

# **GNSS Interference**

## **Towards more resilient system architectures**

**Mark Vincent**

Head Of Safety Risk &  
Quality Assurance



## Impact on Aviation Safety – Well Know

**1** **Dramatic increase** in Jamming and Spoofing levels`

**2** **The high dependency on GPS** –  
Leading to the impact on navigation,  
communication, and surveillance systems

**3** **Lack** of technical information

**4** **Risk of complacency** – due to the  
commonplace encounters of GPS spoofing  
impacts (normalization)

# What can be done?

## In the Short Term

Strengthening the mitigation strategy

Procedures

Training





## In the Short Term

### Strengthening the mitigation strategy

#### Procedures

#### Flight planning procedures to stay vigilant on

- NOTAMS related to known or expected GNSS RFI.
- The availability of non-GNSS-based routes, procedures, and approaches (ILS, VOR, and DME).
- Limitations caused by inoperative radio navigation systems or other MEL items to operate in GNSS RFI-affected areas.

#### FLT OPS - Standard operating procedures to provide pilots with supplemental procedures on

- GPS outage cockpit effects and typical indications of jamming/spoofing
- Keeping the aircraft status scan quality in a high number of ECAM/EICAS warnings situations.
- Handling Nuisance alerts in critical flight phases (Especially EGPWS ECAM alerts)
- Unplanned entry into Danger Areas, Restricted Airspace, and other FIRs
- Dealing with escape routes in case of RNP capability unavailability
- Unavailability of Runway protection systems

## In the Short Term

Strengthening the mitigation strategy

### Training

#### Dispatcher recurrent training

- Consider including considerations GNSS Interference technical understanding and safety concerns

#### Flight crew Training

- Consider using simulator training sessions to explore RFI-related CRM and crew mitigation

## Current Operational landscape

& Mid Term strategy

- ✖ **Winter increases operating risk** - poor weather, icing, and IMC conditions
- ✖ **Operation of Degraded aircraft**
- ✖ **Geopolitical conflicts** leading to a Potential for worsening of the situation



## In the Mid Term

Current Operational landscape

- ✧ Develop an easily accessible **Jamming/Spoofing Location Map** that informs the dispatcher and flight crew of GPS outage location
- ✧ Integrate a **periodic evaluation of the exposure to threats** identified in the GNSS RFI risk model into risk management activities
- ✧ Do not let **Spoofing/Jamming** to become “normal” – Encourage Flight crews to continue reporting





## In the Long Term

There are no easy solutions

## Increasing resilience of onboard equipment /systems

- ✖ Spoofers mitigation using enhanced GNSS receiver signal processing
- ✖ Multi-Frequency Multi-Constellation (MCMF) GNSS Receivers to use other GNSS frequency bands and other constellations
- ✖ Controlled Reception Pattern Antennas CRPA





Thank you

