Beacon Manufacturers Workshop
Annapolis, Maryland
May 1st 2014

Cospas-Sarsat Programme Updates
Dany St-Pierre
Cospas-Sarsat Secretariat
Cospas-Sarsat Programme Status

- Mission Statement
- Programme Participants
- Search and Rescue using beacons evolution: A Cospas-Sarsat Perspective
- System segments Status: Space, Ground, Beacon
- Assisted Saves statistics

Cospas-Sarsat Programme Evolution

- MEOSAR System Concept
- MEOSAR Status, Timeline and deployment schedule

Other Cospas-Sarsat Programme matters

- New Cospas-Sarsat Website
- IBRD updates
Mission Statement

The International Cospas-Sarsat Programme provides accurate, timely and reliable distress alert and location data to help search and rescue authorities assist persons in distress.

Objective

The objective of the Cospas-Sarsat system is to reduce, as far as possible, delays in the provision of distress alerts to SAR services, and the time required to locate a distress and provide assistance, which have a direct impact on the probability of survival of the person in distress at sea or on land.

Strategy

Cospas-Sarsat Participants implement, maintain, co-ordinate and operate a satellite system capable of detecting distress alert transmission from radiobeacons and of determining their position anywhere on the globe. The distress alert and location data is provided by Cospas-Sarsat Participants to the responsible SAR services.

Services are provided world-wide and free of charge for the user in distress.
Cospas-Sarsat Participants

4 Founders: Canada, France, Russia and the USA
26 Ground Segment Providers
11 User States
2 Organisations

Algeria
Argentina
Australia
Brazil
Canada
Chile
China (P.R.)
Cyprus
Denmark
Finland
France
Germany
Greece
Hong Kong
India
Indonesia
Italy
ITDC
Japan
Korea (R. of)
Madagascar
Netherlands
New Zealand
Nigeria
Norway
Pakistan
Peru
Poland
Russia
Saudi Arabia
Serbia
Singapore
South Africa
Spain
Sweden
Switzerland
Thailand
Tunisia
Turkey
UAE
UK
USA
Vietnam
Cospas-Sarsat Participants

- 60% of world land area
- 72% of world population
- 84% of estimated world wealth
Cospas-Sarsat Participants

EVOLUTION OF COSPAS-SARSAT PARTICIPANTS (1988-2013)

41 States and 2 Organisations:

- **4 Parties:**
  - Canada, France, Russia, USA
- **28 Ground Segment Providers**
- **11 User States**
Search and Rescue using beacons evolution: A Cospas-Sarsat Perspective

COSPAS-SARSAT Programme

121.5 MHz Beacons
- Modern mean to locate persons in distress
- Limited coverage
- Highly variable position accuracy

LEOSAR System
- Improved Accuracy (500 m.)
- Enhanced Position confirmation latency
- Enhanced Coverage
- 10 Km accuracy
- Data Distribution Network to SAR

406 MHz beacon with GNSS
- Enhanced detection latency (worldwide)
- Enhanced confirmed position latency
- Possibility to track moving beacons
- New service (RLS)

GEOSAR System
- Enhanced detection latency (except at high latitude)
- Worldwide Coverage
- Reduced Latency
- Improved accuracy 2 Km

Second Generation 406 MHz Beacons
- Enhanced position accuracy (100 m. or less with GNSS)
- More information in the beacon message
- New applications (in-flight trigger)

406 MHz Homing?
2 Types of Operational Satellites

- Low Earth Orbiting Search And Rescue (LEOSAR)
- Geostationary Orbiting Search And Rescue (GEOSAR)
Cospas-Sarsat Components

- **Space Segment:**
  - 6 LEO satellites (3 more still planned to be deployed)
  - 6 GEO satellites + 2 more recently completed commissioning tests (5 more planned before 2018)

- **Ground Segment:**
  - 54 Operational LEOLUTs + 1 in development
  - 22 Operational GEOLUTs + 1 in development
  - 30 Operational Mission Control Centres + 1 in development

- **Distress Beacons:**
  - >1.4 million 406 MHz beacons (end of 2013)
  - about 40 active manufacturers
LEO System Visibility

LEOSAR SAR Visibility (end of 2013)
Space Segment: GEOSAR Coverage
As of April 2014

- 1 satellite visibility 96.1%
- 2 satellites visibility 80.9%
- 3 satellites visibility 38.5%
- 4 satellites visibility 15.3%

Source: International Cospas-Sarsat Programme
Beacon Population Evolution

406 MHZ BEACON POPULATION

15.1% annual growth since 1993

NUMBER OF BEACONS

0  200,000  400,000  600,000  800,000  1,000,000  1,200,000  1,400,000  1,600,000


ESTIMATED NO. IN USE
Cospas-Sarsat
SAR Events and Assisted Saves

Worldwide Results

2013 (Partial)
SAR Events: 741 (TBC.)
P. Rescued: 1931 (TBC.)

SAR Events (1982 / 2013): > 10382
P. Rescued (1982 / 2013): > 36,986
Cospas-Sarsat

SAR Events and Assisted Saves

Cospas-Sarsat Events 2013

- Maritime: 33%
- Aviation: 27%
- Land: 39%

Cospas-Sarsat Assisted Saves 2013

- Maritime: 46%
- Aviation: 22%
- Land: 32%

Cospas-Sarsat Events 2012

- Maritime: 54%
- Aviation: 20%
- Land: 26%

Cospas-Sarsat Assisted Saves 2012

- Maritime: 68%
- Aviation: 17%
- Land: 15%
Cospas-Sarsat Saves Evolution

COSPAS-SARSAT EVENTS AND ASSISTED SAVES (1982-2013*)

*Data compiled for 2013 is still preliminary as some Administrations have not yet provided annual statistics

ON AVERAGE 5.9 ASSISTED RESCUES PER DAY IN THE LAST 4 YEARS
MEOSAR System Concept
Russia (GLONASS), USA (GPS) and EC (Galileo) will provide 406 MHz repeater instruments on future medium Earth altitude orbiting (MEO) satellite constellations

- Backward compatible with current 406MHz beacons
- SAR components of constellations will be fully interoperable
- Operational alerts could be made available in the Cospas-Sarsat System as soon as 2014
Why MEOSAR?

- Improve speed and reliability of detecting and locating 406 MHz distress alerts (near-real-time):
  - Can locate beacons on single burst: First Burst Detection and Location
  - Continuous detection and location
  - Independent location accuracy improves in time

- Moving beacons can be tracked:
  - on life raft adrift at sea
  - on aircraft in emergency in flight (before a crash)

- No Doppler mirror image location generated

- Additional features e.g. Return Link Service, cancellation of false alerts

- High level of satellite redundancy and availability (multiple path less susceptible to blockage)

- Allowing improvements in beacon performance and affordability (SGB)
• 13 DASS POC payloads (S-Band) in orbit, used by Cospas-Sarsat Participants for MEOSAR D&E tests. Seven more payloads expected to be deployed by 2017.

• Three operational L-Band MEOSAR payloads are available for, one on Glonass K-1 launched in early 2011 and two on Galileo IOV satellites. A second Glonass K is expected to be deployed near the end of 2014. Six Galileo FM satellites with SAR payloads are expected to be deployed in 2014. 40+ payloads planned to be available for operational use by the of 2019.
MEOSAR Space Segment Planned Availability

MEOSAR PAYLOADS AVAILABILITY (2014-2019)

<table>
<thead>
<tr>
<th>Year</th>
<th>S-Band payloads (Experimental)</th>
<th>L-Band payloads (Operational)</th>
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<tr>
<td>2014</td>
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<td>16</td>
<td>10</td>
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<tr>
<td>2019</td>
<td>17</td>
<td>12</td>
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MEOSAR IOC → MEOSAR IOC
MEOSAR D&E Testing
MEOSAR FOC
Cospas-Sarsat MEOSAR Operational Space Segment Planned Availability

<table>
<thead>
<tr>
<th>Year</th>
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<th>Galileo</th>
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<td>2034</td>
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Legend:
- **Galileo+ Glonass**
- **Galileo**

- MEOSAR IOC → MEOSAR IOC
- MEOSAR D&E Testing
- MEOSAR FOC
## Details and Status of Existing and Planned Experimental MEOLUTs
### as of April 2014

<table>
<thead>
<tr>
<th>Ground Segment Operator</th>
<th>MEOLUT Name</th>
<th>Code</th>
<th>Associated MEOSAR-ready MCC</th>
<th>MEOSAR-ready MCC Status</th>
<th>MEOLUT Location</th>
<th>Number of Channels</th>
<th>MEOLUT Status</th>
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<tbody>
<tr>
<td>Argentina</td>
<td>El Palomar</td>
<td>TBD</td>
<td>El Palomar</td>
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<td>058° 36’ W</td>
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<td>Brasilia Recife</td>
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<td>Brasilia</td>
<td>Available</td>
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<td>047° 54.13’ W</td>
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<tr>
<td>Canada</td>
<td>Ottawa</td>
<td>TBD</td>
<td>Trenton</td>
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<td>075° 54.07’ W</td>
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<tr>
<td>China (P. R. of)</td>
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<td>Beijing</td>
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<tr>
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<td>France</td>
<td>Toulouse</td>
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<td>Toulouse</td>
<td>Available</td>
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<td>001° 28.85’ E</td>
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<tr>
<td>Greece</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>Planned</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
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<tr>
<td>Germany</td>
<td>Berlin</td>
<td>TBD</td>
<td>Berlin</td>
<td>Planned</td>
<td>TBD</td>
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<tr>
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<td>TBD</td>
<td>TBD</td>
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<tr>
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<tr>
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<td>TBD</td>
<td>TBD</td>
<td>Callao</td>
<td>Available</td>
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<td>Russia</td>
<td>Moscow</td>
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<td>South Africa</td>
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<td>TBD</td>
<td>Planned</td>
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Existing Experimental MEOLUTs
as of April 2014
Existing + Planned Experimental MEOLUTs
as of April 2014
Cospas-Sarsat MEOSAR Timeline

- Cospas-Sarsat MEOSAR schedule will be reviewed in more detail in the upcoming months
- Success oriented timeline for most important events are currently planned as follow:
  - MEOSAR IOC (2015)
  - MEOSAR FOC (beginning of 2018)
  - Second Generation Beacons available on the market (end of 2018)
Important Cospas-Sarsat and 406 MHz Beacon Related Activities since September 2013

- First Eurocae WG-98 meeting (November 2013). The group is expected to provide a draft revision to ED-62A Minimum Operational Performance Specification for Aircraft Emergency Locator Transmitters, in particular, to address future SGB and ELT triggered-in-flight requirements.

- Cospas-Sarsat Task Group meeting on SGB specification (February 2014)

- Cospas-Sarsat Task Group meeting on MEOSAR D&E Phase (March 2014)

- ITU WP-4C meetings on the protection of the Cospas-Sarsat system from out-of-band/adjacent band emissions of other services (two WP-4C meetings in October 2013 and February 2014)

- First Eurocae WG-98 /RTCA SC-229 joint meeting (March 2014) the two groups are to develop new harmonized requirements for ELTs (ED-62 and DO-204).
Upcoming Cospas-Sarsat and 406 MHz beacon related meetings in 2014

- Cospas-Sarsat JC-28 meeting (June 2014)
- Last ITU 4C meeting (prior to WRC 15 CPM) on the protection of the Cospas-Sarsat system from out-of-band/adjacent band emissions of other services (June 2014)
- Eurocaen WG-98 /RTCA SC-229 joint meetings (September and December 2014)
- Cospas-Sarsat Expert Working Group Meeting on MEOSAR D&E (September 2014)
• New Cospas-Sarsat website inaugurated on 27 March 2014 (UTC), with most but not all work completed
• Enhanced functionality available throughout the website, in particular, mobile-platform-friendly design that incorporates automatic scaling to the screen of the device from which the website is accessed
• Engineered as two available “mini-sites”, with one directed towards the general “public” audience (beacon owners, prospective beacon owners and those previously unfamiliar with the Programme) and the other towards Cospas-Sarsat “professionals” who need quick access to documents and tools
• Menu reorganized with the addition of customized icons and quick links, to permit the user to easily and intuitively locate information relevant to them throughout the site
New Cospas-Sarsat Website

- Consolidation of duplicative tables and the addition of customized filters that facilitate quickly finding the desired information within tables
- Recoding of the website backend, elimination of obsolete articles, clean-up of QMS tables and select database tables to reduce overall site latency, thus improving user access times to load site pages
- Framework where the Secretariat can more easily manage content on the website (in three languages) and develop future modules at relatively low costs
- Long-term cost savings to be realized with the new system architecture
Cospas-Sarsat operates the International 406 MHz Beacon Registration Database (IBRD) which is freely available to users with beacons coded to a country with no national registration facilities, or with beacons coded to an Administration that wishes to allow use of the IBRD.

IBRD helps to facilitate the availability of beacon registration data to SAR services.

The search and rescue community has continued consistent use of the IBRD, with an average of 315 SAR users per month logging in to the IBRD in 2013.
In 2013, there were over 9,000 new beacon registrations in the IBRD, which now holds more than 41,000 registration records for beacons from 125 Administrations, of which only 15 had more than 500 beacons registered (none above 5000 beacons).
For More Information

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Email: dstpierre@cospas-sarsat.int