingency procedures (as described in EASA SIB 2022-02R3 and FAA SAFO 24002).

To States and ANSPs:

- Establish internal mechanisms to promptly collect and analyze GNSS interference reports from aircraft and operators.
- Issue NOTAMs immediately when interference is confirmed or suspected, Early notification supports flight planning and crew awareness.
- If the source is uncertain or external to the State's boundaries, coordinate with neighboring FIRs/ACCs to ensure consistent information dissemination and to avoid gaps across borders. ICAO regional Offices are available to assist with coordination and data sharing.
- ANSPs should develop reversionary scenarios to help identify appropriate mitigations to RFI and meet the operational requirements of each airspace.
- Report any interference incident to your National Spectrum Authorities, coordinate established mitigation actions, and provide follow-ups.

Additional References and Resources

- ICAO Annex 10, Volume I: provisions related to the protection and monitoring of radio navigation services.
- EASA SIB 2022-02R3: operational recommendations for aircraft operating in GNSS-degraded environments.
- FAA SAFO 24002: guidance on flight operations affected by GNSS interference.
- CANSO Guidelines for implementing a Minimum Operational Network(MON)
- IATA GNSS Interference Safety Risk Assessment (2024): industry practices for risk mitigation.
- EUROCONTROL Guidance: recommendations for airspace management and contingency planning in regions affected by interference.

Conclusion

The occurrences of GNSS interference in northern South America, adjacent Caribbean and Pacific airspaces highlights the importance of establishing collective regional mitigations. The phenomenon is not limited by borders, and its effects can extend across several FIRs within a single flight. Timely information sharing, publication of NOTAMs, and proactive coordination among States and operators is essential to preserve the safety and predictability of international air transportation in the region.