International Civil Aviation Organization

MIDANPIRG/21 & RASG-MID/11 Meetings

(Abu Dhabi, UAE, 4 – 8 March 2024)

Agenda Item 4.2: Outcome of ASRG/5

GNSS RADIO FREQUENCY INTERFERENCE INCIDENTS

(Presented by IATA)

SUMMARY

This paper presents the update of GNSS interference and spoofing statistics for the year 2023 and provide information on the activities conducted to address the issue by our Safety Risk management experts.

Action by the meeting is at paragraph 3

REFERENCE

- DOC 9849 GLOBAL NAVIGATION SATELLITE SYSTEM MANUAL
- RASG-MID 10 REPORT
- CONCLUSIONS OF ICAO EUR/MID RADIO NAVIGATION SYMPOSIUM

1. INTRODUCTION

1.1 GNSS RFI has become a significant safety risk, particularly in geographical areas surrounding conflict zones and in the eastern Mediterranean and Middle East where RFI can increase pilots' and air traffic controllers' workload.

1.2 It is to note that signals from the Global Navigation Satellite System (GNSS) are one of the main inputs used for aircraft positioning or time reference for Communication, Navigation and Surveillance functions on-board of aircraft.

1.3 Operators reported an increased number of events related to the loss of GNSS signals in MID region and Turkey due to Radio Frequency Interference (RFI) and/or spoofing. The issue of GNSS jamming and spoofing is getting worse, and outages are sporadic and unpredictable impacting aircraft systems resulting in misleading or the unavailability of navigation and/or surveillance information.

2. DISCUSSION

2.1 To support the joint effort between IATA and ICAO in developing mitigation strategies for GNSS vulnerability, Global Aviation Data Management (GADM) database is used to produce trend analysis of reported GNSS interferences and to identify hot spots.

2.2 IATA MENA presented the first version of GNSS/GPS interference analysis in November 2020. It identified two major area of frequently reported GNSS/GPS interferences: Eastern Anatolia and Eastern Mediterranean. To continue the effort, an updated analysis is produced for year 2023.

2.3 The analysis from the Flight Data Exchange (FDX) extracted a total of **37,770** 'GPS signal loss' events in the MID region from **January 2023 to December 2023** with the monthly rate trends for the FDX 'GPS Signal Loss' event rate of **92.96 events per 1000 FDx flights** compared to world rate of 29.83 events per 1000 FDx flights as depicted in figure 1.

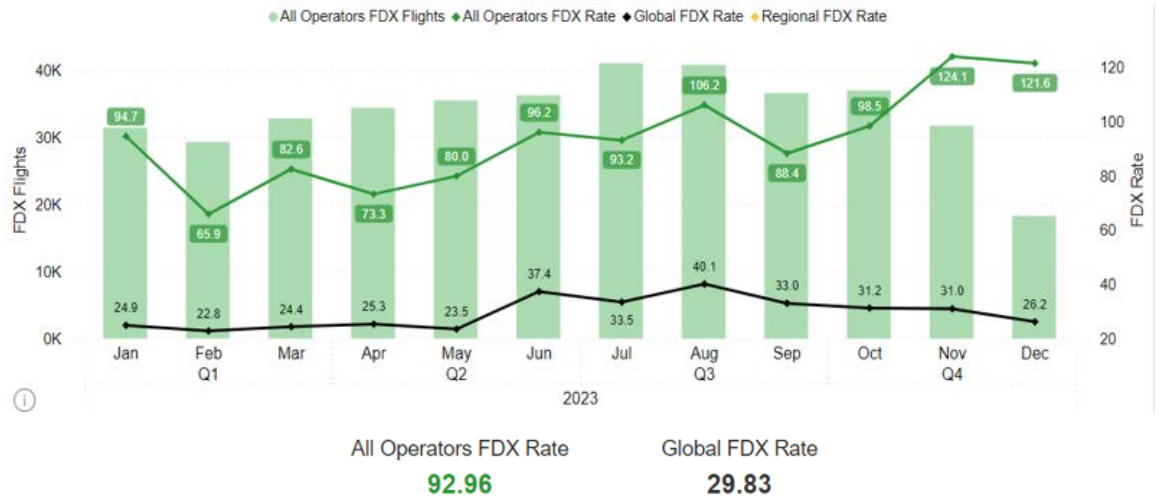

FIGURE 1 GNSS RFI MID

EUR – MENA routes exhibit significantly higher rates of 'GPS Signal Loss' events compared to other regions. The rate is approximately **329.40 per 1,000 flights**, indicating 45% of FDX flights experienced 'GPS Signal Loss' events on these routes as depicted in figure 2.

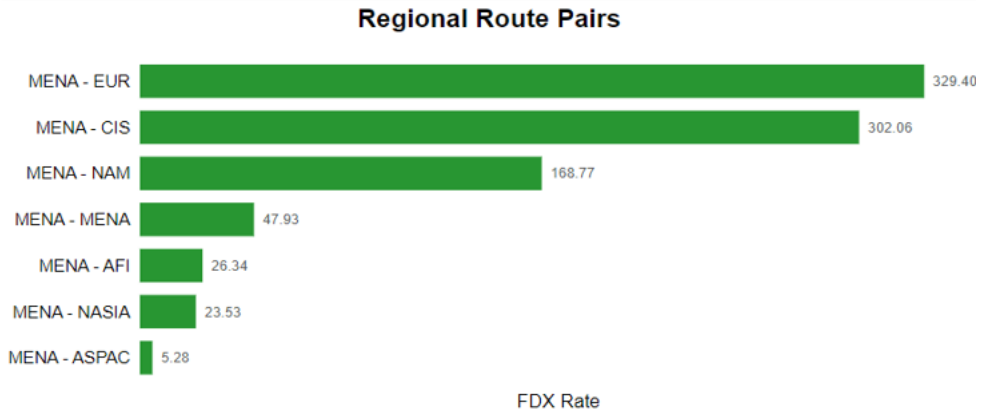

FIGURE 2 ROUTE PAIRS

2.4 Globally on average, the duration of GPS Signal Loss events is less than 30 minutes representing 75.8% of signal loss events while 18.2% of signal loss with duration between 30-60

minutes as shown in figure 3.

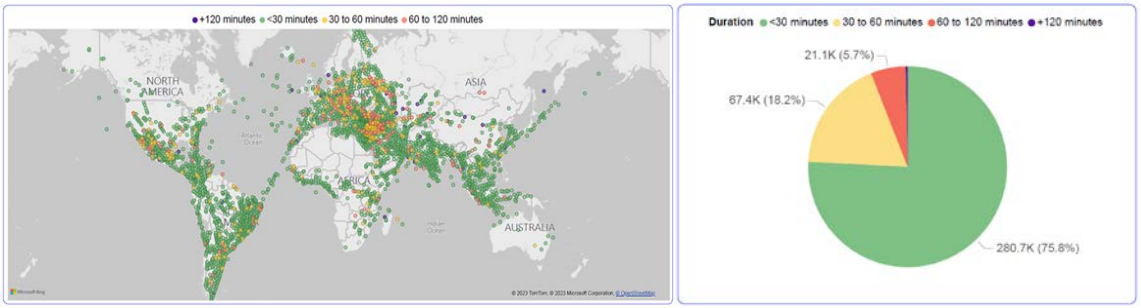

FIGURE 3 SIGNAL LOSS DURATION

2.5 IATA continues to monitor the issue and implement recommendations within its Safety Risk

Assessment (SRA) and published fact sheet (Ver.03) (as Attachment "A") with recommendations that includes among other recommendations:

- Encouraging operators to review the mitigations and controls, listed in the SRA, and to check against their own assessment.
- Promote the importance of reporting loss of GNSS events to ensure the extent of the issue is fully recognized.
- Influence OEMs to provide guidance on increasing the resilience of equipment to jamming.
- States to implement appropriate mitigation measures as contained in ICAO GNSS Manual (Doc 9849) as a matter of high priority and to report progress and any difficulties to ICAO.
- States to ensure that contingency procedures are established in coordination with air navigation service providers and airspace users and that essential conventional navigation infrastructure, particularly Instrument Landing System (ILS), are retained and fully operational.

2.6 Recently several airlines reported GNSS interference in Iraq & Turkey impacting aircraft GPS system and ADS-B capability .in some cases the crew were unable to re-gain operations of GPS system even after leaving the GPS interference area and as result their operation through NAT airspace which requires certain capabilities including GPS & ADS-B systems is impacted ,in some cases the aircraft may be required to reroute or given lower levels depending on the traffic density.

2.7 The recent reporting regarding potential spoofing incidents can also pose increased safety-of-flight risks due to potential loss of aircraft situational awareness, unauthorized entry into prohibited or restricted airspace, and increased pilot and air traffic control (ATC) workload issues. Any of the previous could lead to potential aircraft accidents, or incidents, and/or loss of life.

2.7 Based on the above, the meeting is invited to endorse the following Draft Conclusion:

Why	To enhance safety of operators' operations
What	*to raise awareness of states of the safety risk of GNSS interference and spoofing impacting aircraft systems resulting in misleading or the unavailability of navigation and/or surveillance information.*
Who	RASG /11
When	March 2023

DRAFT RASG CONCLUSION 11/XX: GNSS INTERFERENCE AND SPOOFING

That,

a) *ICAO with the support of states and IATA to establish a regionally determined minimum operational network (MON) of conventional navigation aids for use in case of GNSS interference /Spoofing.*

b) States to develop procedures (conventional routes) to be used in case of GNSS interference.

c) States maintain adequate infrastructure to enable aircraft operators use of conventional navigation aids as appropriate during GNSS RFI or Spoofing.

d) Original Equipment Manufacturers (OEMs) to provide further guidance and information on the effects and mitigations of GNSS RFI (including interference, jamming and spoofing) from the perspective of aircraft equipment.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) endorse conclusion in para.2.7; and

c) amend RASG-MID SAFETY ADVISORY – 14 to update the GNSS RFI statistics and to include GNSS spoofing effect and mitigation measures.

- END -