Estado Global del COSPAS –SARSAT

Reunión de implementación del Servicio de búsqueda y salvamento para la Region SAM (SAR – SAM)

Lima, Perú, 6 y 7 de Diciembre 2019

Introduction

The International Cospas-Sarsat Programme initiated the development of the Medium-altitude Earth Orbiting Satellite System for Search and Rescue (MEOSAR system) in 2004, with SAR repeaters placed on the satellites of the Global Navigation Satellite Systems (GNSS) of Europe (Galileo), Russia (Glonass) and the USA (GPS).

Early operational capability (EOC) for the MEOSAR system was declared in December 2016 and full operational capability (FOC) of the system is anticipated in 2020.

MEOSAR complements the existing LEOSAR (satellites in low-altitude orbits) and GEOSAR (satellites in geostationary orbit) systems, and will eventually replace the LEOSAR system

The Cospas-Sarsat System is comprised of:

- 406 MHz distress radiobeacons (ELTs for aviation use, EPIRBs for maritime use, and PLBs for personal use) which transmit signals during distress situations,
- instruments on board satellites which detect the signals transmitted by distress radiobeacons,
- ground receiving stations, referred to as Local Users Terminals (LUTs), which receive and process the satellite downlink signal to generate distress alerts, and
- Mission Control Centers (MCCs) which receive alerts produced by LUTs and forward them to Search and Rescue Points of Contacts (SPOCs).

The current operational Cospas-Sarsat System includes three types of satellites:

- satellites in low-altitude Earth orbit (LEO) which form the LEOSAR system,
- satellites in geostationary Earth orbit (GEO) which form the GEOSAR system,
- satellites in medium-altitude Earth orbit (MEO), which form the MEOSAR system currently operating regionally with early operational capability.

Once fully operational, the MEOSAR system will provide global coverage and near-real-time beacon detection and independent location.

406 MHz Beacon Population (December 2017)

Global beacon population estimated using the registration rate method: about 2,105,000

Global beacon population estimated using the beacon survey method: about 1,879,000

Global registered beacon population: about 1,634,000

SAR Operations (December 2017)

From **January to December 2017**, the Cospas-Sarsat System provided assistance in **rescuing 2,746 persons in 963 SAR events**

Type of Distress	SAR Events	Persons Rescued
Aviation	162	364
Maritime	397	1,765
Land	404	617
Total	**963**	2,746

From **September 1982 to December 2017**, the Cospas-Sarsat System provided assistance in **rescuing at least 46,553 persons in 13,627 SAR events**.

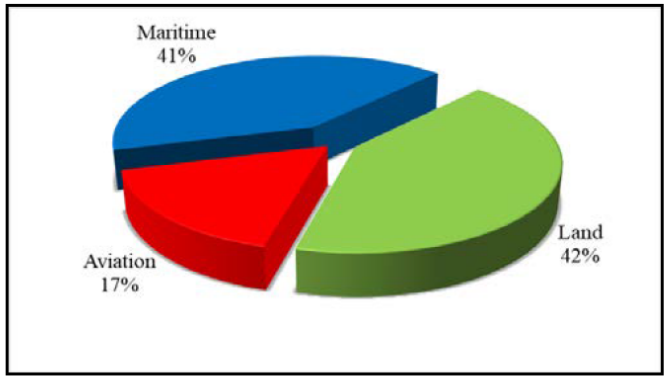


Figure 2: Distribution of SAR Events Assisted by Cospas-Sarsat by Type of Events (January - December 2017)

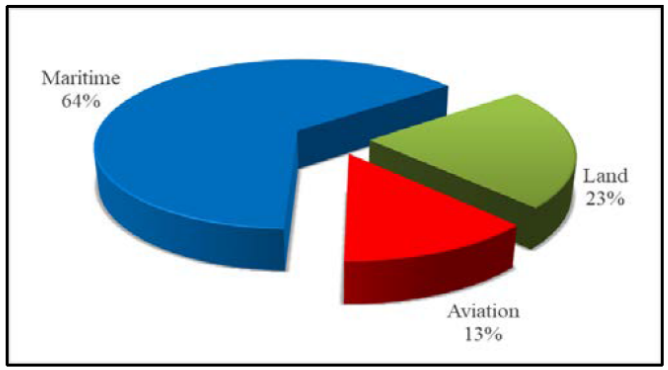


Figure 3: Persons Rescued by Type of SAR Event Assisted by Cospas-Sarsat (January - December 2017)

2 ASSISTANCE IN SEARCH AND RESCUE OPERATIONS

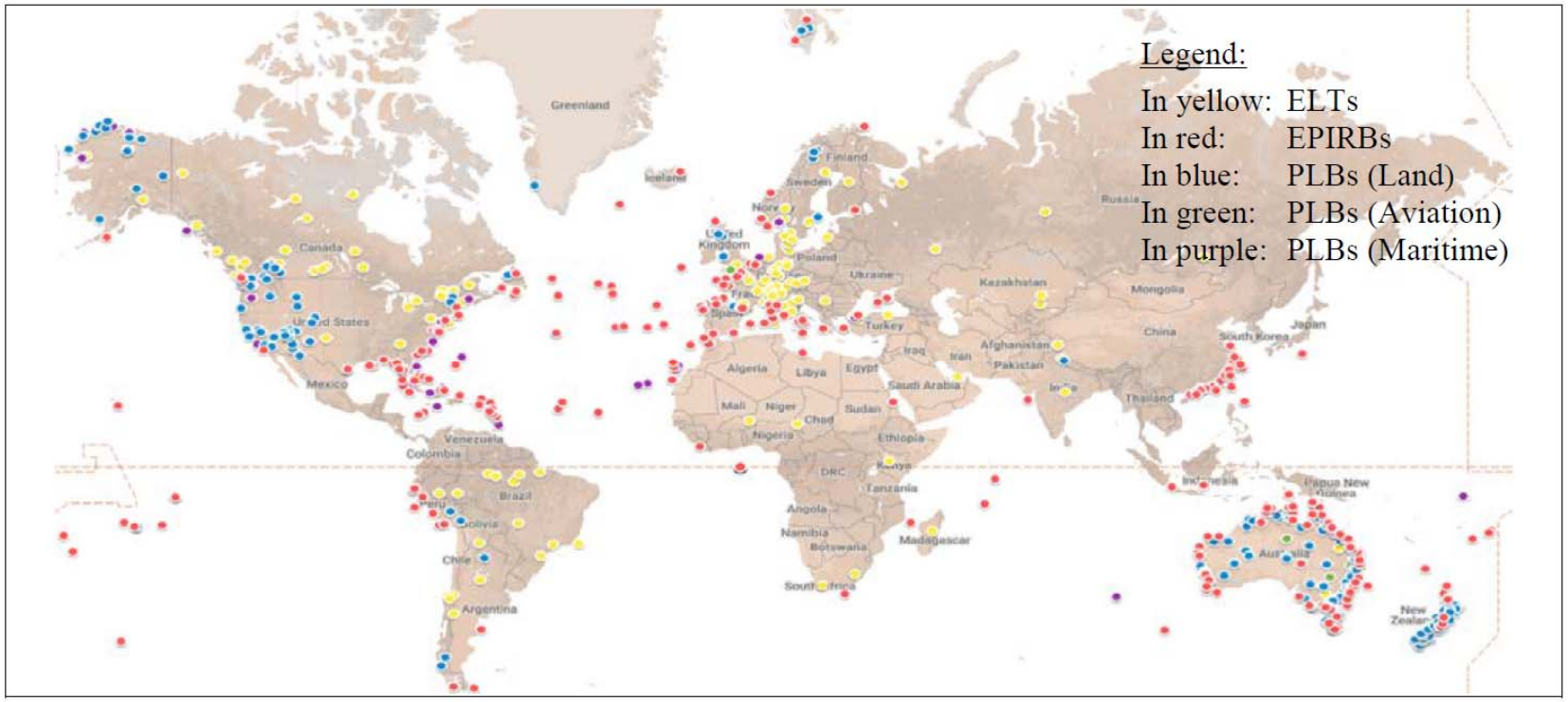


Figure 1: Geographic Distribution of Confirmed SAR Events for which Cospas-Sarsat Data Was Used (January - December 2017)

The MEOSAR System

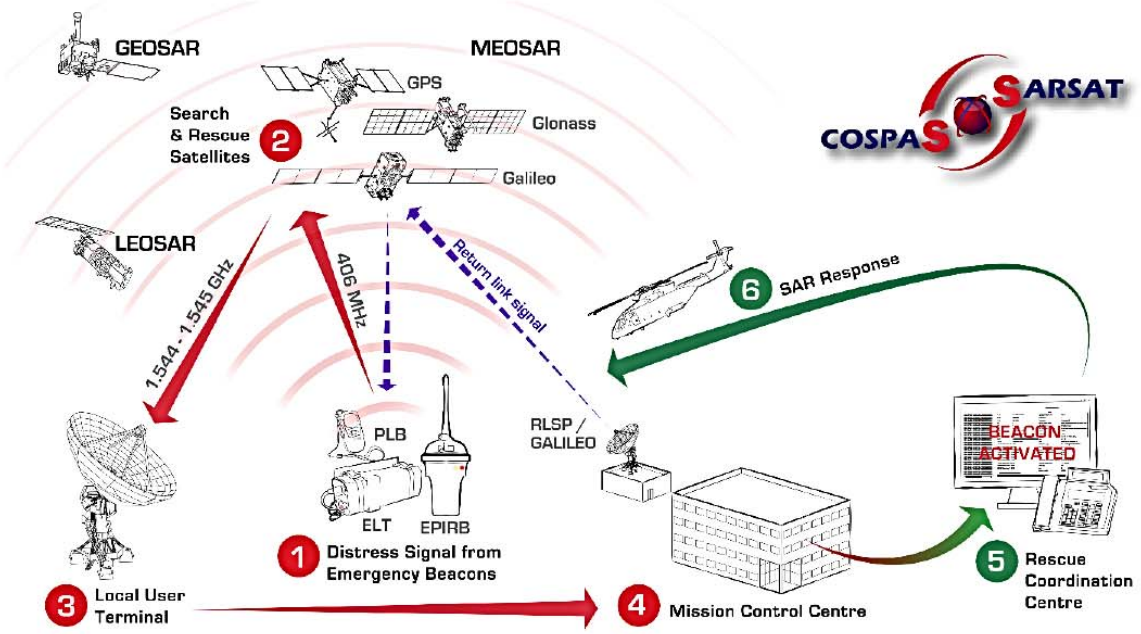


Figure 8: The Cospas-Sarsat System concept

The MEOSAR System

Global Navigation Satellite System (GNSS) satellites orbit the Earth at an altitude between 19,000 and 23,000 km, a range considered as medium-altitude Earth orbit.

Hence this component of Cospas-Sarsat is known as the Medium-altitude Earth Orbit Search and Rescue system, or MEOSAR.

It will complement the existing LEOSAR and GEOSAR systems.

The MEOSAR System (2)

The current LEOSAR and GEOSAR systems that detect and locate distress beacons have shortcomings that MEOSAR will overcome. The GEOSAR system constantly covers the entire Earth except the high-latitude (i.e., polar) regions.

While the GEOSAR system can nearly instantaneously receive beacons' distress messages across most of the globe, it cannot locate a beacon unless the location is encoded in the beacon’s message from a local navigation (GNSS) receiver.

The MEOSAR System (3)

The LEOSAR system can locate a beacon without location information being transmitted in the beacon message (or can confirm the location even if position information is transmitted in the beacon message), but the LEOSAR satellites have a view of only a small part of the Earth at any given time, which at times creates a delay in the distress signal reaching a ground station.

While LEOSAR and GEOSAR still provide valuable search-and-rescue capabilities, MEOSAR is a revolution in technology.

Once fully operational, the MEOSAR system will offer the advantages of both the LEOSAR and GEOSAR systems without their limitations by providing transmission of the distress message and independent location of the beacon, with near-real-time worldwide coverage.

The MEOSAR system will facilitate other planned enhancements for Cospas-Sarsat beacons, such as a return-link-service (RLS) transmission to a distress beacons that will provide, for example, the user with a confirmation that the distress message has been received.

The large number of MEOSAR satellites that will be in orbit when the system is fully operational will allow each distress message to be relayed at the same time by several satellites to several ground antennas, improving the likelihood of quick detection and improving the accuracy of the location determination.

At the beginning of 2013, Cospas-Sarsat entered a Demonstration and Evaluation (D&E) phase for the MEOSAR system to show that MEOSAR performance met expectations, and that distress alerts received by SAR authorities from the MEOSAR system have the required reliability and accuracy.

The MEOSAR early operational capability (EOC), where distress alerts provided by the MEOSAR system are provided to SAR authorities for operational use, began in December 2016.

The EOC phase will be followed by the initial operational capability (IOC) phase anticipated to be declared at the end of 2019, which will provide improved MEOSAR performance.

When enough MEOSAR satellites and commissioned ground stations (MEOLUTs) are available to provide worldwide, near-real-time coverage, the MEOSAR system will be declared at full operational capability (FOC), which is anticipated in 2020.

Galileo & ReturnLink Rescue Solutions

Galileo is the European Union's Global Navigation Satellite System (GNSS) constellation, which reached its operational phase in 2017, allowing technology with a Galileo-enabled receiver to use signals provided by Galileo's global satellite constellation for positioning, navigation and timing.

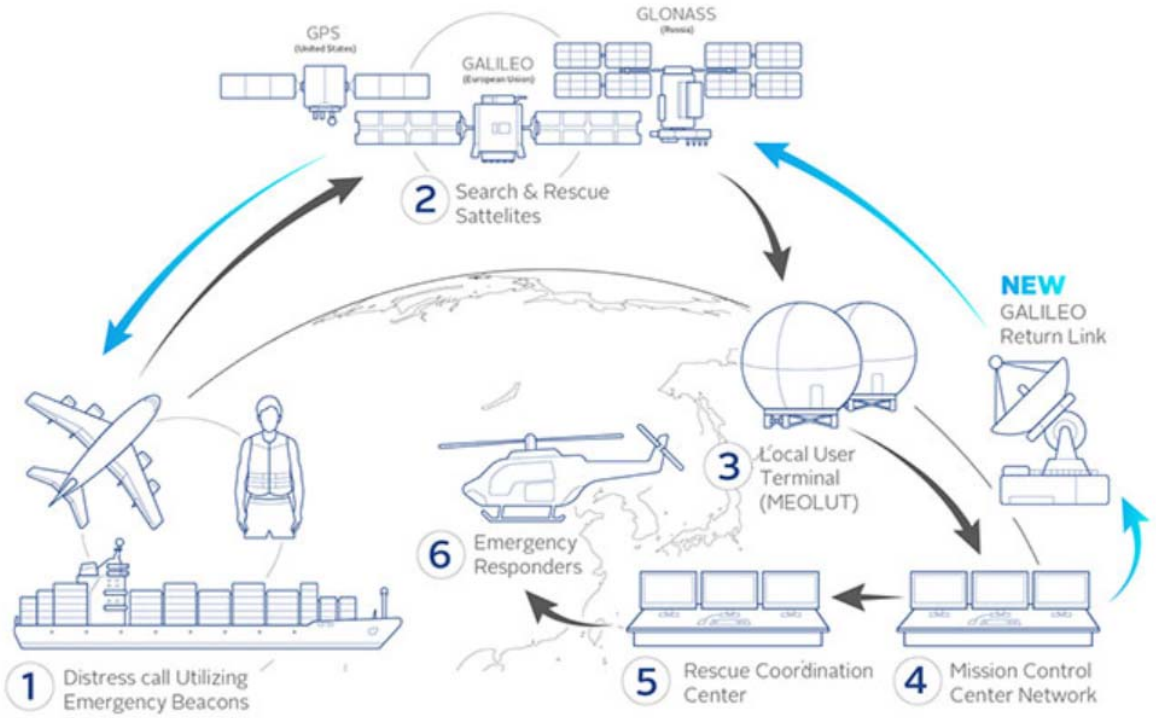
Galileo's development is part of the EU's preparations for upgrading the international distress beacon locating organisation COSPAS SARSAT's Search and Rescue (SAR) Ecosystem under the MEOSAR program, which requires new earth based antenna and a network of 72 SAR satellites, made up of the US GPS, EU Galileo and Russian Glonass constellations.

What Impact will Galileo have on search and rescue?

Galileo's immediate impact on Search and rescue (SAR) has been the addition of 26 new satellites, allowing greater global coverage, with faster detection of the 406MHz distress frequency.

Coupled with Galileo's precision GNSS capabilities, SAR beacons with Galileo receiver's location detection is greatly accelerated. Interaction with the GPS network has also created a Canyon Effect capability that allows signal detection in areas with previously limited coverage.

The Second major impact will be the Return Link Service (RLS), a re-assurance signal back to a new generation of SAR beacons to inform the user that their distress signal and location have been detected. This new capability is unique to the Galileo satellites and is due to be activated in early 2020.



How does the ReturnLink Service contact the beacon to confirm distress detection?

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The confirmation signal for ReturnLink will be the activation of **a blue light on a new range of beacons as the blue light is widely seen as being associated with the emergency services.**

The flashing blue light is sent around 15minutes after confirmation that the distress signal has been detected and the beacons location independently located.

Who Manages the Return Link Service (RLS)?

The Galileo Return Link Service Provider based at CNES headquarters in Toulouse, where the Cospas-Sarsat French Mission Control Centre is also operated.

This facility is in charge of the management of the Return Link Messages and their coordination with the Cospas-Sarsat network and with the Galileo Ground Mission Segment on the transmission of messages to the distress beacons through the Galileo E1 signal.

OACI UNIENDO A LA AVIACIÓN

NINGÚN PAÍS SE QUEDE ATRÁS

GRACIAS