Paper ID: 32248
oral

SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Integrated Applications End-to-End Solutions (2)

Author: Mr. Frank te Hennepe
OHB System, Germany

Dr. Charlotte Bewick
OHB System AG-Bremen, Germany
Mr. Alfred Werni
RUAG Space GmbH, Austria
Mr. Florian Rieger
RUAG Space GmbH, Austria
Dr. Øystein Olsen
Norwegian Defence Research Institute (FFI), Norway

# MEOSAR: GALILEO'S CONTRIBUTION TO SEARCH-AND-RESCUE OF PEOPLE IN DISTRESS

**Abstract**

COSPAS-SARSAT is an international satellite-based Search-And-Rescue (SAR) system, which is dedicated to the reception and positioning of emergency beacons anywhere on the Earth in order coordinate rescue efforts for people, vehicles and facilities in distress. This is achieved by evaluating the time and the frequency of the beacon signal upon arrival at a SAR transponder, which can be used to determine the relative distance and velocity of the sender if sufficient data points are available.

The current elements of the COSPAR-SARSAT system consist of a LEOSAR component in low-Earth orbit (high performance, but low availability due to poor coverage characteristics) and a GEOSAR component in geostationary orbit (high availability, but limited performance due to absence of Doppler information). However with the advent of the Galileo constellation, the COSPAR-SARSAT system will be expanded with a MEOSAR component, which combines good coverage characteristics with a high localization performance. Furthermore, a MEO-based SAR-system improves satellite-to-ground station visibility and contact time, which increases the overall system reliability and response time. As such, MEOSAR is considered a valuable addition to the COSPAR-SARSAT system.

Contemporary emergency beacons transmit their distress signal in UHF at a frequency of 406 MHz. Current generation MEOSAR transponders, which are based on a transparent payload architecture, relay the received UHF distress signals, perform up-conversion to L-band and transmit this L-band signal back to ground. On Earth, the so-called Local User Terminals (LUTs) are responsible for reception of the downlinked signal and determination of the Time-of-Arrival (ToA) and Frequency-of-Arrival (FoA). Combining multiple ToA and FoA measurements in the Central Location Processor (CLOP) enables the position determination of the distress beacon and subsequent generation of the alert data.

In this paper, the overall functionality of the MEOSAR system architecture will be presented, including the characteristics of the space segment, ground segment and user segment as well as the corresponding interfaces. An analysis of the overall traffic model related to distress beacon activations will be presented, followed by a high-level discussion of advantages and disadvantages of the MEOSAR component in comparison to the other COSPAR-SARSAT components. Finally, several possible modifications to improve the performance of the MEOSAR system will be proposed.