नागर विमानन महानिदेशालय
DIRECTORATE GENERAL OF CIVIL AVIATION

GNSS RADIO FREQUENCY INTERFERENCE (RFI)

DIRECTORATE GENERAL OF CIVIL AVIATION **INDIA**

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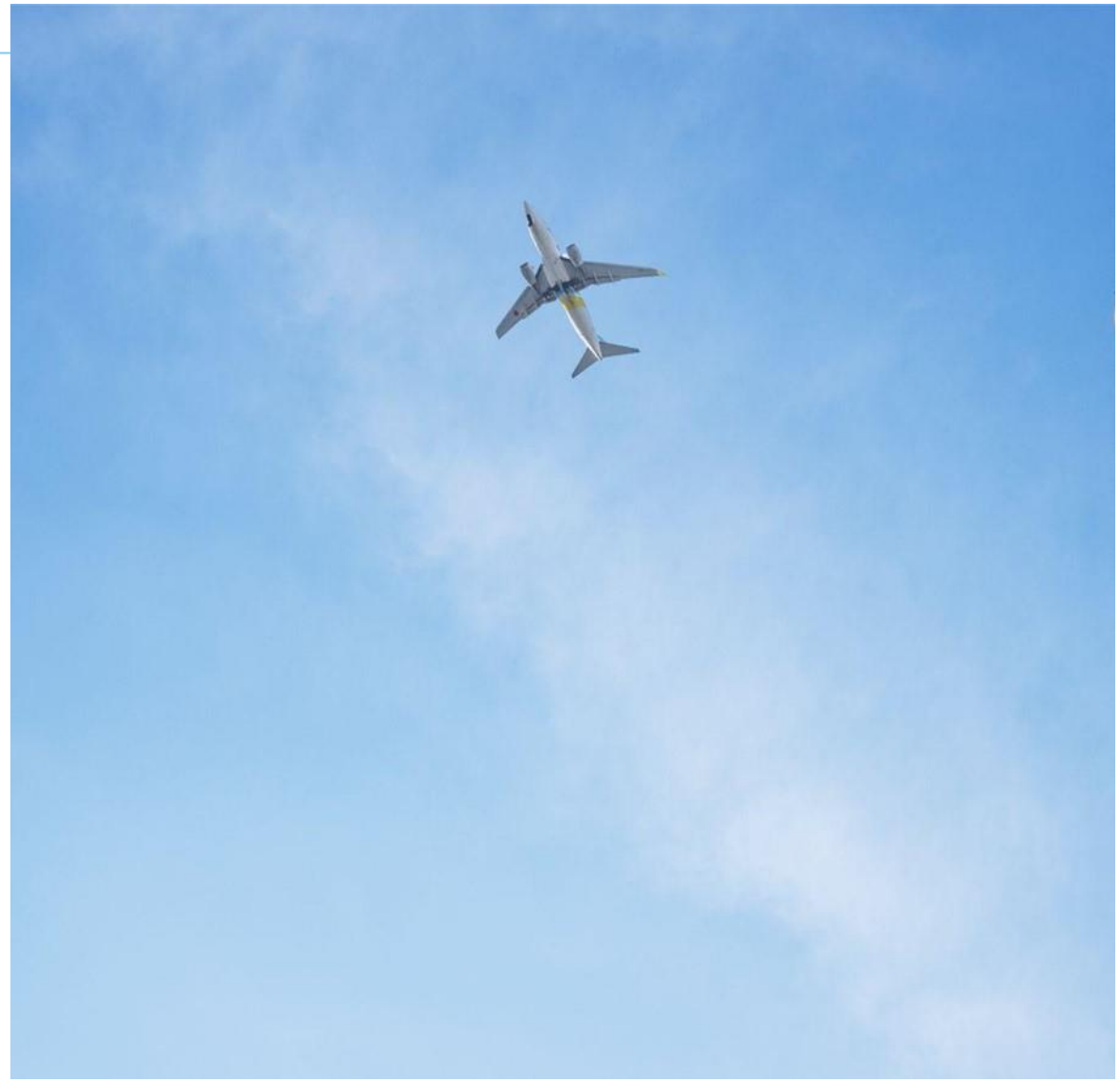


REGULATORY RESPONSE

DGCA INDIA

(1) Took Note of rising GNSS RFI Spoofing reports in Late Sep 2023, in and around conflict zones.

(2) Conducted a comprehensive situation assessment, studies, discussions with OEMs, ANSP, airlines and other CAAs

(3) Recognizing need for guidance in case of GNSS RFI, DGCA Published Advisory Circular on GNSS Interference Published on 24 – Nov - 2023

- **AIP INDIA ENR 2.3 GNSS**

Provides Information on SBAS – GAGAN

Section 10. Anomaly Reporting

Provides Reporting Format for reporting GPS/GAGAN Anomaly.

- **DGCA ANSS AC 01 of 2023 – GNSS Interference in Airspace**

Comprehensive guidelines for airline operators, pilots, air navigation service provider and air traffic controllers for dealing with the threat in effective and coordinated manner.

- ✓ **Mandates Reporting** of GNSS RFI EVENTS.

  Reporting Format is as per ICAO DOC 9849 GNSS Manual and experience gained.

- ✓ **Guidance** for safety risk assessment

- ✓ **Guidance** for SOPs and contingency procedures

ANSS AC 01 of 2023

GNSS INTERFERENCE IN AIRSPACE – 24 NOV 2023

भारत सरकार
नागर विमानन महानिदेशालय
Government of India
Directorate General of Civil Aviation

ADVISORY CIRCULAR

ANSS AC 01 of 2023
Ref. DGCA-21040/1/2023-ANS
Issue date: 24. 11.2023

Sub: GNSS INTERFERENCE IN AIRSPACE

1. Introduction

1.1 A vast range of applications in civil aviation use GNSS for timing, position and navigation, both in aircraft and in space-based or ground-based systems.

1.2 GNSS Signals, being weak, are susceptible to interference. The interference which could be intentional or unintentional has potential to affect the services which require reliable GNSS signals.

1.3 With increased reliance and dependency on GNSS, GNSS interference including jamming and spoofing has become a real threat in airspace, and as such, active measures are required by all concerned to effectively deal with it.

2. Purpose

2.1 The purpose of this circular is:
(a) to increase awareness among aviation personnel about potential threats of GNSS Interference,
(b) to establish roles and responsibilities of different stakeholders in monitoring and mitigating threats,
(c) to establish an unambiguous channel for reporting GNSS Interference, and
(d) to establish a threat monitoring and analysis network.

3. Applicability

3.1 This circular is applicable to all Aircraft Operators and Air Navigation Service Provider (ANSP) for information, guidance and compliance.

ADVISORY CIRCULAR

- The Advisory circular increases awareness among aviation stakeholders about potential threats of GNSS interference.
- It establishes **roles and responsibilities** of different stakeholders in monitoring and mitigating the threat.
- It provides guidance for **Safety Risk Assessment**.
- It provides a **reporting** format for reporting GNSS interference events.
- It envisions creation of **Threat Monitoring and Analysis network** for preventive and reactive threat monitoring for data and report analysis.

Introduction

Objective

1. Purpose
2. Applicability

GNSS Interference

1. Jamming and Spoofing
2. Affected Areas (FIRs)
3. Potential Impact

Mitigation Measures

1. Air Operators
2. Pilots
3. ANSP
4. ATC

Reporting

Reporting Structure established

Threat Monitoring and Analysis Network

Role of ANSP | Quick Response Mechanism

Safety Risk Assessment

ACTION PLAN

Regulator Expectations - Roles and Responsibilities of each Stakeholder

Advisory Circular – Stakeholder's Role

Airlines

- Assess operational risk to safety on their fleet.
- Coordinate and collaborate with OEMs
- Develop contingency procedures.
- Sensitize and train Flight Crew.
- Report and share information.

Pilots

- Monitor aircraft position and instruments.
- Notify ATC for assistance.
- Revert to conventional instruments and procedures.
- Report and share information.

Threat Monitoring and Analysis Network

Air Navigation Service Provider (AAI)

- Assess operational risk to infrastructure.
- Develop contingency procedures.
- Issue NOTAMs – disseminate information.
- Sensitize and train Air traffic controllers.
- Report and share information.

Air Traffic Controllers

- Monitor traffic to detect deviation.
- Provide assistance to affected traffic.
- Implement contingency procedures.
- Report and share information.

GNSS RFI REPORTING

- A common reporting format has been developed for stakeholders to report GNSS Interference events.
- The reporting format covers all details and lists potential impact on aircraft and ground systems.
- A reporting channel has also been established, and clear directions are given as to **who** should report, **what**, **how** and **to whom** to report to remove all ambiguity.
- Collection of appropriate data will enable data analysis giving important information and threat picture to further refine response.
- The data and report analysis to be conducted by ANSP AAI under Threat Monitoring and Analysis Network.

REPORTING FORMAT

Appendix 1

Reporting Format GNSS Interference Occurrence

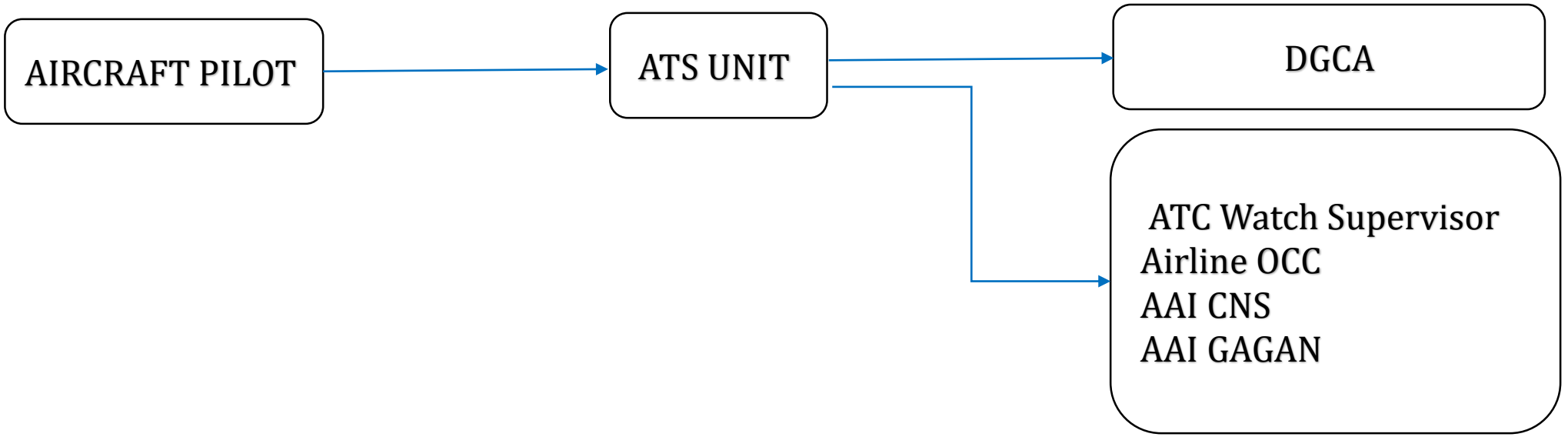
Originator of Report	
Report Filed by	[] Aircraft Operator [] Flight Crew [] Air Navigation Service Provider [] Air traffic Controller [] Any other
Date and Time of Report (dd/mm/yyyy) and UTC	
Aircraft Operator Details	
Name	
Email address	
Flight Details	
Call sign of Aircraft (Flight No.)	
Flight Sector	
Airway/ Route of occurrence	
FIR code	
Flight Level or Altitude during event	
Phase of flight	
Aircraft Type	
Aircraft Registration	
ATS Details	
Location of ATS Station (Location identifier)	
Surveillance Systems details	
Affected airspace Details	
Event Details	
Affected GNSS Element	[] GPS [] GLONASS [] GAGAN [] Any other. Pls Specify:
Coordinates of the first point of occurrence / Time (UTC):	UTC: Lat: Long:
Coordinates of the last point of occurrence / Time (UTC):	UTC: Lat: Long:
Duration of Observed Interference/outage:	

Impact Details	
List of impacted systems:	
Observation of a "time shift" on clock (details of shift and recovery, if any)	
Observation of a "map shift" on navigation display (details of shift and recovery, if any)	
Enhanced ground proximity warning alerts:	
Degraded EPU (Estimated Position Uncertainity)/ Estimated Position Error	
Loss of automatic dependent surveillance (ADS) reporting capabilities (ADS-B out, ADSB-in, ADS-C) (details)	
Loss of GNSS-based landing capability.	
Large position errors (details):	
Loss of integrity (RAIM warning/alert):	
Complete outage (Both receivers):	
Loss of GPS1 or Loss of GPS 2	
Loss of satellites in view/details:	
Lateral indicated performance level change	From: To:
Vertical indicated performance level change	From: To:
Indicated Dilution of Precision changed	From: To:
information on PRN of affected satellites (if applicable)	
Low Signal-to-Noise (Density) ratio:	
Degraded PBN capability	
Switching to an alternate navigation mode (such as IRS updating or DME/DME)	
Any other observed impact:	
Automatic GNSS Systems Recovery (y/n)	
Other	
Any other relevant details:	

Note: *All available details should be provided. Separate sheet may be attached for additional information/pictures, etc, if any.*

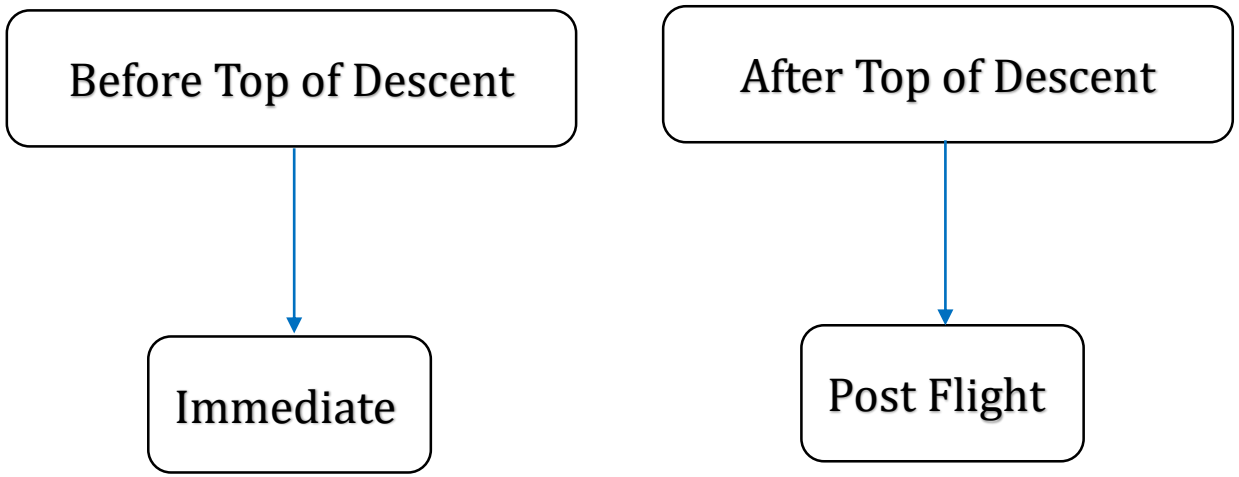
SOP FOR REAL TIME REPORTING

- SPIKE IN GNSS RFI reports in NOVEMBER 2025.
- DGCA issued SOP for REAL TIME REPORTING (within 10 minutes of occurrence) in Delhi FIR.
- Prompt Reporting to aid in effective investigation, analysis and mitigation.



REAL TIME REPORTING – METHODOLOGY

- Relaying information within 10 minutes challenging.

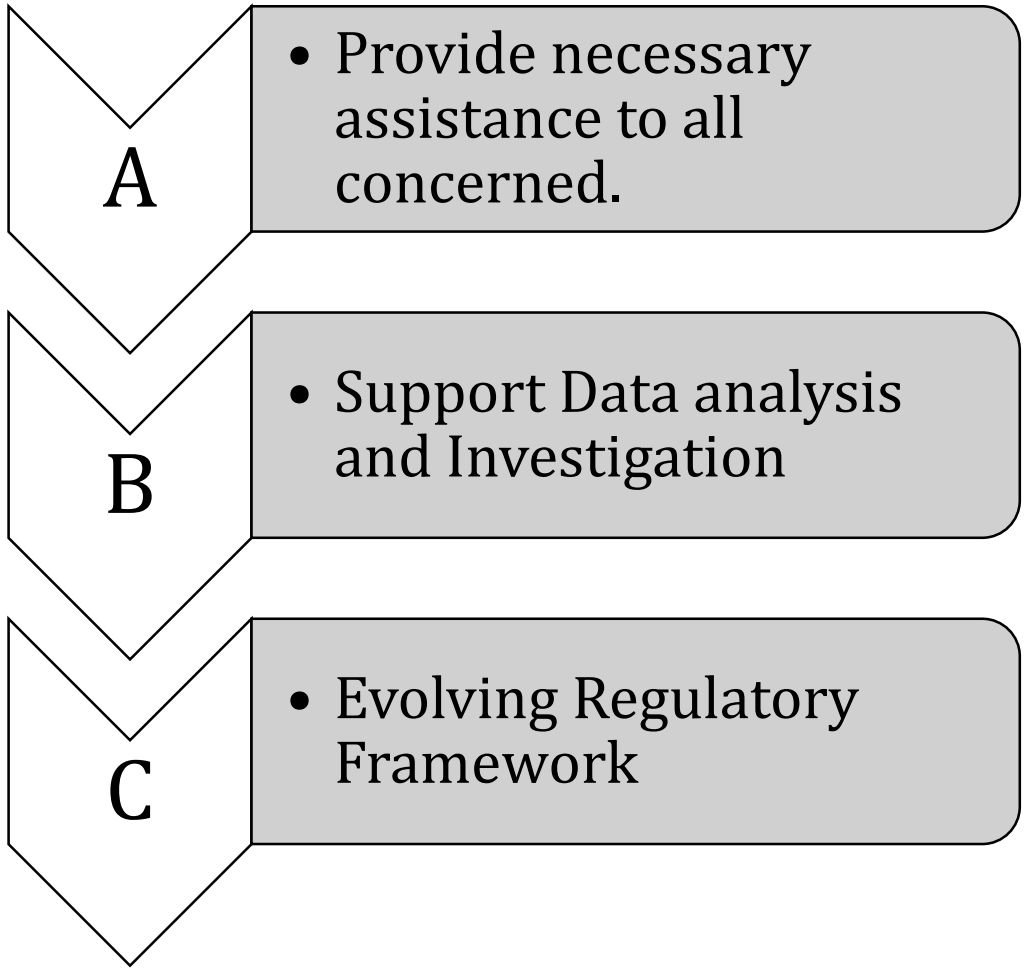


Mandatory Information for Real Time Reporting

- Date/Time of Occurrence
- Aircraft Type and Registration
- Operator/Airline Name
- Flight sector/Route
- Coordinates (Lat-Long)
- Type of Interference
- Aircraft Equipment affected
- Any other operational impact.

May include additional information.

NEXT STEPS



- India is part of ICAO APAC GNSS and Data Link Disruption Ad-hoc Group
- Disruption Data sharing for hotspot picture
- Development of APAC Guidance material for GNSS Interference.

Thank You.