European and North Atlantic Office

NORTH ATLANTIC PROCEDURES AND OPERATIONS GROUP

EIGHTEENTH MEETING

(Gander, Canada, 16-20 September 2024)

Agenda Item 2: Planning and implementation programmes

2.c) Other Issues

GNSS JAMMING EFFECTS OBSERVED IN REYKJAVIK IN Q1 AND Q2 OF 2024

(Presented by Iceland)

SUMMARY

This information paper provides the NAT POG with information on effects of GNSS jamming in Reykjavik CTA from January through June 2024.

1. Introduction

1.1 GNSS jamming and spoofing is a relatively new threat to aviation and is steadily increasing. Iceland presented statistics on effects of jamming in the year 2023 during NAT POG/17 in WP/19. This is an update of the situation for the first six months of the year 2024.

2. Discussion

2.1 To air traffic controllers in Reykjavik, there are three visible effects of GNSS jamming:

a) **ADS-B:** Quality indicators below minimum or ADS-B reports not sent at all. This will result in aircraft not being visible on surveillance systems that rely solely on ADS-B.

b) **ADS-C:** Figure of merit (FOM) in ADS-C reports is below minimum. This will result in the inability to support PBCS which affects application of 23NM lateral, 5 minutes longitudinal and 15 NM TtT ATS Surveillance separation.

c) **Datalink logon:** In some cases, aircraft are unable to log on to CPDLC, most likely due to clock de-synchronization.

2.2 There are no known cases of GNSS jamming or spoofing occurring inside Reykjavik CTA. However, aircraft subject to GNSS jamming prior to entering the NAT region often show the symptoms described above. In this case, the service to the aircraft is affected as air traffic controllers are unable to provide reduced separation standards such as PBCS and surveillance separation (15 NM TtT or 5 NM).

2.3 A data collection was made in Reykjavik CTA for the period from 1 January to 30 June 2024 with the goal of quantifying the effects of GNSS jamming. The data collection uses ADS-B and ADS-C to assess if an aircraft was potentially jammed earlier in the flight. An aircraft was considered possibly jammed if it displayed either issue with ADS-B or ADS-C using the criteria below:

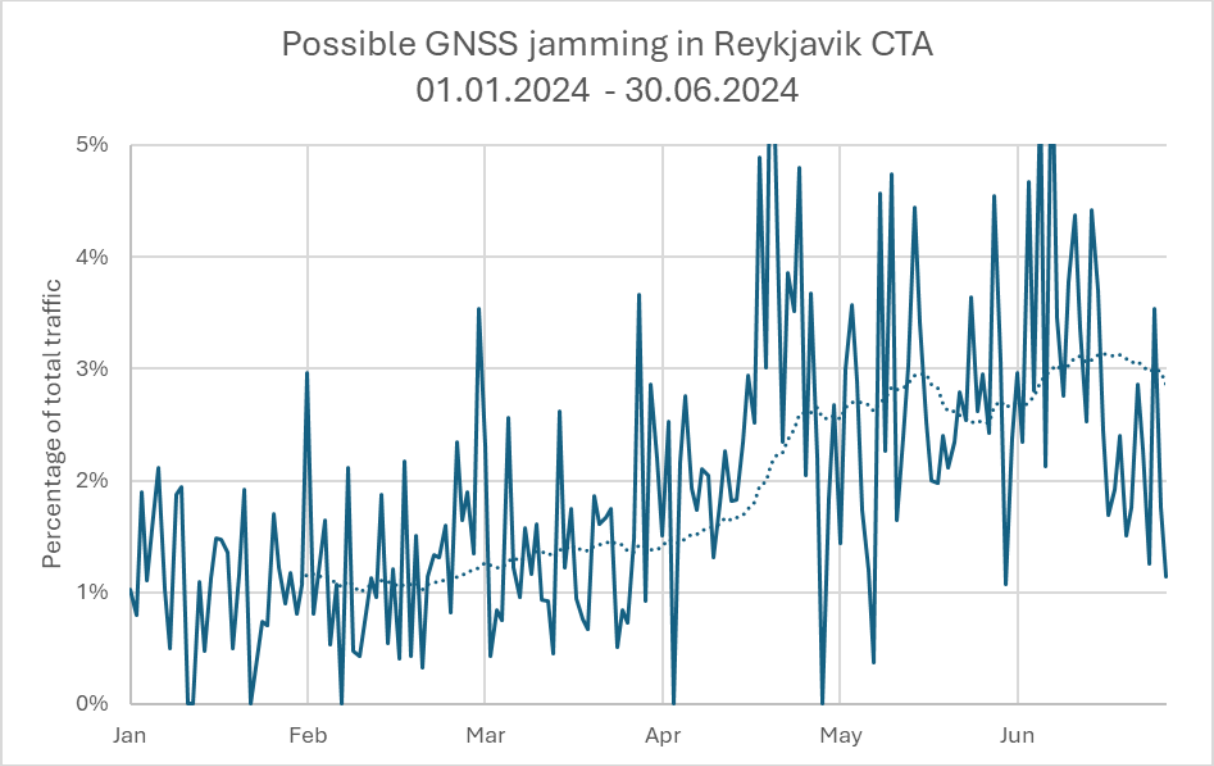
ADS-B	ADS-C
ADS-B is not received at all.	ADS-C is received and more than 5% of the ADS-C reports contain FOM 5 or lower.
More than 5% of ADS-B reports have poor quality indicators.	

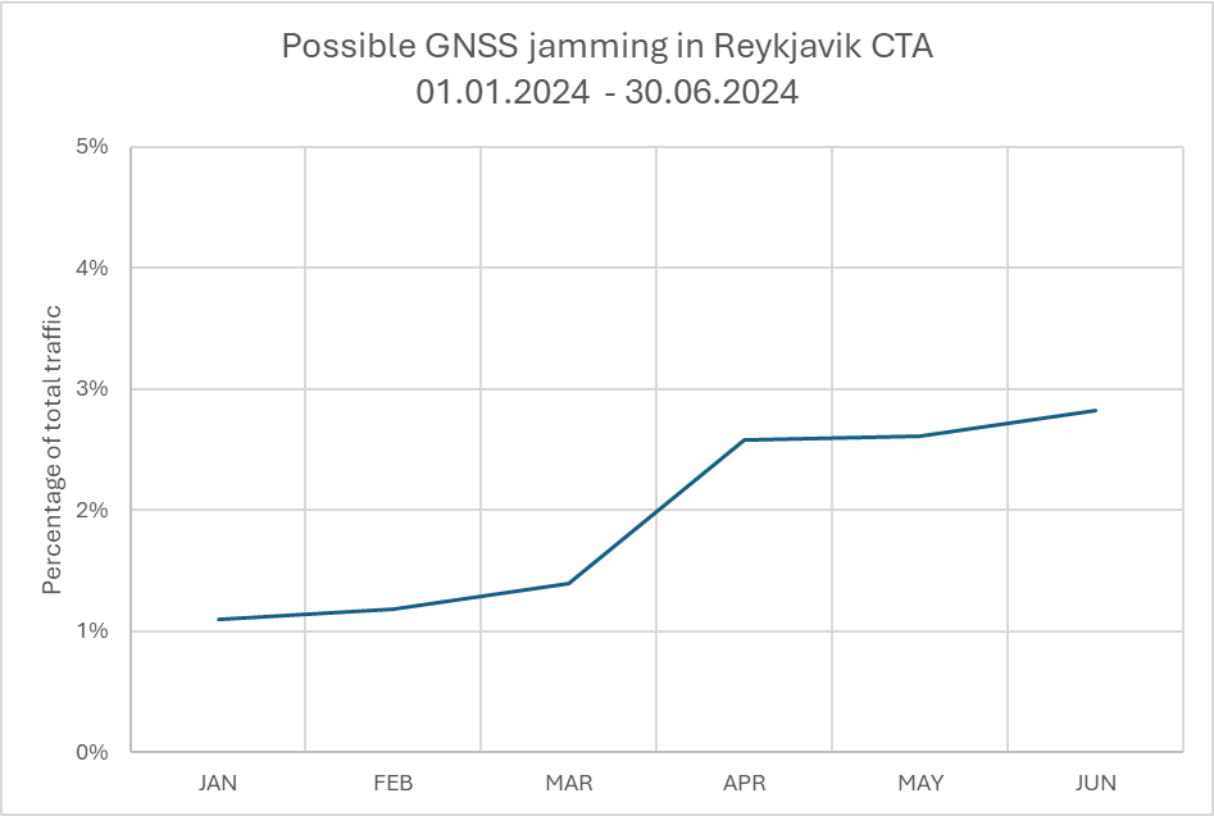
2.4 The following traffic is excluded from the data collection:

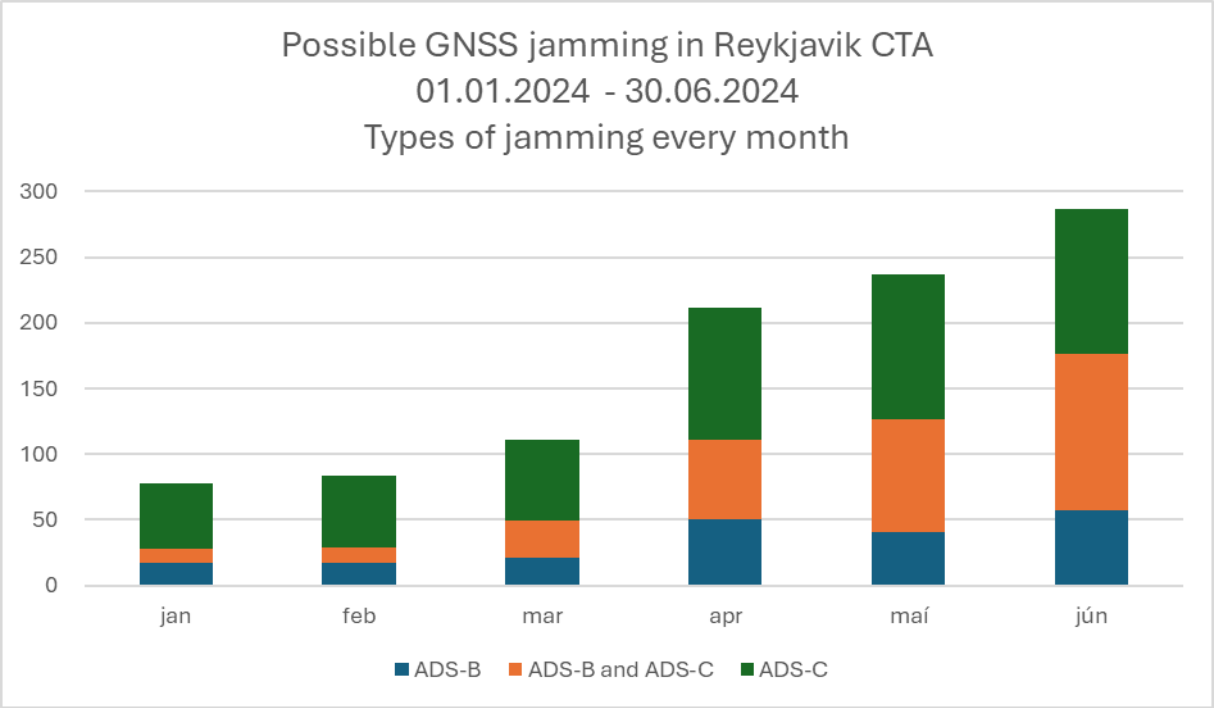
- Military flights.
- Flights to/from Iceland, Greenland or Faroe Islands.
- Flights that are less than 60 seconds within Reykjavik CTA.

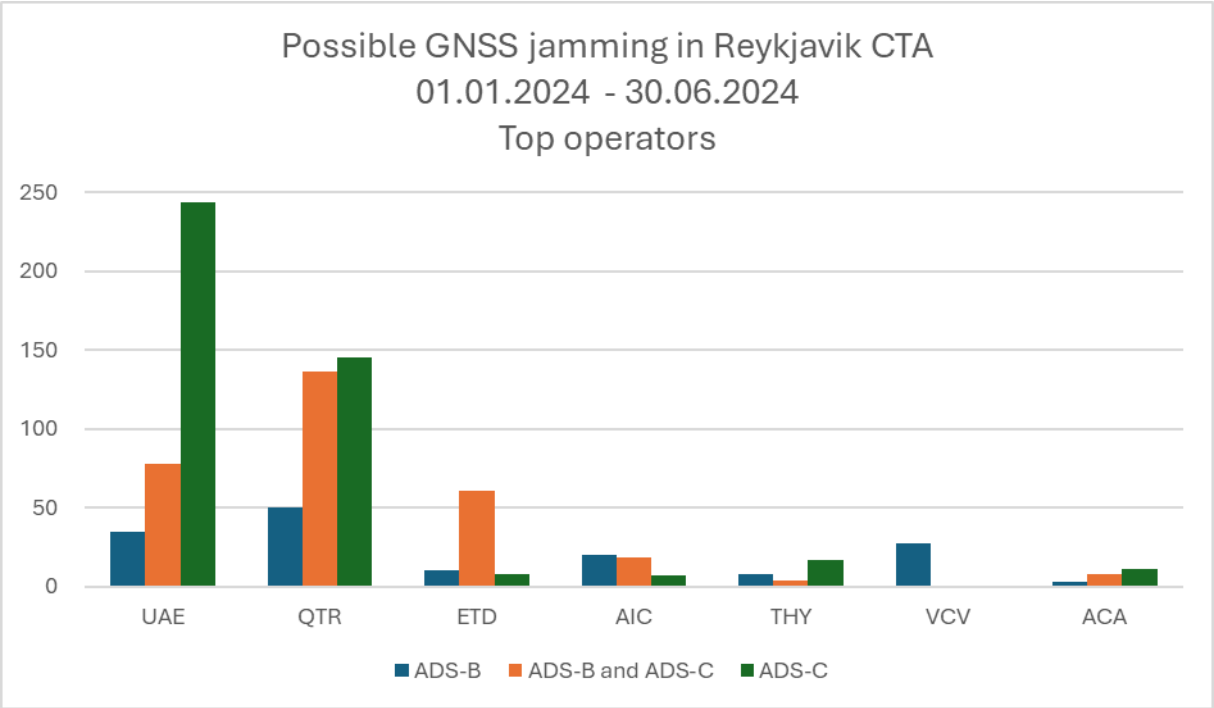
In NAT POG/17 WP/19, data north of 82°N was excluded to account for a known Airbus A380 issue where ADS-B quality indicators would drop north of 87°N (and south of 87°S). This issue has been fixed in a software release by Airbus and data in Reykjavik indicate that this is no longer a factor.

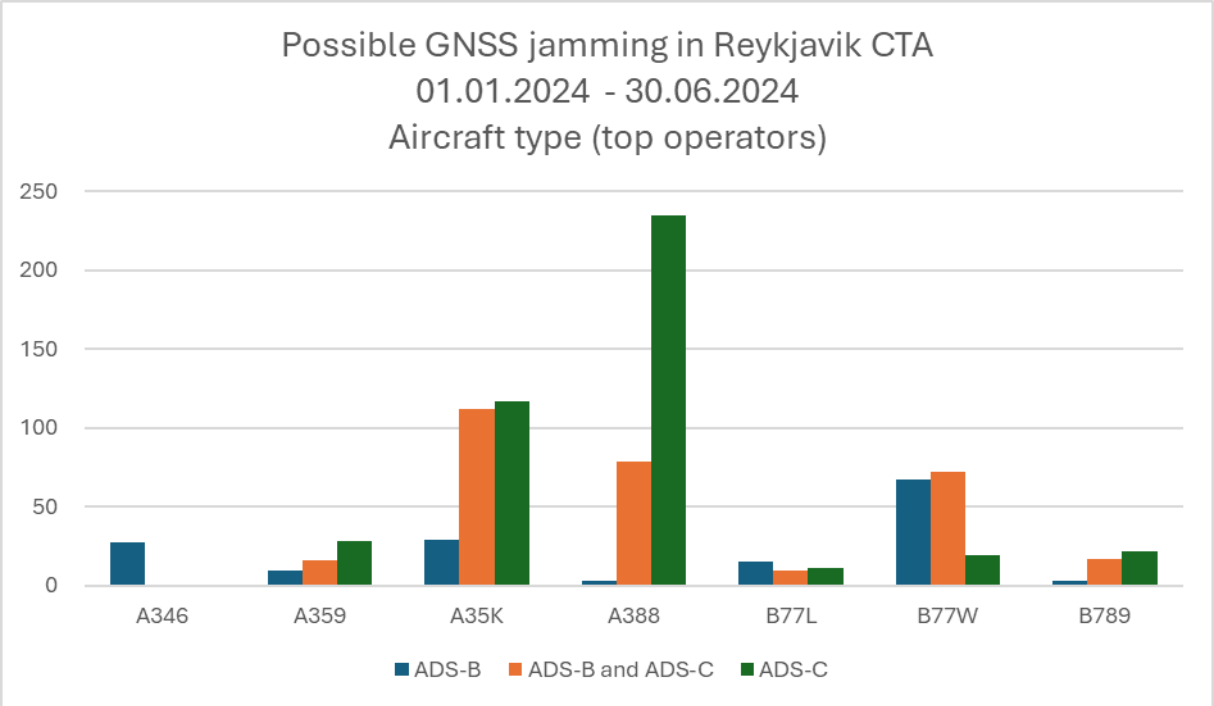
2.5 The following graphs give an overview of the results of the data collection.

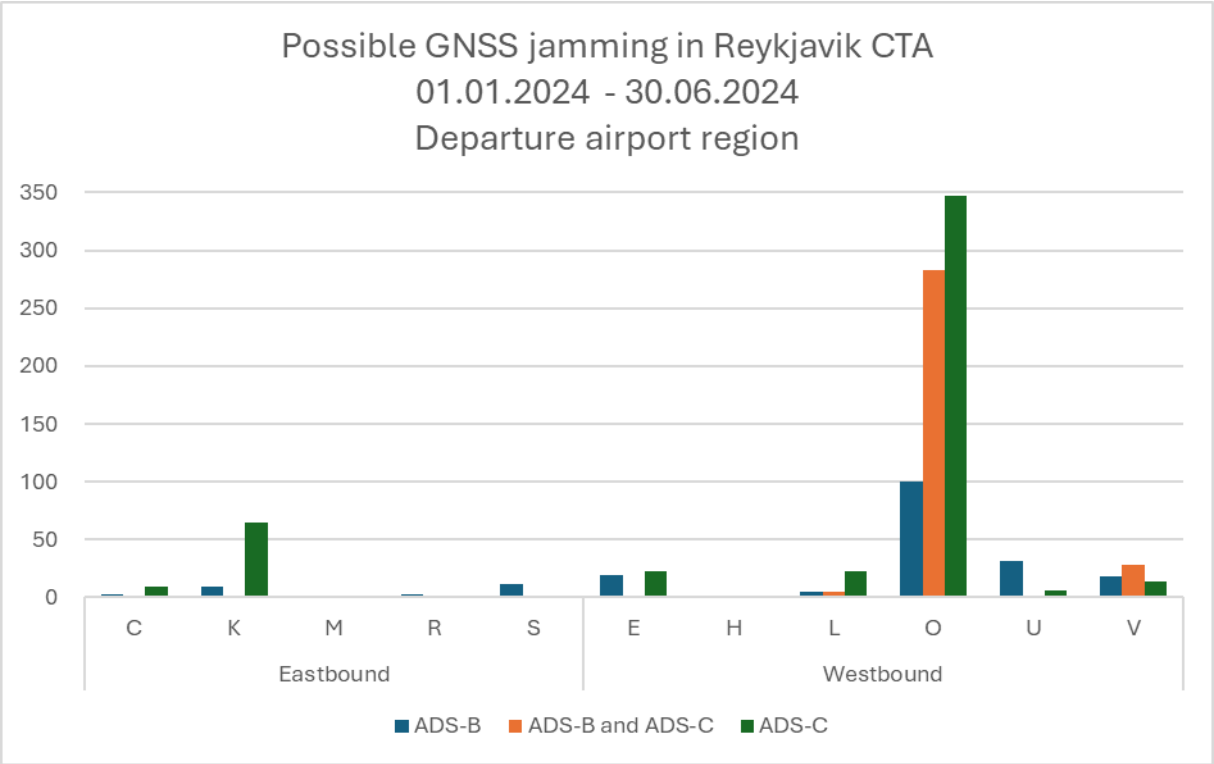


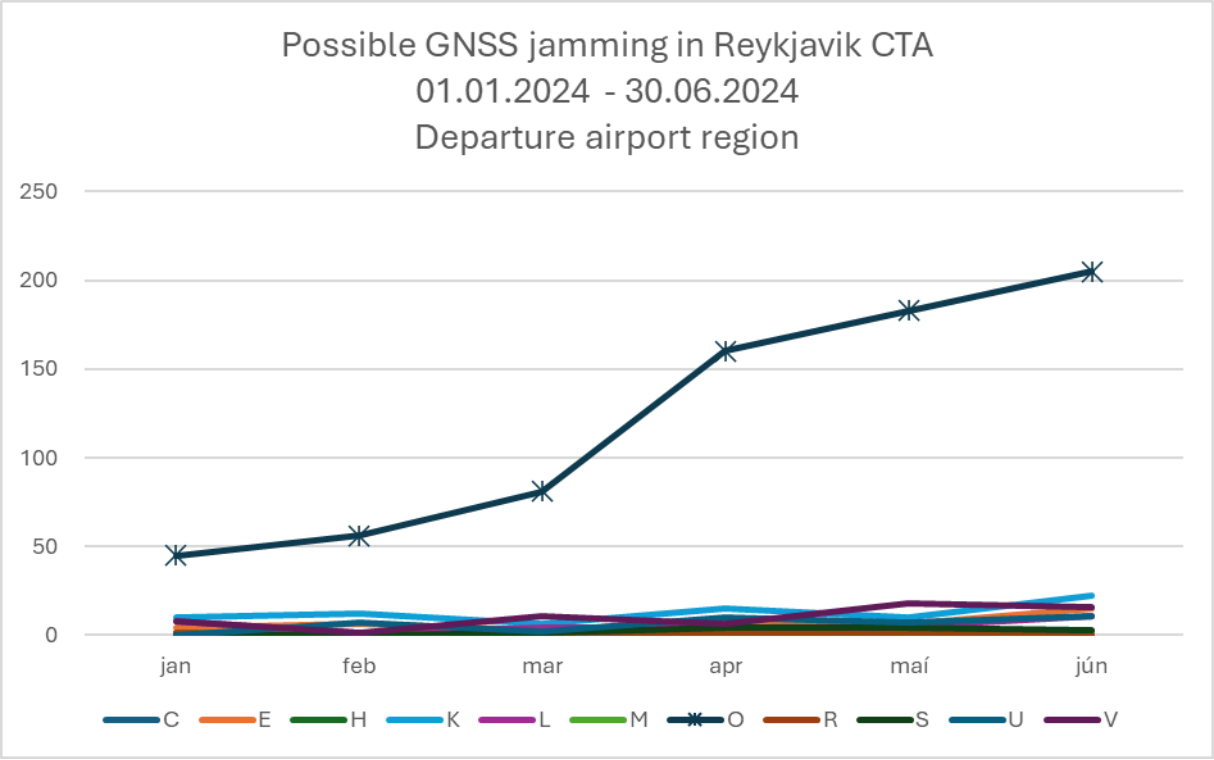

Possible GNSS jamming in Reykjavik CTA
01.01.2024 - 30.06.2024
Percentage of total traffic
5%
4%
3%
2%
1%
0%
JAN
FEB
MAR
APR
MAY
JUN


Possible GNSS jamming in Reykjavik CTA
01.01.2024 - 30.06.2024
Types of jamming every month
300
250
200
150
100
50
0
jan
feb
mar
apr
maí
jún
ADS-B
ADS-B and ADS-C
ADS-C


Possible GNSS jamming in Reykjavik CTA
01.01.2024 - 30.06.2024
Top operators
250
200
150
100
50
0
UAE
QTR
ETD
AIC
THY
VCV
ACA
ADS-B
ADS-B and ADS-C
ADS-C


Possible GNSS jamming in Reykjavik CTA
01.01.2024 - 30.06.2024
Aircraft type (top operators)
250
200
150
100
50
0
A346
A359
A35K
A388
B77L
B77W
B789
ADS-B
ADS-B and ADS-C
ADS-C





2.6 In total, 1009 cases that could potentially be attributed to jamming/spoofing were identified within Reykjavik CTA. In the beginning of the year, possible jammed aircraft were 1.1% of the traffic with a steep increase in April, increasing to 2.6%, and 2.8% in June.

2.7 Aircraft from the Middle East are 730 of the total 1009 with Abu Dhabi, Dubai and Doha having 723 departures.

2.8 The data set contains 106 eastbound aircraft. It is believed that those have most likely not been directly affected by GNSS jamming prior to BIRD entry, but rather a combination of aircraft not having been rebooted on ground and false positives.

Examples of false positives are:

- Aircrew changing clock input before entering Europe resulting in FOM in ADS-C to drop to 0.
- Aircraft with equipment failures unrelated to GNSS jamming/spoofing.
- One airline abruptly stops sending ADS-B.

3. Action by the Meeting

3.1 The NAT POG is invited to note the information provided.

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