

GNSS Interference study using de-identified flight data

Edward Jumi

Dragos Munteanu

Introduction

- GNSS interference has been a reality for the past 10 years
- Reports received from airlines by IATA, Eurocontrol, EASA etc.
- Various types of disruption – EGPWS/TAWS, PBN, ADS-B etc.
- IATA, IFALPA, IFATCA paper – ICAO 40th Assembly
- ICAO State letter in 2020 to States
- ITU attention
- All IATA Regions working to address the problem



FDX Analysis

GPS Signal Loss

Aug 2021 - Jun 2022



Foreword and Disclaimer

International Air Transport Association (IATA)
Global Aviation Data Management (GADM) Data Sharing Programs
Flight Data Exchange (FDX)

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- The collection of flight data on a global level requires a broader categorisation and definition of event limits and Key Performance Variables.
- Concerning sector counts, FDX makes no guarantee that all flights have been submitted by an airline and that all flights submitted have been processed, which may further result in rate variations.

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Report Background

GNSS is a key technology of the Communications, Navigation, and Surveillance (CNS) infrastructure. GNSS can support navigation applications in all phases of flight as well as surveillance application like ADS-B. GNSS is also used in safety nets like the GPWS (Ground Proximity Warning Systems) and provides the time reference that is used to synchronise systems and operations in ATM.

GNSS/GPS vulnerability, including intentional and unintentional signal interference, has been identified as a major safety issue as GNSS is embedded into numerous critical infrastructures. Especially the intentional interference presents significant threat to aircraft and passengers.

Therefore, such interference needs to be monitored and its operational risk needs to be assessed. To monitor the potential GNSS/GPS interference risk, IATA FDX program introduced new event of GPS outage from August 2021.

Report Criteria

FDX program data from August 2021 to June 2022.

The report includes the following FDX Events used in the FDX program:

- GPS Signal Loss, recorded GPS non operational for more than 60 seconds in flight data.

Last report Update (UTC) was on Sep 01, 2022 05:22:55 PM

Other questions?

Contact the FDX team at fdx@iata.org if you have any other questions about the report or the program.

Report Definitions and Notes

Flight Period: Aug 2021 - Jun 2022 Region of Occurrence: Global

FDX Events Definitions

The FDX Events Definitions used to build the FDX Safety Performance Indicators (SPIs) are [listed here](#).

FDX Rule of 3

IATA employs the general “rule-of-three” philosophy for de-identification. As such, to provide analysis on any parameter (Region, Aircraft category, Airport, etc.) there must be at least three participants’ information represented. For example, at least three participants must be contributing data from each country/region before that country/region is identified in an analysis.

There have to be 3 or more operators flying into an airport and more than 100 landings in TOTAL in the analysis (NOT on a per month basis) for an airport to be included

FDX Regional and Global Rates

The Regional rates for this report are calculated based on the region of occurrence (as per IATA SFO region definition). The region of occurrence is derived from the Takeoff and Landing airports. The Regional rates also exclude the events that occurred in the studied airport.

The Global rates are calculated for global FDX events, excluding the events that occurred in the studied airport.

The Regional and Global rates are calculated as: $\text{spi_count} / \text{number_of_flights} * 1000$. Where multiple events are collated into a single SPI (Safety Performance Indicator), and a flight with multiple events of the same SPI will be counted as one when computing the SPI rate.

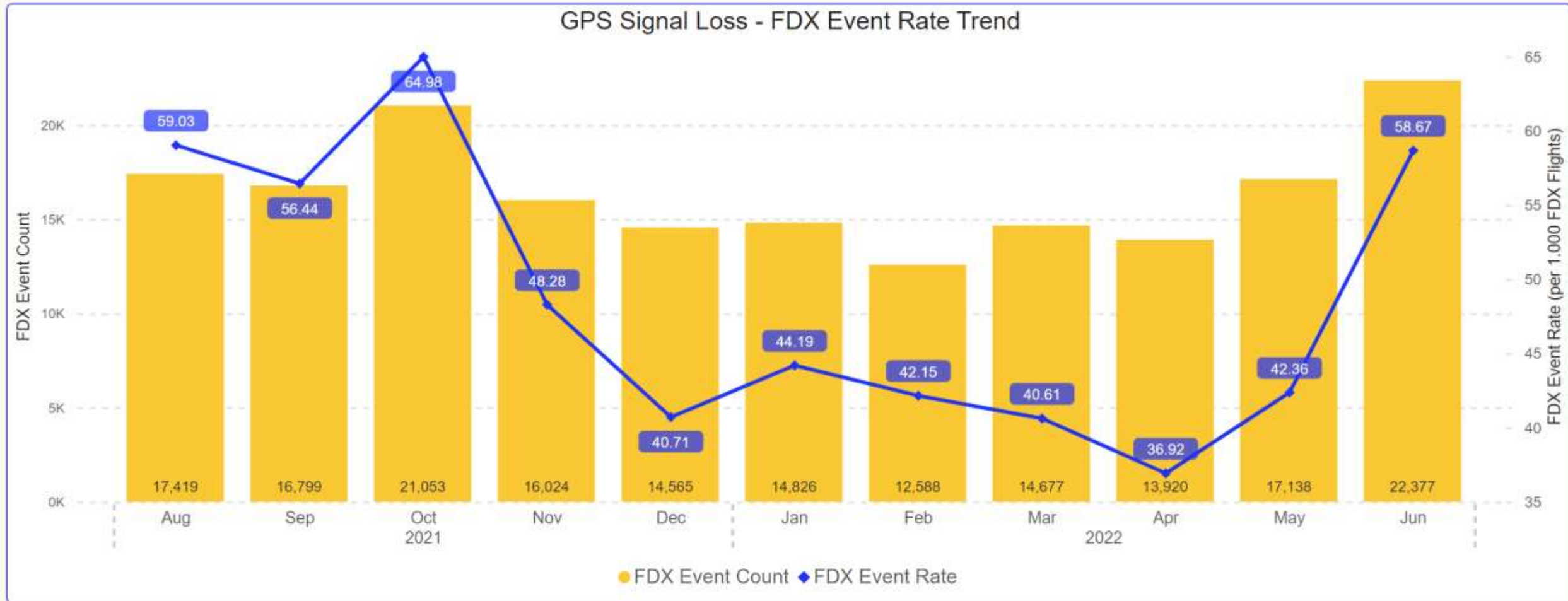
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Flight Data SPIs: GPS Signal Loss

Flight Period: Aug 2021 - Jun 2022 Region of Occurrence: Global

The first visual presents the monthly rate trends for the FDX GPS Signal Loss event and the FDX GPS Signal Loss event count.



Flight Data SPIs: GPS Signal Loss

Flight Period: Aug 2021 - Jun 2022 Region of Occurrence: Global

The 2 visuals present the FDX rates for of GPS Signal Loss per Departure-Arrival Region Combinations and the scatter chart with the rate per each Departure-Arrival Region.

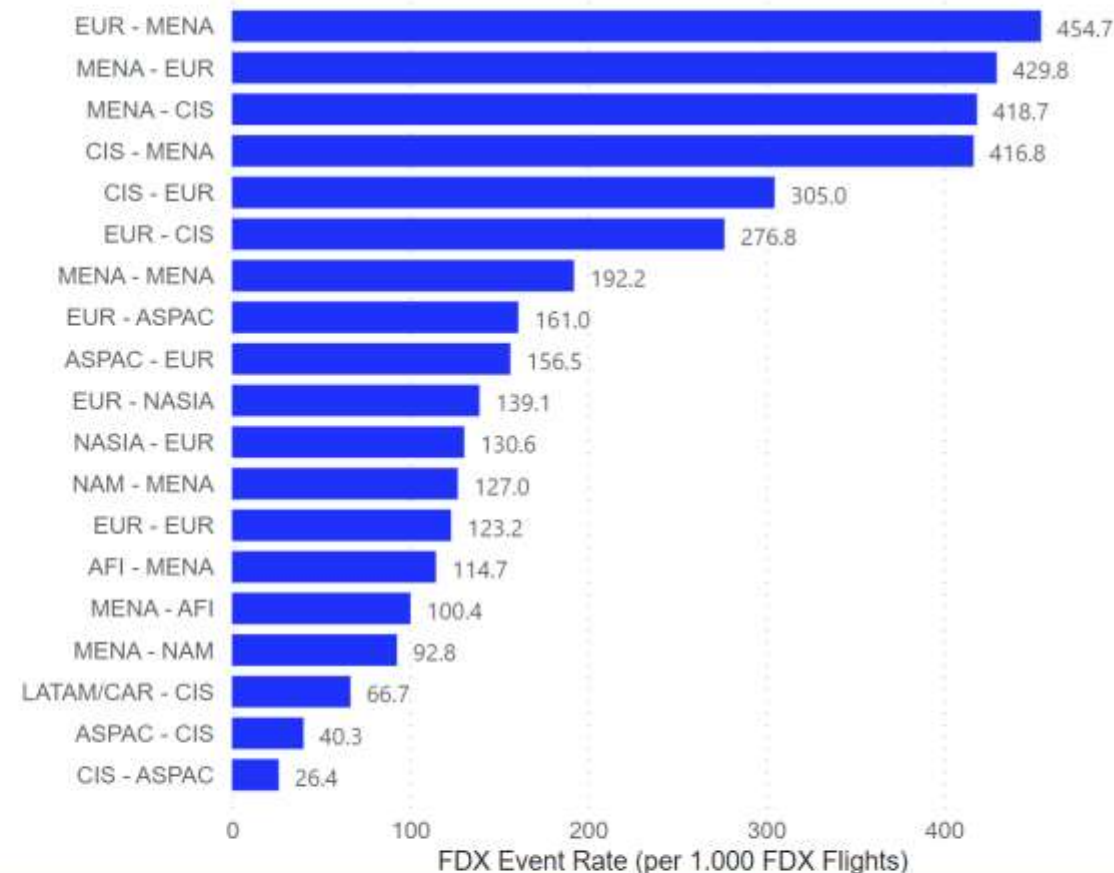
FDX Event Rate Per Departure-Arrival Region Combination

	AFI	ASPAC	CIS	EUR	LATAM/CAR	MENA	NAM	NASIA
AFI	1.5			3.7		114.7		
ASPAC	1.9	0.4	40.3	156.5		6.0	0.2	0.4
CIS		26.4	1.2	305.0		416.8		21.5
EUR	0.7	161.0	276.8	123.2	0.6	454.7	1.2	139.1
LATAM/CAR			66.7	1.7	8.9		6.4	
MENA	100.4	4.5	418.7	429.8		192.2	92.8	2.9
NAM		3.8		0.5	19.0	127.0	0.1	7.0
NASIA		0.2	8.6	130.6			1.2	0.1

The visual below presents the % of GPS Signal Loss events per flight segment.



Region TO - Region LDG



Note: The bubble size indicates the FDX Flights count.

Flight Data SPIs: GPS Signal Loss

Flight Period: Aug 2021 - Jun 2022 Region of Occurrence: All Regions

The visuals present the event count and % over total events for the FDX GPS Signal Loss event per IATA SFO Region.

IATA SFO Region	FDX Event Count	%GT FDX Event Count
AFI	1.4K	0.7%
ASPAC	1.0K	0.5%
CIS	6.4K	3.5%
EUR	133.4K	72.1%
LATAM/CAR	10.7K	5.8%
MENA	31.7K	17.1%
NAM	0.3K	0.1%
NASIA	0.1K	0.0%
Total	184.9K	100.0%

Note: Region derived from FIR of occurrence from the FDX events

%GT : Percentage over total FDX Event Count

FDX GPS Signal Loss Event Count Per Region - %GT FDX Events Count

