

REACHING YOU FASTER WHEN EVERY MINUTE MATTERS



GALILEO, THE EUROPEAN GLOBAL NAVIGATION SATELLITE PROGRAMME

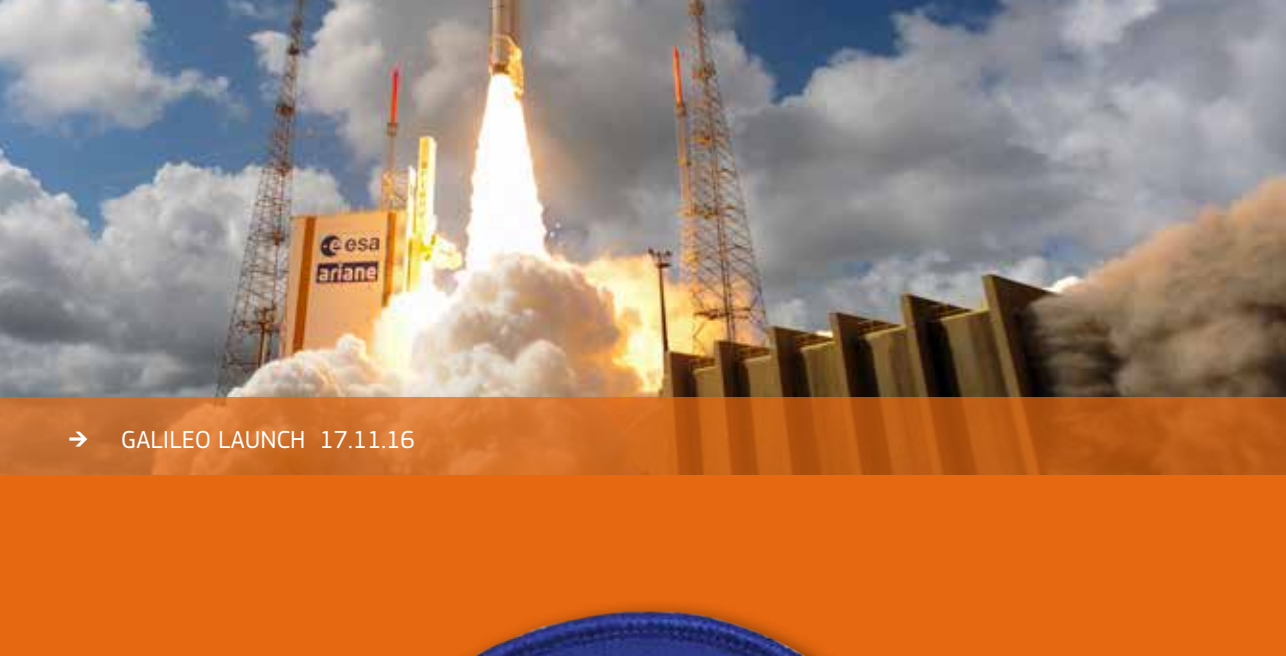
THE GALILEO PROGRAMME IS EUROPE'S GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS), PROVIDING A HIGHLY ACCURATE GLOBAL POSITIONING SERVICE UNDER CIVILIAN CONTROL. THE FULLY DEPLOYED SYSTEM WILL CONSIST OF 24 SATELLITES + 6 ACTIVE SPARES IN ORBIT, AND ITS ASSOCIATED GROUND INFRASTRUCTURE. GALILEO PROVIDES EUROPE WITH INDEPENDENCE IN SATELLITE NAVIGATION BUT ALSO INTEROPERABILITY WITH OTHER GLOBAL NAVIGATION SATELLITE SYSTEMS.

Galileo offers more accurate positioning, thanks to a greater number of signals, a new satellite clock design, and improved corrections of ionospheric effects. In combination with GPS signals, this will allow positioning within a meter, depending on the service used.

AVAILABILITY IS A KEY ELEMENT OF GALILEO.

On top of the Search And Rescue (SAR) service, Galileo will initially offer high performance navigation and positioning services:

- **Open Service (OS):** Galileo open and free of charge signals, providing navigation and timing services;
- **Commercial Service (CS):** complements the OS by providing an additional navigation signal and added-value services in a different frequency band. The CS signal can be encrypted in order to control access to the Galileo CS services;
- **Public Regulated Service (PRS):** a Galileo navigation service using encrypted signals restricted to government-authorised users.



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GALILEO FOR SAR

Search And Rescue (SAR) operations involve locating and helping people in distress. They can be carried out in a variety of locations including at sea, in the mountains or the deserts.

With the launch of initial services, Galileo will help SAR operators respond to distress signals faster and more effectively while also lowering their own exposure to risk.

The time to acquire the location is reduced from several hours to a few minutes, which makes SAR operations at sea easier thanks to a narrowed "search box" because the distressed vessel drifts less. On land, the quick acquisition of a precise position enables rescue teams to reach the operation zone and assist the victims. Neither Galileo/SAR, nor COSPAS-SARSAT are operational SAR units: that is the role of the national competent authorities and administrations

COSPAS-SARSAT

Galileo's SAR capabilities are integrated into the international COSPAS-SARSAT programme – a satellite-based SAR distress alert detection and information distribution system.

COSPAS-SARSAT detects and locates emergency beacons activated by aircraft, ships and individuals. It provides accurate, reliable, and timely alert and location data to help SAR operators find and help people in distress.

Galileo provide a ground segment coverage of 40 million square km over Europe as a contribution to the MEOSAR global coverage.

Galileo's contribution to COSPAS-SARSAT

Galileo plays an important role in the Medium Earth Orbit Search and Rescue system (MEOSAR of COSPAS-SARSAT). The Search And Rescue transponders on Galileo satellites can pick up signals emitted from any 406MHz distress beacons and broadcast this information to dedicated ground stations (MEOLUTs) using dedicated frequencies. Once the beacon is located by the MEOLUTs, this data is sent to the COSPAS-SARSAT mission control centre (MCC) which then distributes it to the relevant rescue centres worldwide.

- Thanks to the advanced European technology used, integration of Galileo into COSPAS-SARSAT improves the system by:
- enabling nearly real-time detection and localisation of distress signals anywhere in the world, reducing the delay between beacon activation and distress localisation;
 - making it easier to find the source of a signal by significantly boosting precision in comparison to the current situation;
 - increasing availability and improving detection of signals in difficult terrain or weather conditions;

By the end of 2018, people in distress will receive an acknowledgment via the Galileo SAR return link that their distress signal has been localised. The SAR/Galileo infrastructure is interoperable with GPS and Glonass SAR transponders.

BEACON TECHNICAL INFORMATION

PLB, EPIRB, ELT icons and descriptions.

PLB
Personal Locator Beacons (PLB's) are generally carried by individuals, away from normal emergency services or on ships and airplanes. They can be used everywhere, both on land and at sea by adding a simple floating case. They are activated manually by pressing a button and operate on 406 MHz. PLBs are small, not much larger than a mobile phone, have a medium battery life and are registered to a person.

EPIRB
Emergency Position Indicating Radio Beacons (EPIRB's) are installed on marine vessels. They are activated when in contact with water if the boat is sinking. Deployment can also happen manually, when the EPIRB is physically removed from its bracket, or automatically when water pressure triggers a hydrostatic release unit to release the EPIRB from its bracket.

ELT
Emergency Locator Transmitters (ELT's) are installed on aircraft. They are activated automatically by detecting unusual decelerated forces, such as those associated with a crash or a forced landing, or manually by the pilot to send an emergency declaration message. 406 MHz ELT's dramatically reduce the false alert impact on Search And Rescue resources and result in a high accident survivability rate.

IMPORTANT INFORMATION FOR BEACON OWNERS

A 406 MHz beacon, whether on a boat, plane, or in your pocket while hiking, does not transmit signals until it is activated in an emergency. COSPAS-SARSAT locates them only when activated. They carry crucial information such as:

- phone numbers to call,
- a description of the vessel, aircraft, vehicle, or person (in the case of a PLB)
- the home port of a vessel or aircraft

When the beacon is purchased, it should be registered immediately with the relevant national or international authority (or on the COSPAS-SARSAT website: www.cospas-sarsat.int).

MEOLUT GROUND STATIONS

To provide beacon identification and location information, the satellite downlinks are processed by ground receiving stations called MEO Local User Terminals (MEOLUT). The distress alert information computed by MEOLUTs is forwarded to COSPAS-SARSAT Mission Control Centres (MCCs) for distribution to SAR services. The MEOSAR payloads are designed according to interoperability requirements, which allow the MEOLUTs to compute the location of distress beacons based on any combination of signals received from the MEOSAR satellites.

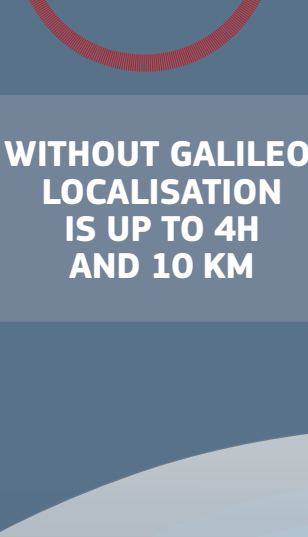


LOCATION PERFORMANCE SAR/GALILEO INITIAL SERVICE LOCATION

PERFORMANCE		EXPECTED VALUE
LOCATION PROBABILITY AFTER	1 TRANSMITTED BURST	> 75%
LOCATION PROBABILITY AFTER	12 TRANSMITTED BURSTS (=10 MINUTES)	> 98%
LOCATION ACCURACY AFTER	1 TRANSMITTED BURST WITHIN 5 KM	> 70%
LOCATION ACCURACY AFTER	12 TRANSMITTED BURSTS (=10 MINUTES) WITHIN 5 KM	> 95%
LOCATION ACCURACY AFTER	12 TRANSMITTED BURSTS (=10 MINUTES) WITHIN 2 KM	> 80%



" BY REDUCING THE DETECTION TIME AND IMPROVING THE PRECISION OF THE LOCALISATION OF DISTRESS SIGNALS, GALILEO CONTRIBUTES TO THE SAFETY OF OUR SAR CREWS, REDUCING THEIR EXPOSURE TO RISK "



WITHOUT GALILEO, LOCALISATION IS UP TO 4H AND 10 KM

WITH GALILEO, LOCALISATION IS DOWN TO 10 MIN AND 2 KM

