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# ICAO EUR/NAT - MID Workshop on GNSS RFI

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# Mitigating GNSS Vulnerabilities in Aviation

## ICAO Assembly A42 – Working Paper WP/108

**Purpose:** Address vulnerabilities in Global Navigation Satellite Systems (GNSS) affecting aviation safety and continuity.

**Significance:** GNSS underpins navigation, positioning, timing, and communication in modern aviation.

**Risks of Disruption:** Interference can cause navigation errors, delays, and increased controller workload.

# GNSS Vulnerabilities & Operational Challenges

## ✓ Main Threats:

- **Jamming:** Deliberate interference that disrupts GNSS signals.
- **Spoofing:** False signals deceive receivers, leading to wrong positional data.

## ✓ Operational Impacts:

- Loss of navigation accuracy, particularly in complex airspace or approach phases.
- Reduced service levels and need for increased aircraft separation.
- Timing disruptions affecting ATM/ATC systems.

## ✓ Key Challenge:

- Growing GNSS reliance (PBN, SBAS) increases exposure, requiring stronger resilience measures.

# Recommendations & Way Forward

## ✓ Mitigation Strategies:

- Conduct national risk assessments of GNSS vulnerabilities.
- Implement alternative or backup navigation systems (e.g., inertial, terrestrial, multi-constellation).
- Strengthen system monitoring, interference detection and alert mechanisms.
- Establish degraded-mode operating procedures.

## ✓ International Coordination:

- Share best practices, report incidents, and align guidance under ICAO.
- Promote capacity building and update ICAO standards to improve GNSS resilience.

## ✓ Outcome:

- Enhanced global resilience and operational continuity through collaborative action.

# 42<sup>nd</sup> ICAO Assembly Outcomes

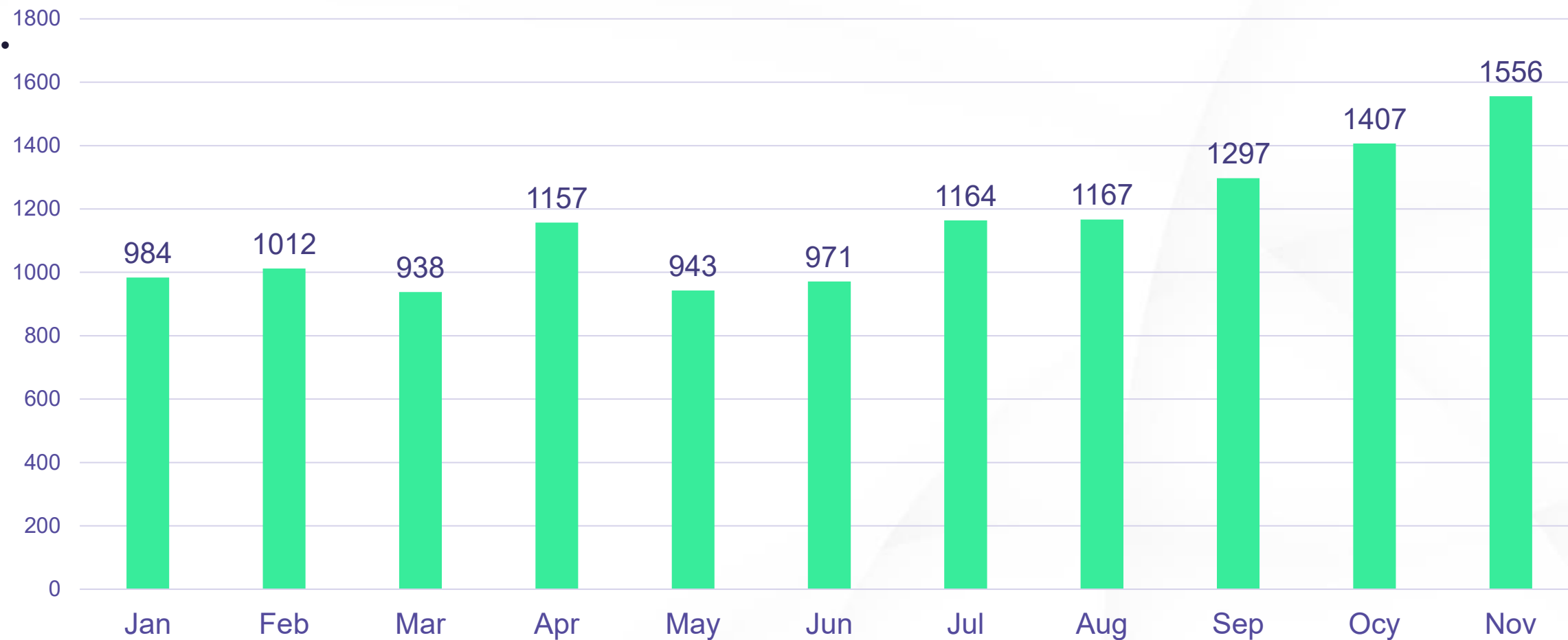
## The Technical Commission:

- Agreed on the need for ICAO to expedite efforts to standardize GNSS RFI related solutions including complementary position, navigation and timing (C-PNT), signal authentication for GNSS core constellations and augmentation services.
- Supported the multi-faceted approach for mitigating GNSS RFI, including the development of real-time GNSS monitoring and analysis systems.
- Acknowledged the need to establish a comprehensive review framework to ensure the overall resilience of CNS/ATM systems and services.
- Noted that capacity building activities related to NAV RON will be carried out to support States in planning and implementing the new concept.

## CANSO Initiatives

- CANSO is urgently working to provide its ANSP Members with information on the management of GNSS interference events.
- GNSS Interference webinar (with IATA participation) – October 2024
- CANSO Guidelines for Implementing a Minimum Operational Network: *Using Conventional Navigation AIDS (NAVAID) for Contingency during GNSS Outages* - – March 2025
- Guidance on GNSS RFI, new publication coming December 2025
- Key topic at regional conferences

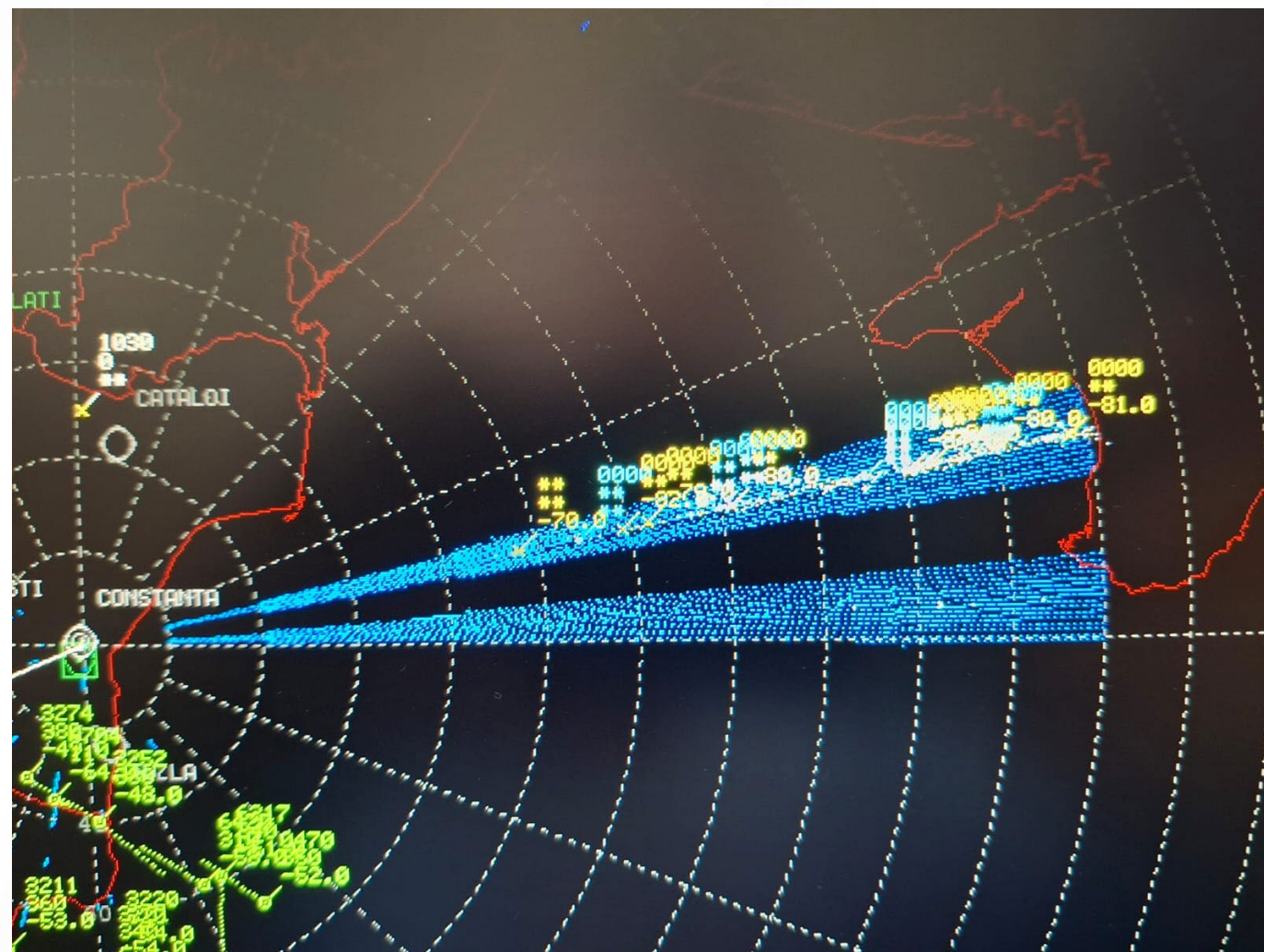
## Number of flights in Bucharest FIR affected by GNSS spoofing per year 2025 to date (November data extrapolated)



# Other RFI occurrences

## In areas close to Black Sea shore MSSR & DME were also affected

- March 2025 – May 2025
- One MSSR on azimuth 57° - 92°
- Three DMEs indicating lower efficiency due to over-interrogation
- DME and Secondary Radar operating frequencies around 1GHz are close to L5 band used by GNSS





**THANK YOU**

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