

Subject: **Global Navigation Satellite System Outage Leading to Navigation / Surveillance Degradation**

Ref. Publications:

None.

Applicability:

National Aviation Authorities (NAAs), Air Navigation Service Providers (ANSPs) and air operators.

Description:

In the current context of the Russian invasion of Ukraine, the issue of Global Navigation Satellite Systems (GNSS) jamming and/or possible spoofing has intensified in geographical areas surrounding the conflict zone and other areas.

Eurocontrol, Network of Analysts and open-source data reports analysed by EASA indicate that since 24 February 2022, there are four key geographical areas where GNSS spoofing and/or jamming has intensified, namely:

- Kaliningrad region, surrounding Baltic sea and neighbouring States;
- Eastern Finland;
- The Black Sea; and
- The Eastern Mediterranean area near Cyprus, Turkey, Lebanon, Syria and Israel, as well as Northern Iraq.

The effects of GNSS jamming and/or possible spoofing were observed by aircraft in various phases of their flights, in certain cases leading to re-routing or even to change the destination due to the inability to perform a safe landing procedure. Under the present conditions, it is not possible to predict GNSS outages and their effects. The magnitude of the issues generated by such outage would depend upon the extent of the area concerned, on the duration and on the phase of flight of the affected aircraft.

The following non-exhaustive list includes some potential issues that a degradation of GNSS signal could generate:

- Loss of ability to use GNSS for waypoint navigation;
- Loss of area navigation (RNAV) approach capability;
- Inability to conduct or maintain Required Navigation Performance (RNP) operations, including RNP and RNP (Authorization Required) approaches;
- Triggering of terrain warnings, possibly with pull up commands;
- Inconsistent aircraft position on the navigation display;

This is information only. Recommendations are not mandatory.



- Loss of automatic dependent surveillance-broadcast (ADS-B), wind shear, terrain and surface functionalities;
- Failure or degradation of ATM/ANS/CNS and aircraft systems which use GNSS as a time reference;
- Potential airspace infringements and/or route deviations due to GNSS degradation.

At this time, the safety concern described in this SIB is not considered to be an unsafe condition that would warrant Safety Directive (SD) action under Commission Regulation (EU) [965/2012](#), Annex II, ARO.GEN.135(c), nor under Commission Regulation (EU) [2017/373](#), Annex II, point ATM/ANS.AR.A.030.

Recommendation(s):

To address the identified issues EASA recommends the implementation of the following mitigating measures. These recommendations are to be considered for the aforementioned areas as well as for other areas where GNSS jamming and/or possible spoofing would be detected in the future.

NAAAs should:

- a) Ensure that contingency procedures are established in coordination with ANSPs and airspace users, and that essential conventional navigation infrastructure, particularly Instrument Landing System, are retained and fully operational;
- b) Implement appropriate and proactive mitigating measures as a matter of high priority, including the issuance of NOTAMs e.g. describing affected areas and related limitations (as appropriate and determined at State level).

NAAAs and ANSPs should:

- a) Establish a process to collect information on GNSS degradations, also in coordination with the relevant National Communications Authorities, and to promptly notify the related outcomes to airlines and to airspace users;
- b) Confirm ANSPs' readiness to provide reliable surveillance coverage that is resilient to GNSS interference, such as ground NAV aids for conventional non-satellite based navigation (Distance Measuring Equipment (DME), Very High Frequency omnidirectional range (VOR));
- c) Ensure that ANSPs' contingency plans include alternative procedures to be followed in case of large-scale GNSS jamming and/or possible spoofing events.

Air operators, including helicopter operators, should:

- a) Ensure that flight crews promptly report via air report to air traffic control any observed interruption, degradation or anomalous performance of GNSS equipment (jamming and/or possible spoofing) or related avionics;
- b) Assess operational risks and limitations linked to the loss of on-board GNSS capability, including other on-board systems requiring inputs from reliable GNSS signal;
- c) Ensure that operational limitations, introduced by the dispatch of aircraft with radio navigation system inoperative in accordance with Minimum Equipment List, are considered before operating an aircraft in the affected areas;
- d) Ensure flight crews and relevant flight operation personnel:
 - i. are aware of possible GNSS jamming and/or possible spoofing;

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- ii. verify the aircraft position by means of conventional navigation aids when flights are operated in proximity of the affected areas;
 - iii. check that the navigation aids critical to the operation for the intended route and approach are available; and
 - iv. remain prepared to revert to a conventional arrival procedure where appropriate and inform air traffic controllers in such a case;
- e) Ensure, in the flight planning and execution phase, the availability of alternative conventional arrival and approach procedures (i.e. an aerodrome in the affected area with only GNSS approach procedure should not be considered as destination or alternate).

All parties concerned are reminded on their obligations to report any event impacting safety according to Commission Regulation (EU) [376/2014](#).

Contact(s):

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