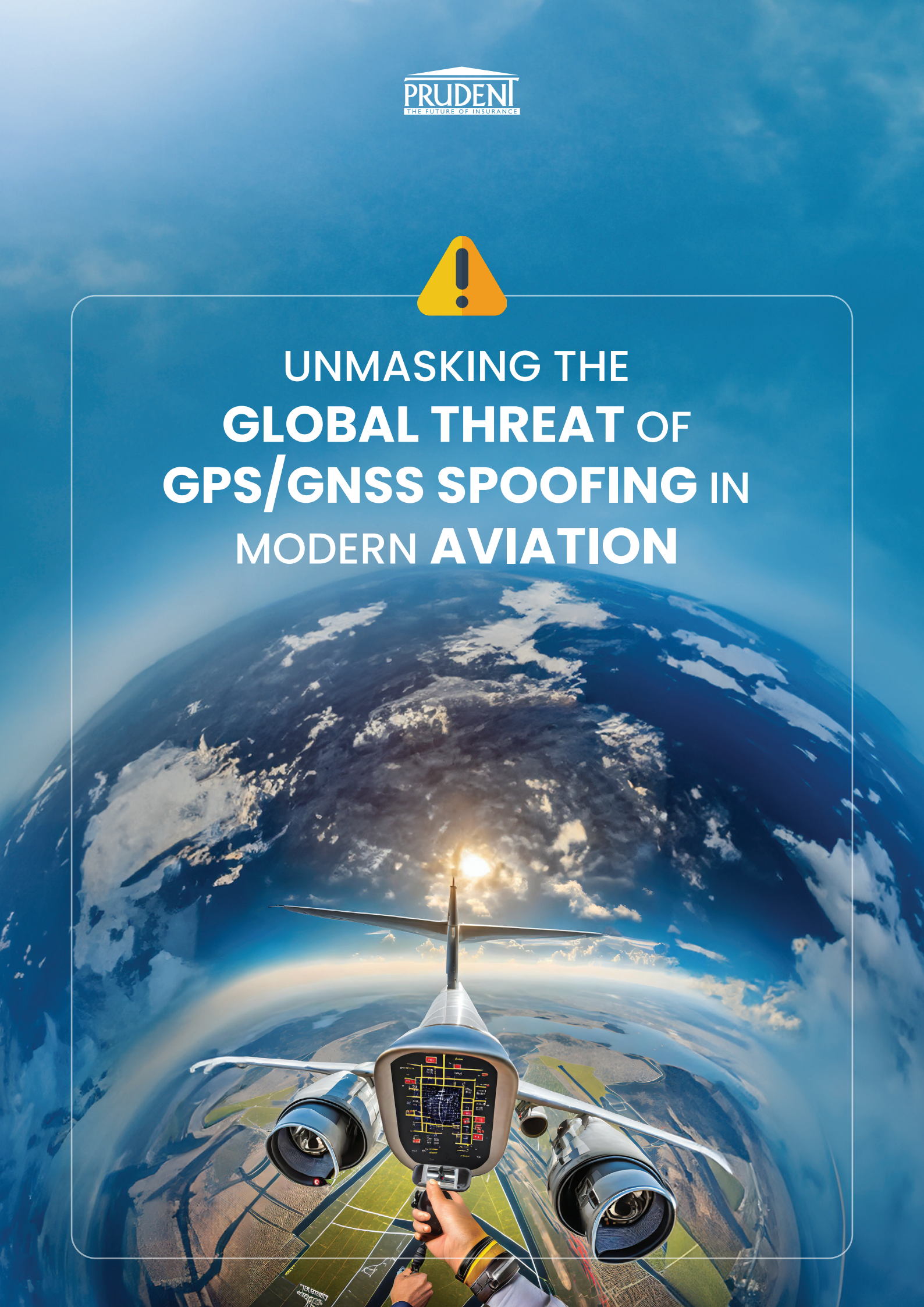




# UNMASKING THE GLOBAL THREAT OF GPS/GNSS SPOOFING IN MODERN AVIATION





In an era of aviation advancement, a hidden peril emerges—**Global Positioning System (GPS)/Global Navigation Satellite System (GNSS) spoofing**. This whitepaper illuminates the intricacies of spoofing, shedding light on its operational mechanics, the aviation vulnerabilities it exploits, real-world incidents in 2023, and the imperative need for comprehensive insurance coverage.



## Understanding GPS Spoofing

### How GPS Works?

The functioning of GPS relies on satellites orbiting the Earth, transmitting signals that GPS-enabled devices utilise for triangulation and location determination.

### Operation of GPS/GNSS Attack

Once a costly method primarily used in warfare, GPS spoofing has become accessible to common hackers.

A portable radio signal transmitter, paired with open-source software, is now attainable for \$300, while a more potent variant can be acquired for only \$3000. This shift underscores the increased accessibility and affordability of technology driving GPS/GNSS attacks in contemporary times.

## Destructive Uses of Spoofing

- **Warfare implications:** Spoofing has evolved from a warfare tactic to a tool accessible that can easily fabricate the locations of ships, aeroplanes, and vehicles, leading to confusion and misdirection.
- **Navigation disruption:** By feeding incorrect GPS/GNSS inputs to aircraft's GPS systems, hackers can set aircraft off course, causing reliance on insecure communication lines.

## Vulnerabilities in Aviation Systems

Reports on GPS spoofing incidents raise concerns due to:

- The sophistication of the methodology
- Unexpected infiltration of Inertial Reference Systems (IRS) with erroneous data
- Flight Management Systems (FMS) and IRS have only been designed to cope with a loss of GPS signal, not an intentional spoofed signal

## Spoofing Incidents in 2023

Sophisticated aircrafts, including Gulfstreams, Boeing series, Bombardier Global Express, Embraer, and Dassault Falcon 8X, have experienced over **52** spoofing incidents in the Middle East and North Africa region this year.

### Why these zones?

The danger lies in the potential misuse of technology in war zones, causing military weapons to become threats to their personnel and equipment.

Multiple war zones across MENA and African regions, yet to be declared 'No Fly Zones', could exploit GPS jamming and spoofing to misguide civil aircraft into hostile airspace.

### EASA Identified Areas

The European Union Aviation Safety Agency (EASA) identified intensified GNSS jamming and spoofing since February 24, 2022, in:



Kaliningrad  
region



Eastern  
Finland



The Black  
Sea



The Eastern Mediterranean area near Cyprus, Turkey, Lebanon, Syria, and Israel, as well as Northern Iraq

## Impact of GPS/GNSS Spoofing on Insurance Considerations

Navigating the insurance coverage in the context of GPS/GNSS spoofing presents a multifaceted challenge. The potential repercussions span from pilot neglect to the ominous spectre of state-sponsored acts of war or terrorism.

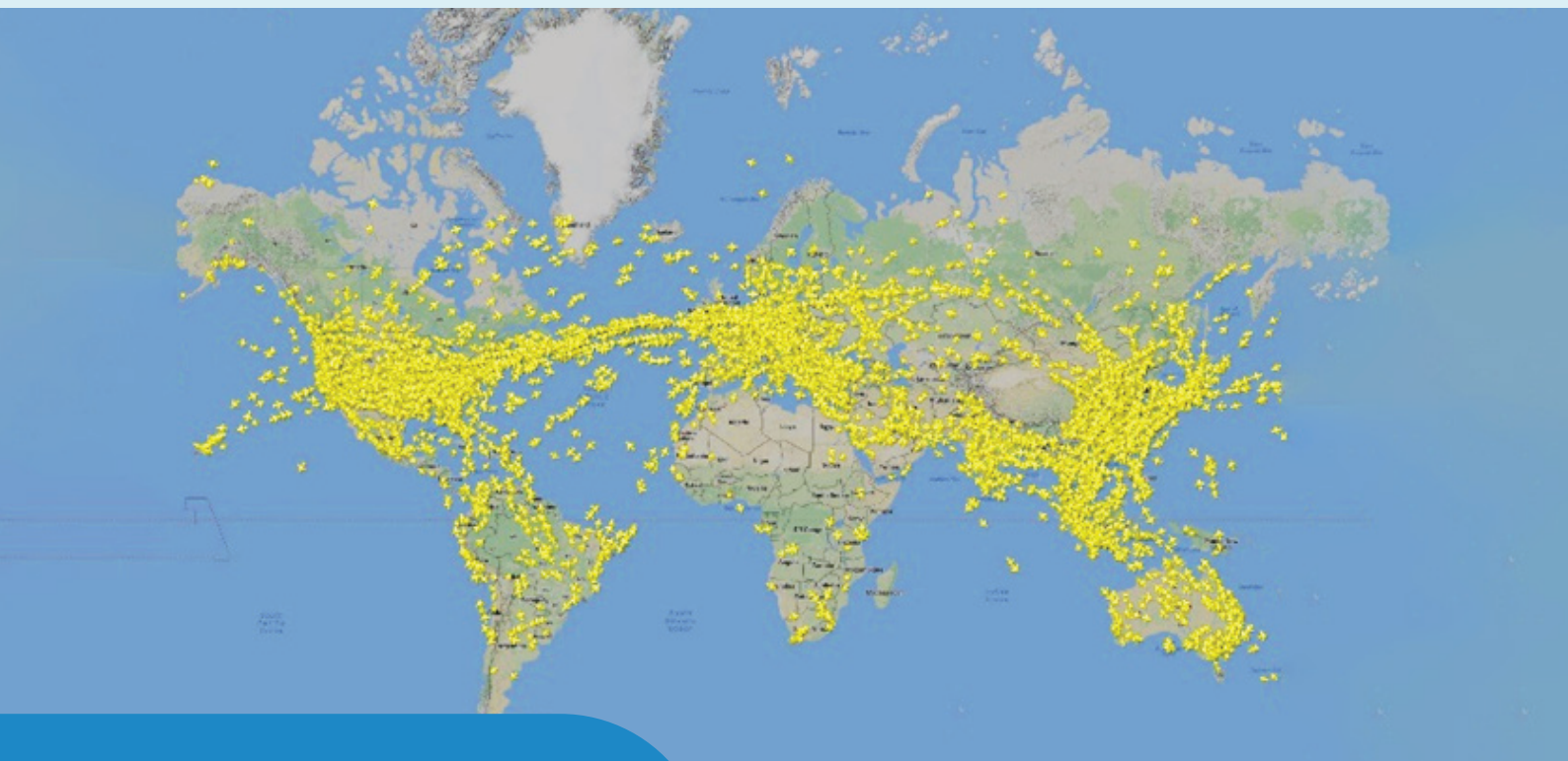
### All Risk or War Risks Consideration

The incident's categorisation under 'All Risk' hinges on the assessment of pilot neglect, while the 'War Risks' classification comes into play when viewed as a state-sponsored act of war or terrorism.

This duality poses a critical question: *Can our current insurance frameworks adequately respond to the sheer scale of such events?*

## Escalation Scenarios

The magnitude of this threat introduces scenarios where multiple events of similar scale unfold over busy air corridors. The reliance on conventional backup systems, such as seeking assistance from Air Traffic Controllers (ATCs), could prove insufficient, especially over airspaces with substantial air traffic, such as Europe or the Middle East.



\*Source – Flight Radar24

## Systemic Vulnerabilities

Current aviation systems, surprisingly and alarmingly, have been primarily designed to address the absence of GPS navigation rather than intentionally spoofed GPS signals. This systemic vulnerability necessitates a re-evaluation of our preparedness to handle the nuanced challenges posed by GPS/GNSS spoofing.

## Global Advisory Landscape

While regulatory bodies globally have issued advisories for airlines and aircraft operating over identified spoofing-prone zones, the pervasive danger lies in the unpredictable emergence of such zones worldwide. Pilots and crew navigating these uncharted territories may encounter difficulties in identifying and addressing spoofing incidents, potentially leading to catastrophic consequences.



## Charting a Secure Course

As GPS spoofing infiltrates aviation, a collective approach is imperative. Regulators, insurers, and aviation professionals must fortify systems, enhance insurance frameworks, and foster global collaboration. This whitepaper serves as a call to action to secure our skies in the face of this evolving threat and its potential impact on the safety and security of air travel.



### Reference links:

- [GPS Spoofing Update: Map, Scenarios And Guidance](#)
- [ASRG/5 meeting](#)

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