



SUPPORTING
EUROPEAN
AVIATION

Mitigating GNSS Radio Frequency Interference (RFI)

EUROCONTROL Network Manager
User Forum 2025

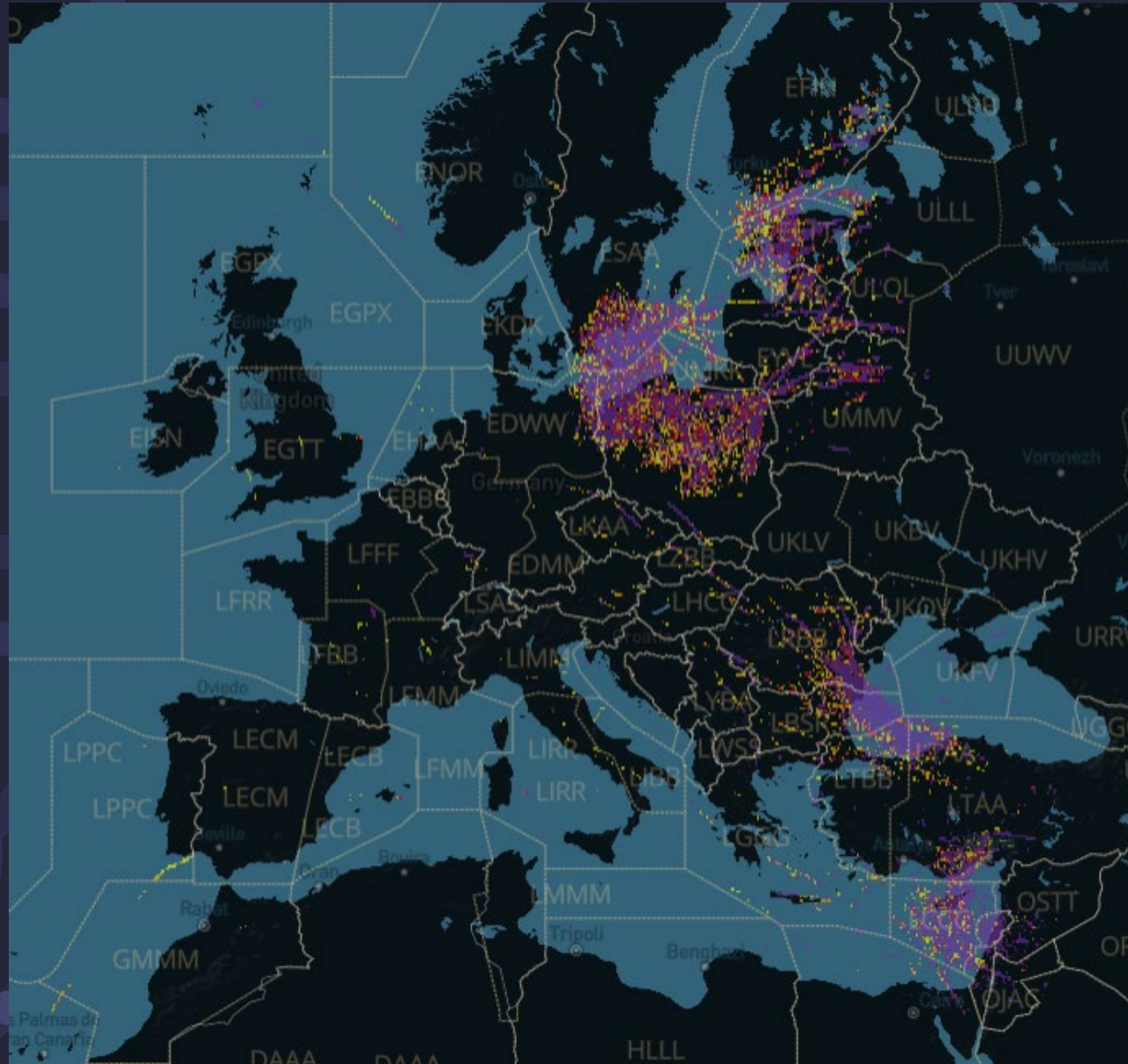
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Threat to Aviation Safety

- Impact on all CNS elements: PBN, ADS-B, CPDLC
 - Plus large variety of cascading effects
 - Difficult to predict actual operational impact
- Most severe threat: Uncoordinated high-rate climb due to **false** Enhanced Ground Proximity Warnings (EGPWS / TAWS)
- Fundamentally undermines today's cockpit safety principles:
 - Trust your instruments
 - Follow Standard Operating Procedure (SOP)
- ATC Perspective: *“Anytime GNSS RFI results in an aircraft not operating in accordance with its clearance, the risk to the operation increases!”*

EUROCONTROL GNSS RFI Monitoring Tool



ADS-B Low PIC Map, Week 8, 2024

Using dedicated 1090 MHz monitoring network, with % affected flights per FIR, part of SHERLOCK Platform

2018 – 2022: GNSS RFI becoming part of daily OPS in some regions, no longer just a “contingency” – it is “normal” operation.

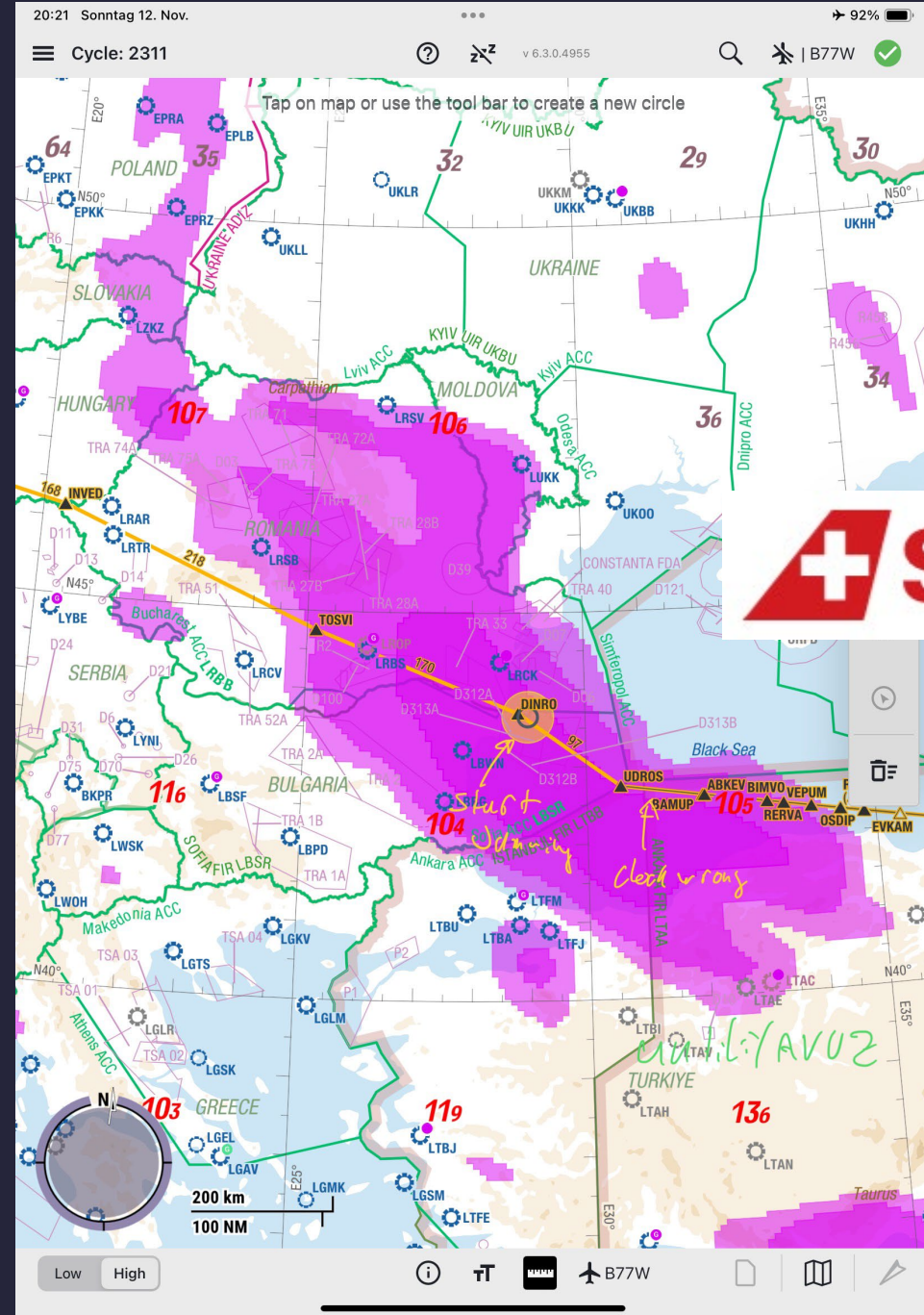
2023 – 2024: Escalation to collateral spoofing, impact can get significant including no recovery of GPS until arrival destination. Some diversions!

Working on CONOPS with most affected States to develop near real time monitoring capability to enable operational decision making to help ensure continued safety

Request from Pilots: Give me the “GPS Weather” on my EFB!

- **GNSS RFI Layer in Lido mPilot**

- Conducted Operational Pilot Trials with Lufthansa Systems
- Lufthansa Group starting operational introduction using NM B2B Interface
- Allows deselection of GPS (if possible) prior to entering GPS-degraded environment to limit impact and reactivation of GPS once outside
- Helpful, but note that aircraft capabilities remain degraded



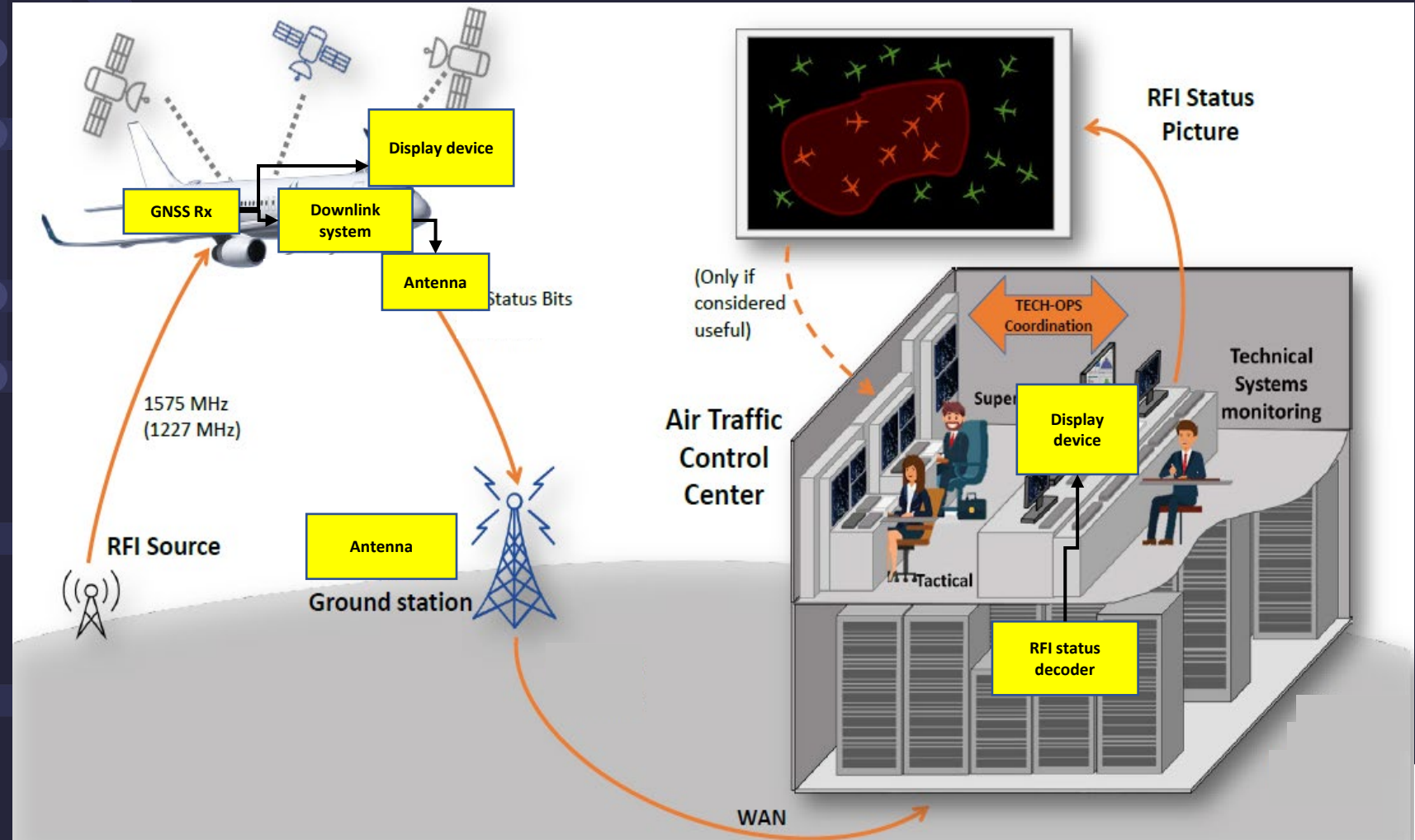
ATC Support Function for GNSS RFI Mitigation

(ADS-B low PIC today, working on standardised capability in future!)

Steps

1. GNSS Receiver **detects RFI** and **reports** it to the ground
2. Ground stations **process RFI status** and allow generating an integrated RFI status picture for multiple aircraft
3. TECH services coordinate with OPS on impacted areas and launch **operational mitigation measures**
4. Report to the **radio regulator**

ATC Impact depends on number of affected aircraft, and available alternate CNS capabilities (terrestrial NAV, SSR, Voice COM)



GNSS RFI Fundamentally Undermines GNSS-enabled Operational Benefits

Short Term Mitigation

- Create Awareness: Regional Workshops, Training and at Policy Meetings
 - ICAO Assembly Resolution 41-8C
 - ITU WRC Resolution 676
- Cooperation with EASA, EC, Radio Regulators
- CIVMIL Coordination
- Cooperation with Operators, OEM, ATC Centers
- Development of Guidance Material
- CNS PM MON work

Long Term Mitigation

- Reduce dependence on GNSS-only enabled capabilities: ICAO PBN Manual, etc
- Improved next generation GNSS Receiver and Antennas (Dual Frequency, Multi-Constellation) including Galileo
- Improved complementary terrestrial navigation capabilities (DME support for RNP)
- Improved ATC ground technical systems
- European CNS Evolution Plan work



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Thank you!

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