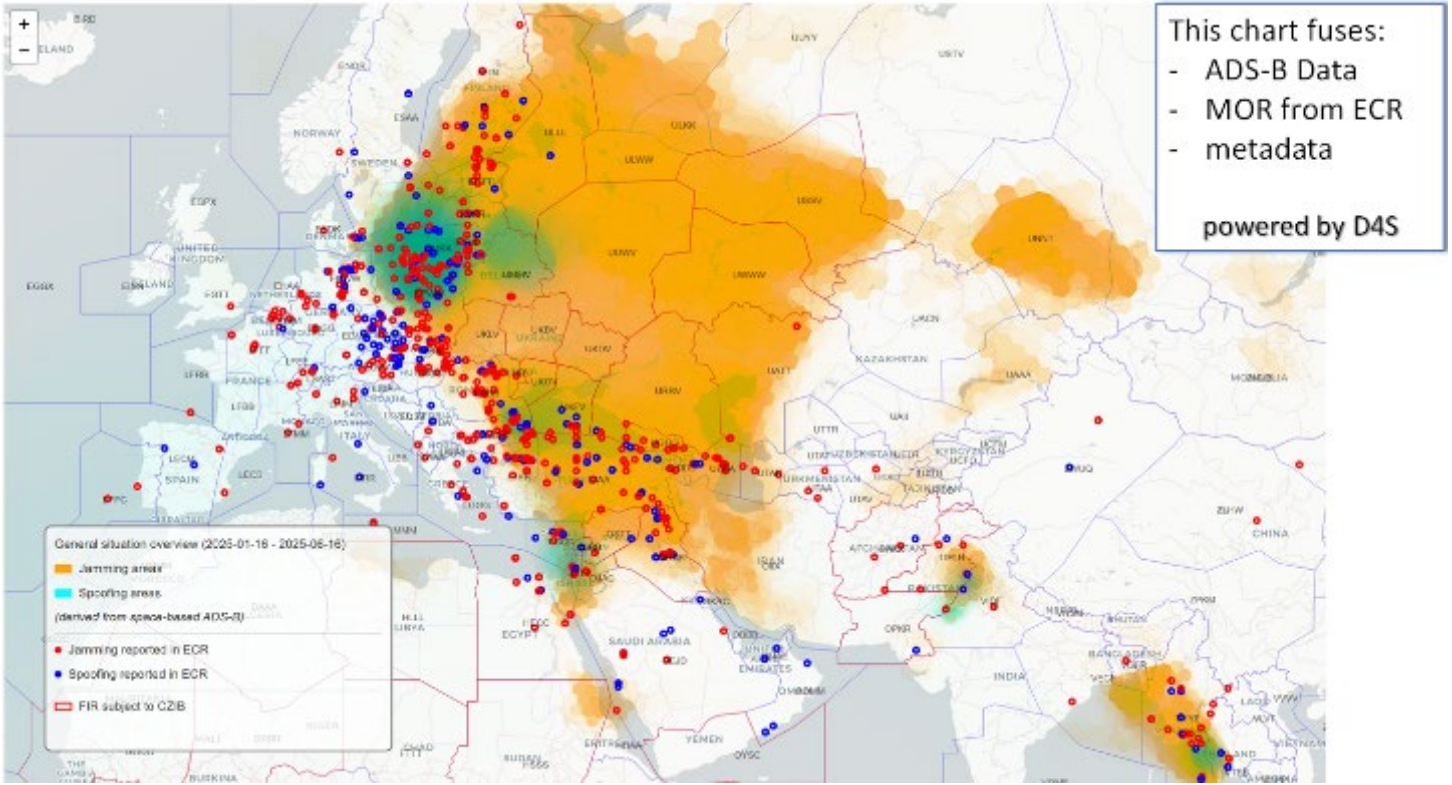
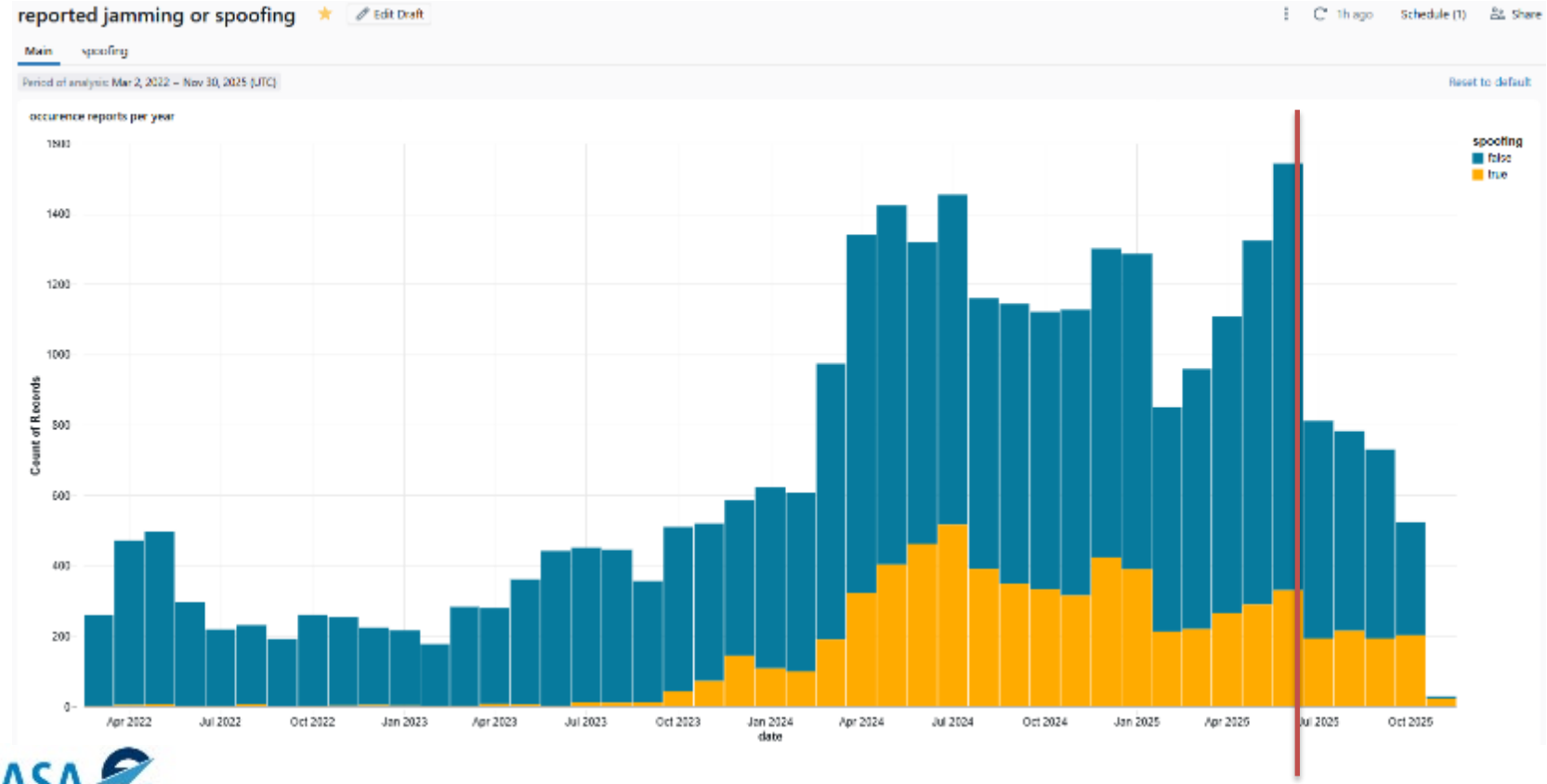
Agenda

1. Setting the Scene
2. EASA – Eurocontrol Joint Action Plan
3. 3 cases of GNSS RFI mitigation measures:
   a. Flight simulation training devices (FSTDs) feature simulating GNSS RFI
   b. Phraseology related to GNSS RFI events
   c. ATS procedures and working methods
4. Monitoring Use Cases
5. Takeaways and next steps

How 2025 started



evolution of RFI reports

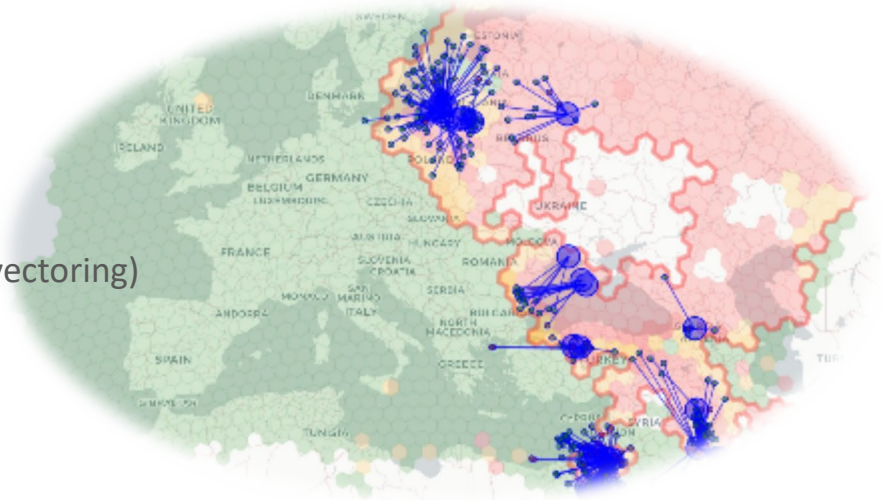


Joint EASA – Eurocontrol Action Plan

Context: who is working on GNSS RFI

- EUROCONTROL and EASA Joint Action Plan
  - Under preparation (mature draft)
  - For endorsement through joint consultation with stakeholders
- EC DG DEFIS Action Plan (GNSS-focus)
- EUROCAE GNSS Resilience Workshop Series
  - Brings together ALL active WG's which have a link to GNSS
  - It is likely that there be similar activity by RTCA
- ICAO iPack, Regional Workshops and Global Events (42nd Assembly)

Context: why?



- GNSS Importance & RFI Risks
  - Vital for CNS + timing in aviation
  - RFI disrupts services, compromises safety

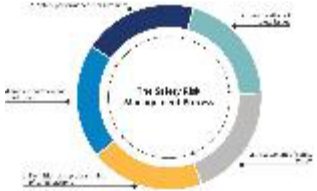
  (e.g., uncoordinated climbs, deviations, increased radar vectoring)
  - expected to persist despite ITU/ICAO efforts
- Response Needed
  - Short-term operational measures
  - Medium/long-term technical solutions
    - not feasible for all aircraft types quickly
- EU Ministerial Call (June 6, 2025):
  - Ministers from 13 countries urge EU actions across domains (space, aviation, maritime, telecom) to coordinate efforts
  - EASA/EUROCONTROL Initiative:
    - First action plan for civil aviation;
    - engages stakeholders, manufacturers, authorities;
    - defines roles, actions, timelines for mitigations.

Scope and Objectives

- → **Civil aviation** (includes enhanced civil-military cooperation)
- → Objective
  - → Maintain operational safety
  - → minimize airspace capacity degradation
- → Timeframes
  - → Short-term (0-3 years) : containment, urgent issues, mostly operational
  - → Medium (3-5 years): address the actions needing more development and coordination
  - → Long-term (5+ years): strategic solutions dependent on technology maturity and regulatory updates
- → Synchronization
  - → Aligned with **European CNS Evolution Plan**
  - → Aligned with DG-DEFIS/EUSPA roadmap

Source of the action plans

NM-EACCC
Workshops with affected States



BIS 35 (GNSS) and BIS 44 (PBN)

Workshops

Workshops, ANC, Assembly

WGs & Standards

EASA-ECT action plan vs EASA SRM

Rationalise current infrastructure (VOR/DME/TACAN...) in a way allowing optimum RNAV and RNP coverage and conventional backup and ensure flight crews are aware of such provided infrastructure Mid and long term: European rationalisation	Implementation Support	ECTL (States) ECTL- NM	States, ANSPs	2026	BIS report NPA/Opinion GNS-EP 2026	BIS-44 (RMT-0761) BIS-35
Provide availability of FSTD features simulating GNSS RFI conditions and consequent aircraft failures/abnormal behaviours in all phases of flight.	Research Safety Promotion	EASA/ECTL		2028	BIS report	BIS 35
Be prepared for more advanced and targeted spoofing (finalise unsafe condition criteria and action plan) New proposed: Take protective measure for	Safety Promotion	EASA	Aircraft manufactures	2028	BIS report	BIS 35 Existing Spoofing Studies by EASA, EUROCONTROL and FAA)

- Actions linked to EU SRM are identified
- will be addressed within the related BIS activities
- ECTL member of the BIS-44, RMT .0761 and BIS 35 teams

Establish a coordinated response that aligns all members to minimize the risk and impact of jamming and spoofing scenarios on the network	Operational	ECTL	NM, ANSPs, Aircraft operators, States, Airports		Guidance	EACCC
Develop National GNSS contingency and operations plans and ATM/ATFCM procedures for safe management of GNSS interference situations	Operational	ECTL	ANSPs, CAAs	2027	Guidance	(RMT 0761)
Update the standard phraseology related to GNSS interference events (spoofing and jamming) to allow	Regulatory	ICAO Supported by EASA-ECTL	Aircraft operators, ANSPs	2026 2028	BIS report	BIS-35

Context - EU Safety Risk Management Process

Impact assessment of the proposed recommendations

[European Plan for Aviation Safety (EPAS)]

[Safety Risk Management | EASA]

How will it work?

- JCSP task force
  - So far 25 volunteers (ANSP, OEM, CAAs, Operators)
- Lifetime up to 2030
- Drafting of the action plan (mostly done, but rolling development foreseen),
  - consultation and coordination with relevant stakeholders to ensure interoperability, prioritization and endorsement of the actions,
    - ICAO
    - EC DG MOVE, DG DEFIS & EUSPA
    - EUROCAE
    - etc.
- Management of plan's implementation
  - Identified BIS actions under EASA SRM process
  - Other actions will depend on the expected deliverable
- Promotion of the plan to other interested organisations
- Reporting on the progress, on a yearly basis, and any issues associated with plan's implementation

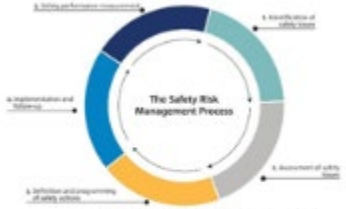
3 practical cases

Short term actions

Flight simulation training devices (FSTDs) features simulating GNSS RFI

Phraseology related to GNSS RFI events

ATS procedures and working methods



BIS 35 (GNSS) and BIS 44 (PBN)

What are the issues?

Outcome of the Safety Issue (SI-0034) - EPAS Vol. III:

- → The available simulated system failures are not capable to replicate all the effects of GNSS RFI on the aircraft systems:
  - → false indications (i.e. maps, terrain…), spurious alerts (TCAS, TAWS)
- → No standard phraseology to communicate jamming or spoofing related issues, such as "both GPS failed", or "emergency climb"
  - → does not facilitate the cooperation between flight crew and for ATC to communicate that airspace is under RFI (jamming and/or spoofing).
- → Large diversity in procedures used by air operators to cope with GNSS spoofing events - reactions on TAWS PU.

Case 1: FSTD

- EURCONTROL to launch a study (Call for Tender) to investigate:
  - Technical possibilities for simulator modifications
  - Realistically simulate jamming / spoofing scenarios
  - Observe effects on aircraft systems
  - Observe flight crew reactions
  - Propose flight crew training requirements
- In close cooperation with EASA

Case 1: FSTD

- Possible scenarios to develop:
  - Jammed GNSS signal
  - Spoofed GNSS signal causing a sudden jump in the lateral/vertical position or time
  - Spoofed GNSS signal causing a slowly drifting lateral/vertical position or time
  - EGPWS alert at an unusual altitude (e.g. 4000ft above ground)
  - EGPWS alert in a low energy state

Case 2: Phraseology

Degradation of NAV Perfomance	• UNABLE RNP (or RNAV) DUE TO (reason e.g. LOSS of RAIM, RAIM ALERT , JAMMING, SPOOFING or GNSS INTERFERENCE) • UNABLE SID/STAR/IAP DUE TO (reason, e.g. EQUIPMENT, JAMMING, SPOOFING, GNSS INTERFERENCE) (request alternative clearance or navigation assistance)
Observation of unavailability of GNSS service	• BASIC GNSS [or GBAS, or SBAS] UNAVAILABLE DUE TO (reason, e.g. LOSS OF RAIM, RAIM ALERT, SPOOFING, JAMMING, or GNSS INTERFERENCE)
Time shift, CPDLC issues	• Request Time Check, Reply NOW (e.g. 11:35:40 NOW)
TERRAIN PULL-UP warning	•PULLING-UP, PASSING (*level*) •GOING-AROUND DUE TO PULL-UP ALERT •ATTENTION ALL AIRCRAFT IN VICINITY OF (*significant point or location*), TERRAIN ALERT CLIMB IN PROGRESS FROM (*level*) or PASSING (*level*) (*followed as necessary by specific instructions, clearances, traffic information, etc*)

ICAO doc Doc 4444 update

Case 3: procedures

→ Collection of existing procedure is on-going

→ Next step:

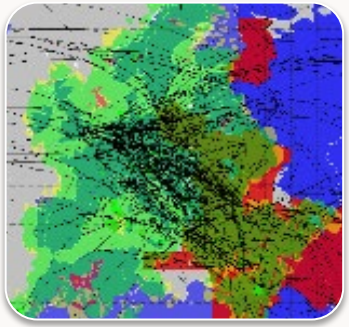
- → Identification of potential harmonisation action
- → Impact assessment
- → Best Intervention Strategy

How monitoring can Help

Monitoring Use Cases

Advisory map on pilot EFB

- Pilots can deselect GPS prior to entering degraded GNSS environment to protect CNS system performance
- And reactivate GPS and associated systems once outside known zone of RFI
- Ongoing discussion: Disable Enhanced GPWS function ONLY if there is **spoofing**



ATC Sector Tactical Workload Management

- Identification of GNSS RFI impacted areas and associated flights
- Capabilities of those flights in line with the flight plan equipage information
- Availability of alternate navigation (and surveillance) capabilities

How many aircraft, need further ATC assistance.

- IF Number of NOT OK Aircraft Exceeds Acceptable Threshold ➔ Reduce Sector Capacity

Monitoring Use Cases

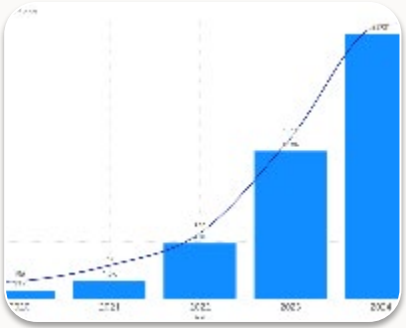
Clearance Compliance Monitoring

- Identification of spoofed flights
- Detect deviations from clearances
- maintain separation

CNS/ATM Strategic Management

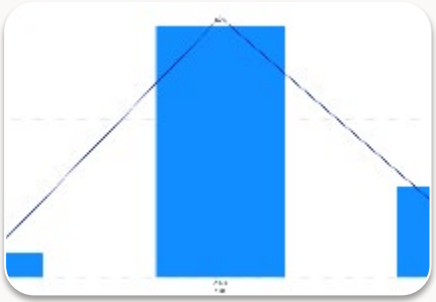
Improvement of CNS infrastructure (e.g. DME, SSR) to limit impact

Monitoring Use Cases



Safety monitoring

- Evolution of reports
- Assess effectiveness of safety barriers
- Inference engine



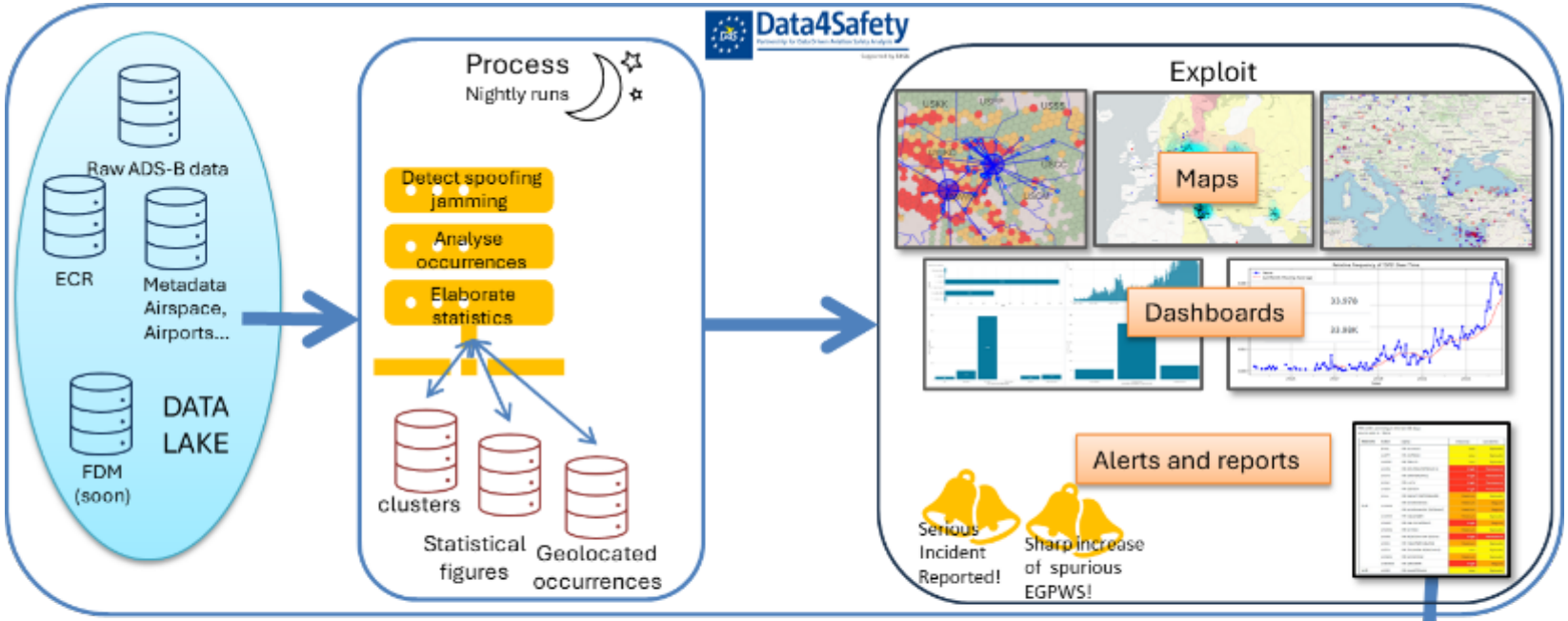
Example

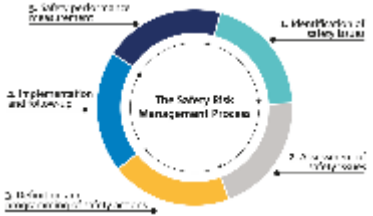
Evolution of spurious TAWS events during spoofing

Effectiveness of procedure?

Reporting fatigue?

Example: Data 4 Safety





Takeaways

- → EASA and ECTL are working on a common action plan
  - → positive impact already reported by stakeholders
- → Monitoring helps is many ways
  - → Operational
  - → Safety monitoring
- → Continue assessing recommendation, including from this workshop
- → Contribute to work at global level (ICAO) further

EASA
European Union Aviation Safety Agency

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