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CENTRE NATIONAL D'ÉTUDES SPATIALES

MONITORING EMERGING GALILEO SERVICES THROUGH THE REGINA GNSS GLOBAL NETWORK

INTRODUCTION

REGINA is a CNES[1]/IGN[2] multi-GNSS and global infrastructure of approximately 40 stations which provide a homogeneous worldwide coverage. The main purpose of REGINA is to contribute to scientific community through International GNSS Service (IGS), indeed almost all REGINA stations are IGS stations.

OBJECTIVE

This poster presents the latest developments in leveraging the REGINA infrastructure to monitor new and emerging **Galileo services**. This monitoring activity is conducted in close coordination and for the benefit of the Search and Rescue (SAR) Galileo Data Service Provider (SGDSP) based at CNES Toulouse. REGINA supports three 3 Galileo Services: RLS, OSNMA and EWSS.

METHODS

- Take advantage of the excellent geographic coverage and reliability of REGINA Network.
- Use the capacity of Septentrio PolarRx5 to provide raw data in differed time and real time through the SBF open format and also data in NMEA format.
- For each service, provide through a specific process all relevant information require by SGDSP Operator located in CNES premises in Toulouse (France).

These specific processes are summarized below.

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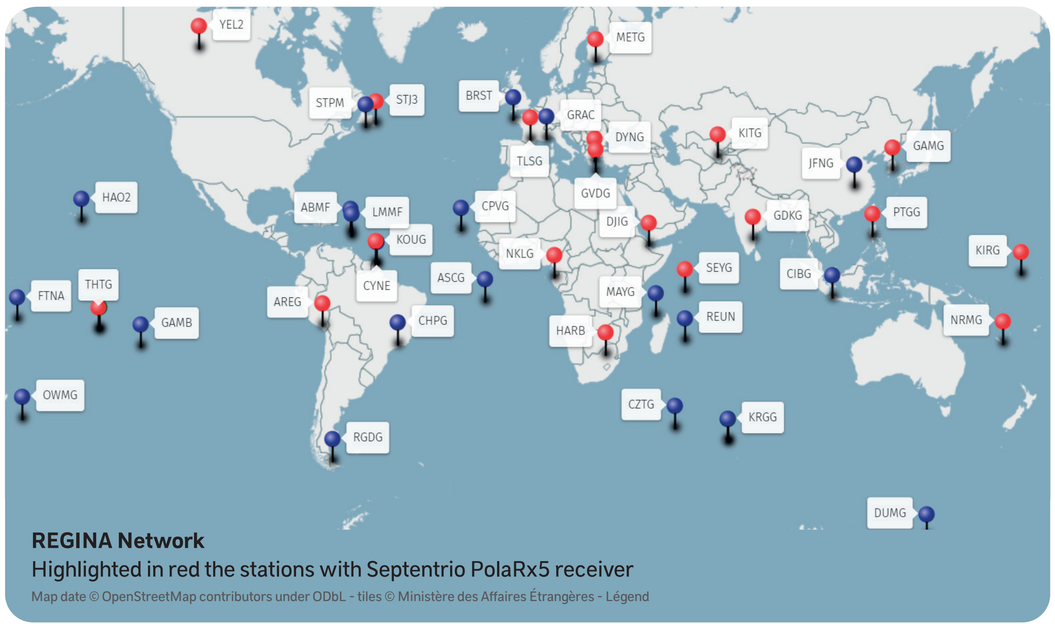
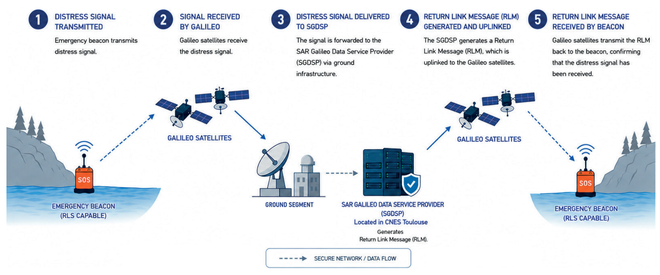


REGINA Network
Highlighted in red the stations with Septentrio PolaRx5 receiver
Map date © OpenStreetMap contributors under ODbL - tiles © Ministère des Affaires Étrangères - Légend

GALILEO SERVICES

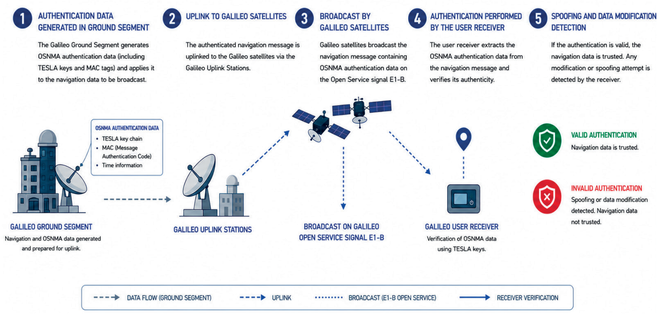
RETURN LINK SERVICE (RLS)

Ensuring that distress signals are received and acknowledged



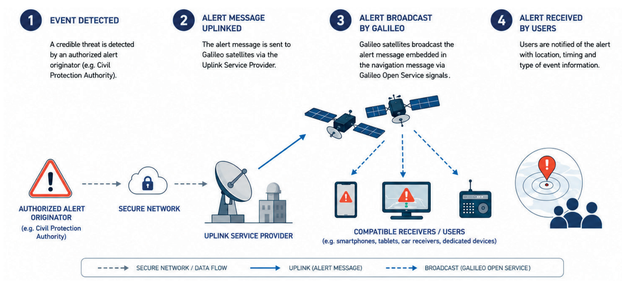
OPEN SERVICE NAVIGATION MESSAGE AUTHENTICATION (OSNMA)

Authentication of Galileo Open Service Signals



EMERGENCY WARNING SATELLITE SERVICE (EWSS)

Timely alerts of natural disasters and humanitarian crises



REGINA SERVICES

RLS
(RLS in service since January, 2020)

- Provide information on RLM reception all around the world with approximately 16 stations.
- Allow SGDSP to monitor area and time of reception for RLM.

- **How:**
  - Uses **Differed Time** Septentrio SBF File 15mn/1s and extract RLM information.
  - Use NMEA message in a separate chain with also RLM information.
  - Combines both chains to increase level of information and robustness.
  - 24/7 with a 15 minutes frequency.

OSNMA
(OSNMA Operational since 24th of July, 2025)

- Provide information on OSNMA reception all around the world with stations Septentrio Equipped.
- Allow SGDSP to monitor area and time of reception for OSNMA.

- **How:**
  - Use **Real Time** Septentrio raw streams from the stations on REGINA Caster.
  - Extract Block ID SBF 4023 (GalRawInav) with dedicated tool.
  - Provide specific access on REGINA Caster to SGDSP to retrieve Real Time OSNMA information.
  - 24/7 in real time.

EWSS
(Demonstrator)

- Provide information on EWSS message reception all around the world with stations Septentrio Equipped.
- Allow SGDSP to monitor area and time of reception for EWSS.

- **How:**
  - Use **Real Time** Septentrio NMEA specific message on receiver specific port.
  - REGINA Caster is used as access portal by SGDSP to the station receivers.
  - The connection between SGDSP and the station's receivers is established via IPTABLES.
  - 24/7 in real time.

CONCLUSIONS

REGINA has been making a significant contribution to the IGS service for 15 years by providing multi-GNSS and real-time GNSS data to the GNSS scientific community. Far beyond its primary mission, it has proven to be a valuable support in recent years for new emerging Galileo Services in the frame of SAR Galileo activities. The results in this poster show how REGINA network is used to serve as a powerful, independent tool for the European GNSS Galileo program. It provides SAR Galileo and EWSS service centers with global, high-frequency data to ensure the reliability and integrity of these advanced satellite services.

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ReGina

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