

PNTCRC – Position, Navigation and Timing Cyber Response Center

Final Presentation

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PNTCRC Objectives

- Development of a center capable of discovering, storing and distributing security threats, vulnerabilities and mitigations associated to PNT services

- Management of different types of threats:
 - Laboratory threats
 - On field threats

- A new approach to global PNT security covering all needs, from device testing to on-field detection

1. Threat and vulnerability subscription
2. Mitigation subscription
3. Geographical reports & alerts subscription
4. GNSS Universal Threat Management



Login

researcher

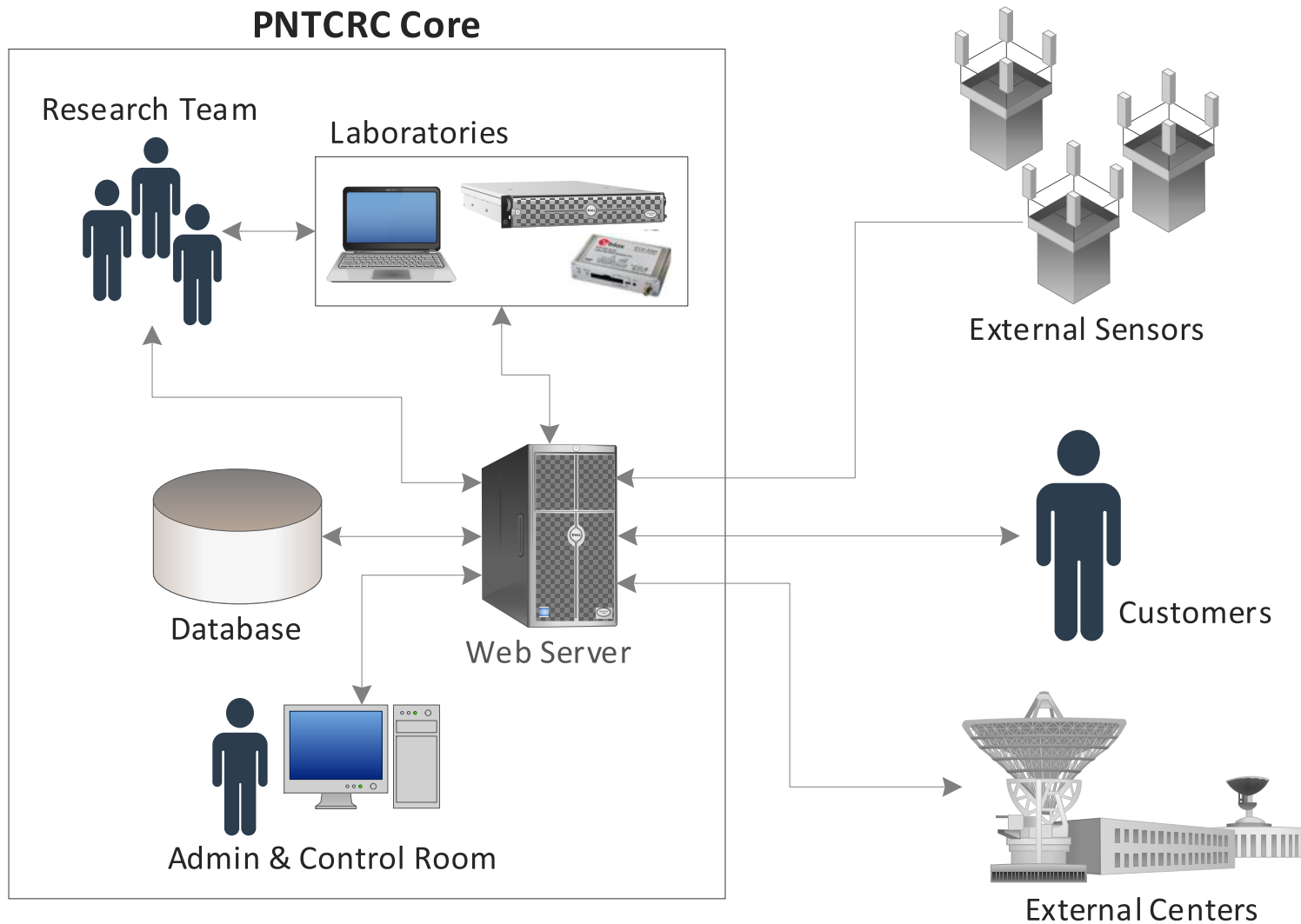
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PNTCRC Architecture




PNT Cyber Response Center

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504

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Search Threats

This page allows to search the available threat scenarios inside the Cyber Response Center database.

[Threats](#)
[Scenarios](#)
[Impacts](#)

Search the simulation impacts available

Reset filters

Impact ID ↑↓	Model ↑↓	Impacts ↑↓	Application ↑↓	Environment ↑↓	Positioning Systems ↑↓	Signal ↑↓
RES-SCN-1	RX-test	Denial of service	Reference Station	Open Sky	Galileo	E1
RES-SCN-2	RX-test	Denial of service	Reference Station	Open Sky	GPS	L1 C
RES-SCN-3	RX-test		Reference Station	Open Sky	GPS	L1 C
RES-SCN-4	RX-test		Reference Station	Open Sky	1) Galileo 2) GPS	1) E 2) L1
RES-SCN-5	RX-test	Denial of service	Reference Station	Open Sky	GPS	L1 C

RECEIVER MODELS →

IMPACTS →

APPLICATIONS →

ENVIRONMENTS →

SIGNALS →

THREAT CATEGORY →

Power spectral density (PSD) over time

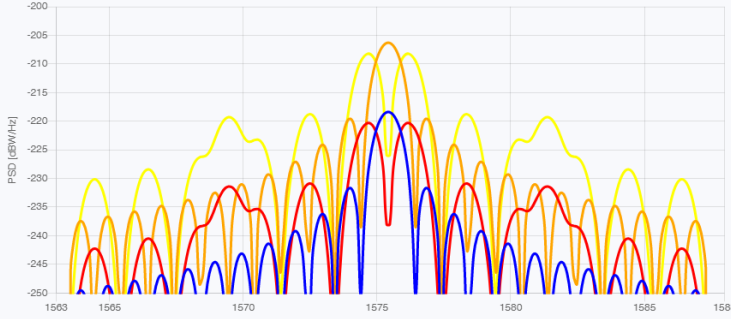
GPS L1 C/A

Galileo E1b

1 - Jamming

2 - Signal-level spoofing


3 - Signal-level spoofing



Time Selector [s]

Current time: 15 / 100 (s).

Map of relevant scenario points

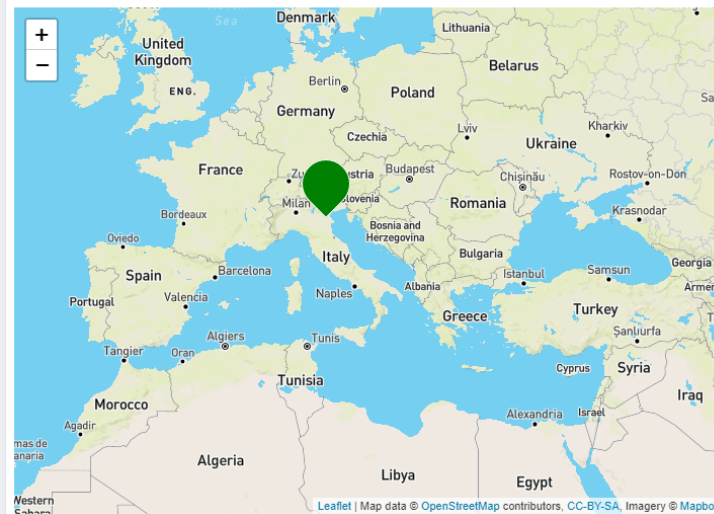


Real-time Alerts

This page shows the real-time geographical alerts detected by the QB-100 sensors.

Real-Time geographical alerts service

Real-Time alerts ●



researcher



JAMMER INFORMATION

Jamming characterization details

Select the sensor below to display the jamming characterization details observed at the beginning of the event

IDLS.SENSOR.001

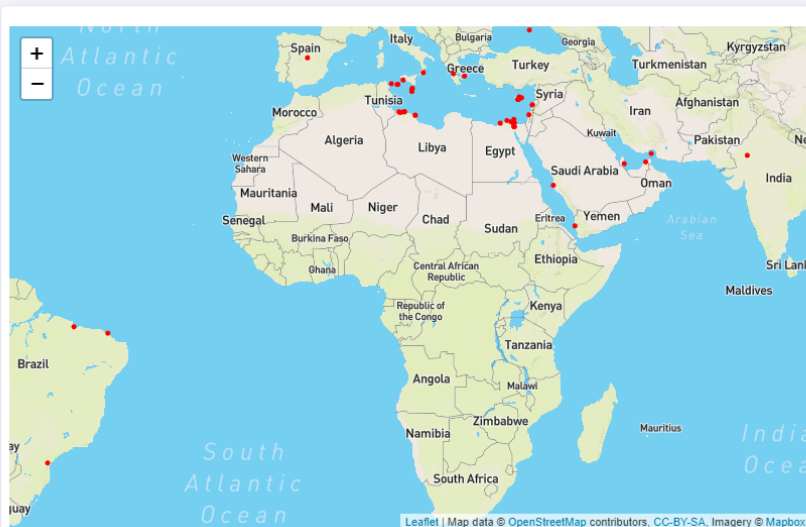
Show data for band:

E1

Frequency Bandwidth (MHz): 0.0146484375

Geographical Reports

This page shows the historical geographical alerts detected by the QB-100 sensors and reported by users.



✓ Show	Report ID	Location (LLA)	Date	Event type	Source
✓	OBS-GEO-29	[36.79, 11.99, 0] 📍	2021-57-02 14:05	Inteference	NAVZEN

OBS-GEO-29

Geographical reports details

Description

User indicated an intermittent problem that was otherwise unspecified.

NAVZEN: The GPS Operations Center reviewed the GPS Constellation and Control Segment, there are no known anomalies that might affect GPS signal integrity at the time and vicinity of the reported problem. Space weather was reviewed and found unlikely to have impacted GPS performance. There were no authorized GPS tests in the area. No correlating reports from interagency partners. The report of interference is similar to that outlined by U.S. Maritime Administration in Maritime Advisory 2021-004-Various GPS Interference. User encouraged to report the issue to the nearest communication authority.

Location

Pantelleria

Latitude [deg]

36.7875

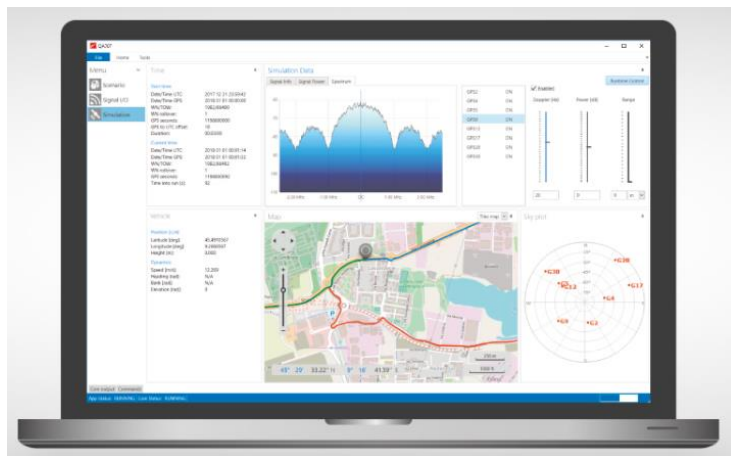
Longitude [deg]

11.9925

Event date & time

2021-05-02T14:57:00Z

- QA707 is the RFCS of Qascom, allowing to design and assess threats (e.g., jamming and spoofing) on GNSS receivers



QA707

File **Home** **Tools**

Calibration Wizard Rinex Editor Trajectory Editor Export Data Core reset Core rerun Open Folder Local Software Preferences Vehicle control Restore Layout **Report threat** **Threats Database**

Tools **Advanced** **Layout** **PNT-CRC**

Remote scenarios

Dynamics (1)

- ☒ Static
- ☒ Moving

Bands (2)

- ☒ Galileo E1B
- ☒ Galileo E5A
- ☒ Galileo E5B
- ☒ Galileo E6
- ☒ Gps L1CA
- ☒ Gps L2
- ☒ Gps L5

Attack types (3)

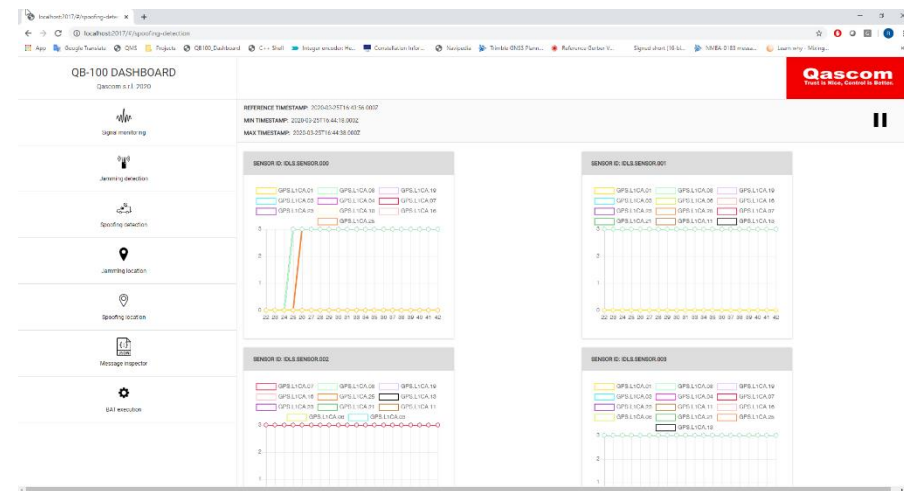
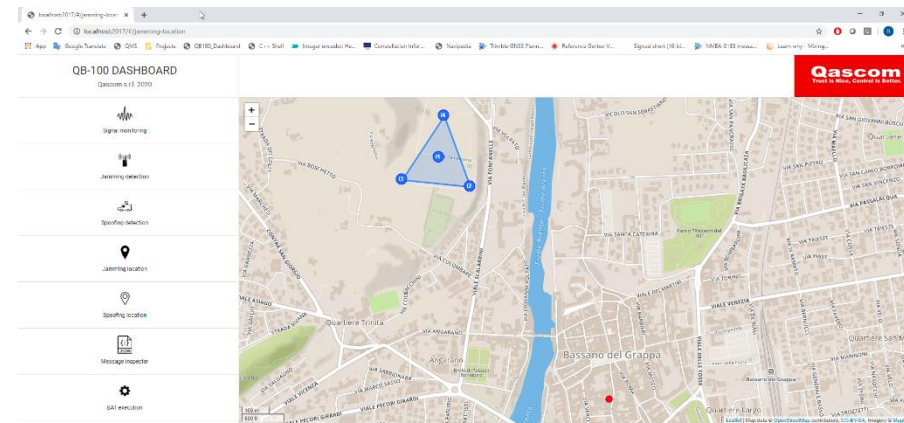
- ☒ Jamming
- ☒ Spoofing
- ☒ Integrity
- ☒ No threat

Scenario ID	Dynamics	Bands	Threats	Jammer type	Jammer power	Spoofing type	Spoofing power	
SIM-SCN-18	Moving	Galileo E1B, Gps...	Spoofing			Static spoofing	-125dBW (at TX)	Download
SIM-SCN-10	Static	Gps L5, Galileo...	Spoofing			Channel spoofing	10dB wrt SIS (at RX)	Download
SIM-SCN-8	Moving	Galileo E1B, Gps...	Spoofing			Channel spoofing	-123dBW (at TX)	Download
SIM-SCN-5	Static		Spoofing			Trajectory spoofing	-123dBW (at TX)	Download
SIM-SCN-3	Moving	Gps L2, Gps L1C...	Spoofing			Static spoofing	21dB wrt SIS (at RX)	Download
SIM-SCN-2	Moving	Galileo E1B, Gps...	Spoofing			Channel spoofing	-138dBW (at TX)	Download
SIM-SCN-26	Static	Gps L1CA	Jamming, Spoofing	Spread spectrum	-112dBW (at TX)	Trajectory spoofing	-129dBW (at TX)	Download
SIM-SCN-24	Moving		Jamming, Spoofing	Spread spectrum	-102dBW (at TX)	Channel spoofing	13dB wrt SIS (at RX)	Download
SIM-SCN-15	Moving		Jamming, Spoofing	Spread spectrum	-136dBW (at RX)	Trajectory spoofing	-134dBW (at TX)	Download
SIM-SCN-9	Moving	Galileo E1B, Gall...	Jamming, Spoofing	User defined	-117dBW (at TX)	Trajectory spoofing	-126dBW (at TX)	Download
SIM-SCN-7	Static		Jamming, Spoofing	Continuous wave	-107dBW (at TX)	Static spoofing	-139dBW (at TX)	Download
SIM-SCN-4	Static	Gps L2, Galileo E6	Jamming, Spoofing	Gaussian Noise	-105dBW (at TX)	Static spoofing	-137dBW (at TX)	Download
SIM-SCN-25	Static	Gps L2, Galileo...	Jamming	Continuous wave	-111dBW (at TX)			Download
SIM-SCN-23	Static	Galileo E6, Gps...	Jamming	User defined	-103dBW (at TX)			Download
SIM-SCN-22	Static	Gps L2, Galileo...	Jamming	Gaussian Noise	-114dBW (at TX)			Download
SIM-SCN-21	Static	Gps L1CA, Gps L...	Jamming	Frequency modulation	-136dBW (at RX)			Download
SIM-SCN-20	Static	Galileo E5A, Gall...	Jamming	User defined	-115dBW (at TX)			Download
SIM-SCN-13	Static	Galileo E1B	Jamming	Gaussian Noise	-102dBW (at TX)			Download
SIM-SCN-1	Moving	Galileo E1B, Gall...	Jamming	Continuous wave	-121dBW (at RX)			Download
SIM-SCN-19	Moving	Galileo E6, Gps...						Download
SIM-SCN-17	Moving	Galileo E5A, Gps...						Download
SIM-SCN-16	Moving							Download
SIM-SCN-14	Moving	Galileo E1B						Download
SIM-SCN-12	Moving	Galileo E5A, Gall...						Download
SIM-SCN-11	Moving	Gps L5, Galileo...						Download
SIM-SCN-6	Moving	Gps L2						Download

(4) (5)

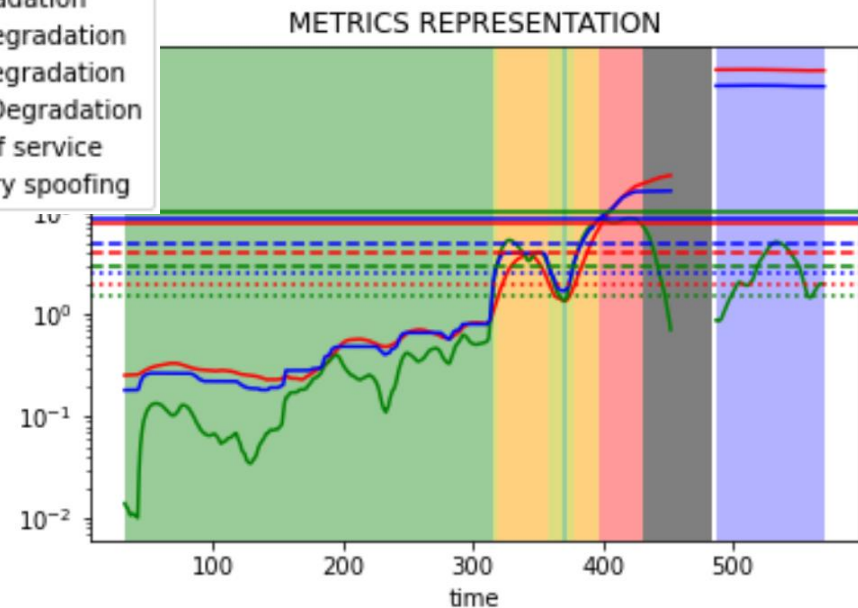
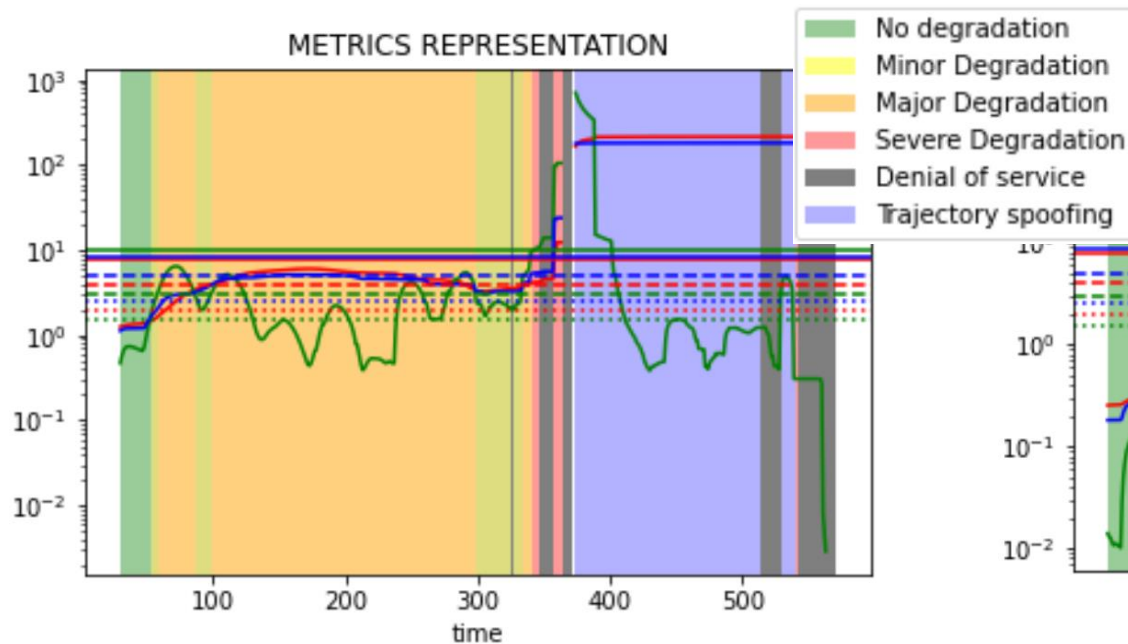
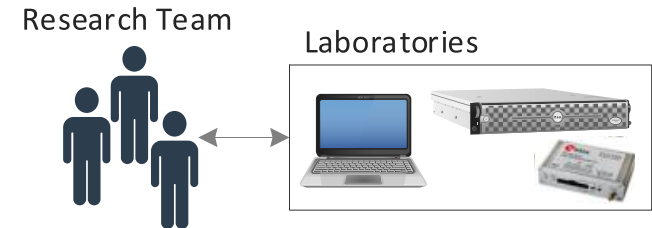
PNTCRC Interface for Interference monitoring - QB100

- QB100 is the RF monitoring sensor of Qascom, allowing to detect, characterize and locate RF threats on GNSS bands



Experimentation phase

- RF threats have been designed and assessed with laboratory equipment



Thank you!

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