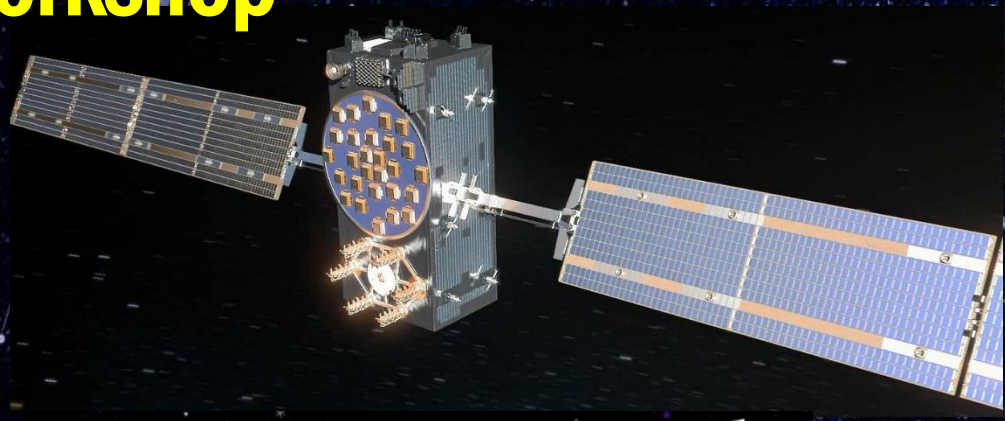
Beacon Manufacturers Workshop

Portsmouth, Virginia, USA
Sept 20th 2019



Cospas-Sarsat updates and ELT-DT related development

Dany St-Pierre
Cospas-Sarsat Secretariat

Cospas-Sarsat Programme

Cospas-Sarsat Programme Status

- Overall Mission and Participants
- System segments status: Space segment, Ground Segment, Beacon population
- Assisted Saves distribution and evolution
- Upcoming developments and developments under consideration

ELT-DT updates

- Historical Perspective
- ICAO, EASA latest ELT(DT)-related developments
- National Regulations latest ELT(DT)-related changes
- Latest Cospas-Sarsat ELT(DT)-related document changes (from JC-33)

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Cospas-Sarsat Mission

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.

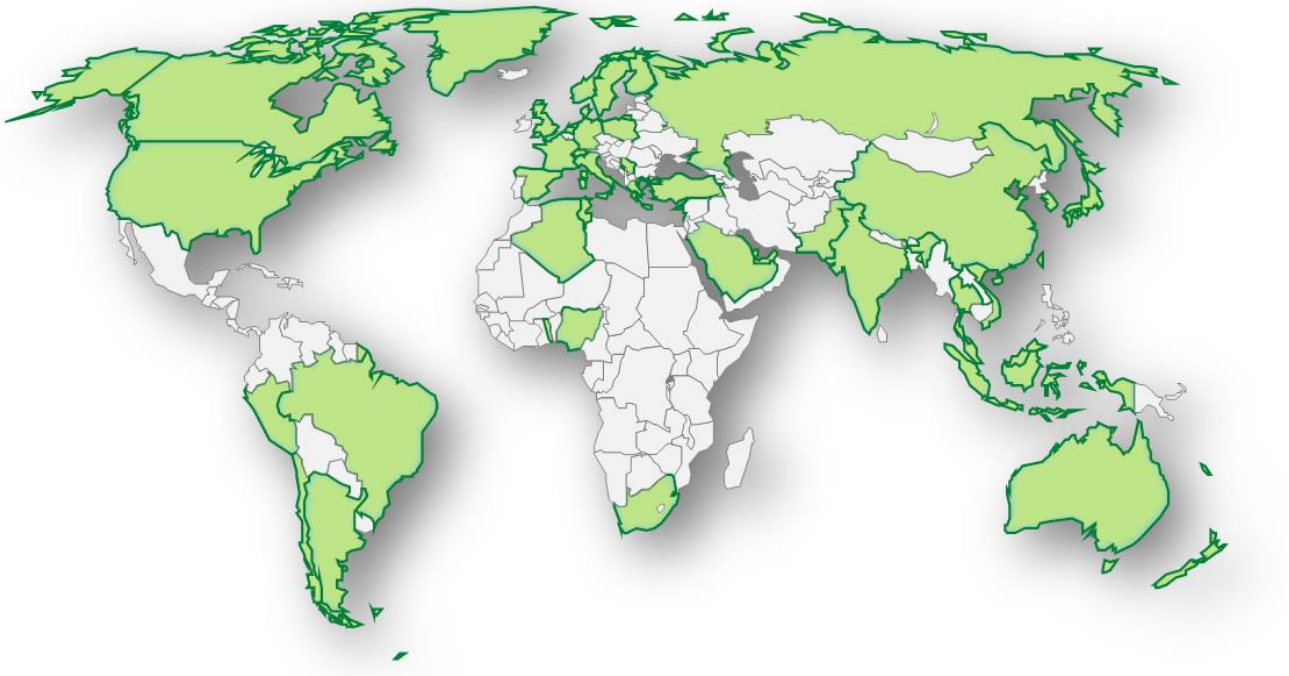
Strategy

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 worldwide and free of charge for the user in distress.

Cospas-Sarsat Participants

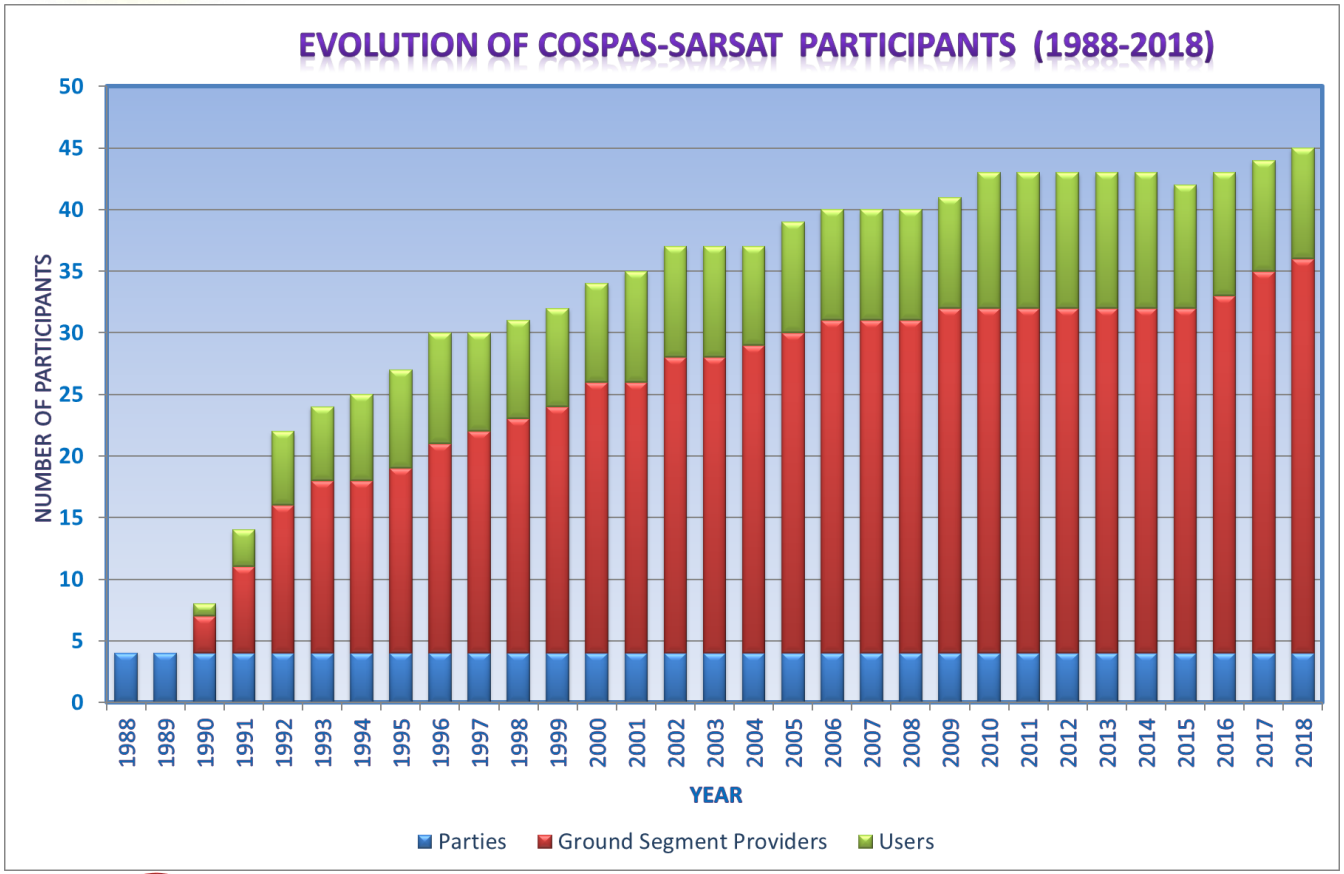
Cospas-Sarsat Participants (45)



>75% of World Population
>85% of World Wealth

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)
Malaysia
Netherlands
New Zealand
Nigeria
Norway
Pakistan
Peru
Poland
Qatar
Russia
Saudi Arabia
Serbia
Singapore
South Africa
Spain
Sweden
Switzerland
Thailand
Togo
Tunisia
Turkey
UAE
UK
USA
Vietnam

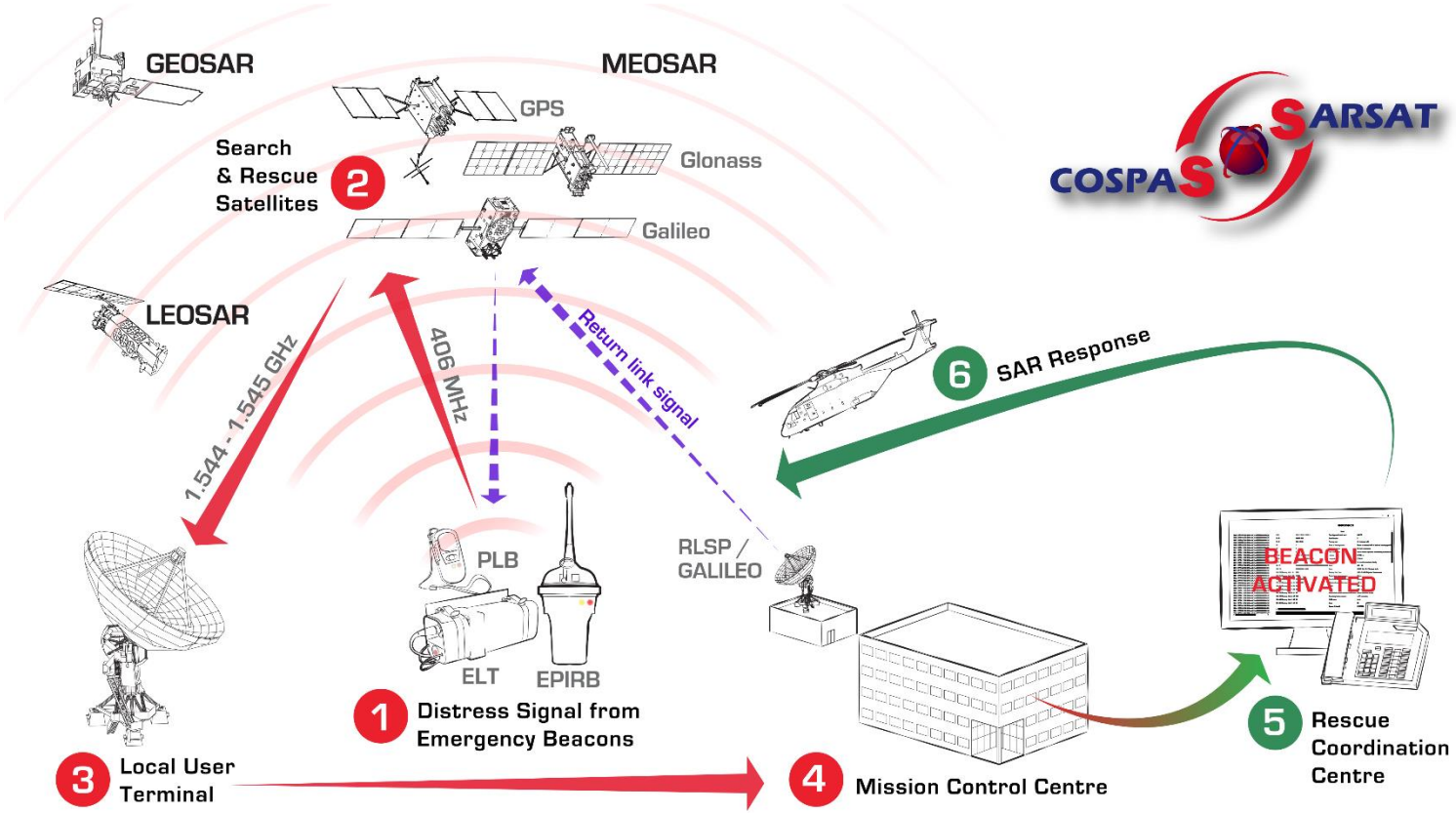
Cospas-Sarsat Participants' Evolution



43 States and 2 Organisations:

- **4** Parties: Canada, France, Russia, USA
- **32** Ground Segment Providers
- **9** User States

Cospas-Sarsat System



Cospas-Sarsat Satellite Systems

3 Types of Satellite Systems

- Low Earth Orbiting Search And Rescue (LEOSAR): first payload deployed in 1982. Main operational system since the beginning of the Cospas-Sarsat Programme
- Geostationary Orbiting Search And Rescue (GEOSAR): first payloads deployed in the mid-late 90s to provide early alerts and complement the LEOSAR system
- Medium Earth Orbiting Search And Rescue (MEOSAR): first payloads deployed in the early 2000s, first operational payload deployed in 2012 (Galileo), declared at Early Operational Capability in 2016

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Cospas-Sarsat LEO-GEO Components

Space Segment:

- 5 LEO payloads in operation (1 temporarily shut-down to avoid ground tracking interference, 1 additional LEO payload in testing, 1 more planned to be deployed in 2020
- 9 GEO payloads in operation (one to be shut down soon), 3 additional GEOSAR under in-orbit tests (4 more planned to be deployed between 2020 and 2025)

Ground Segment:

- 59 Operational LEOLUTs and 26 Operational GEOLUTs (+1 additional (new location) to be added in 2019)
- 30 Operational Mission Control Centres including 5 commissioned at LGM (Leosar, Geosar, Meosar),

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MEOSAR payloads status

- Galileo: 19 SAR repeater satellites are operational (+ one temporarily shut-down). Four additional payloads under testing. 12 additional payloads are to be launched starting in December 2020 until 2022.

  The EC is undertaking the procurement of new satellites that will make the transition between the Galileo First Generation and Second Generation. These satellites will embark a new generation of SAR payloads which will be optimized for reaching the performances expected from the SGBs. These transition satellites are planned to be launched from 2026.

- SAR/Glonass: Two experimental L-band SAR/Glonass payloads are available to support the current the MEOSAR D&E and EOC activities. Six additional Glonass payloads expected to be launched between 2019 and the end of 2020

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MEOSAR payloads status

- DASS/GPS II: 19 DASS payloads used operationally, two more DASS payloads in orbit to be tested. Six additional DASS payloads planned to be deployed on GPS-III satellites. First L-band payloads to be deployed starting in 2026 on GPS-III
- Chinese BEIDOU: 2 SAR/Beidou payloads launched in September 2018, currently under testing. 4 more satellites planned to be deployed with a SAR payload prior to the end of 2020. Future payloads are TBD
- By the end of 2021 more than 60 MEOSAR payloads are expected to be made available for SAR operations and more than 80 MEOSAR payloads are expected to be in operation by 2030

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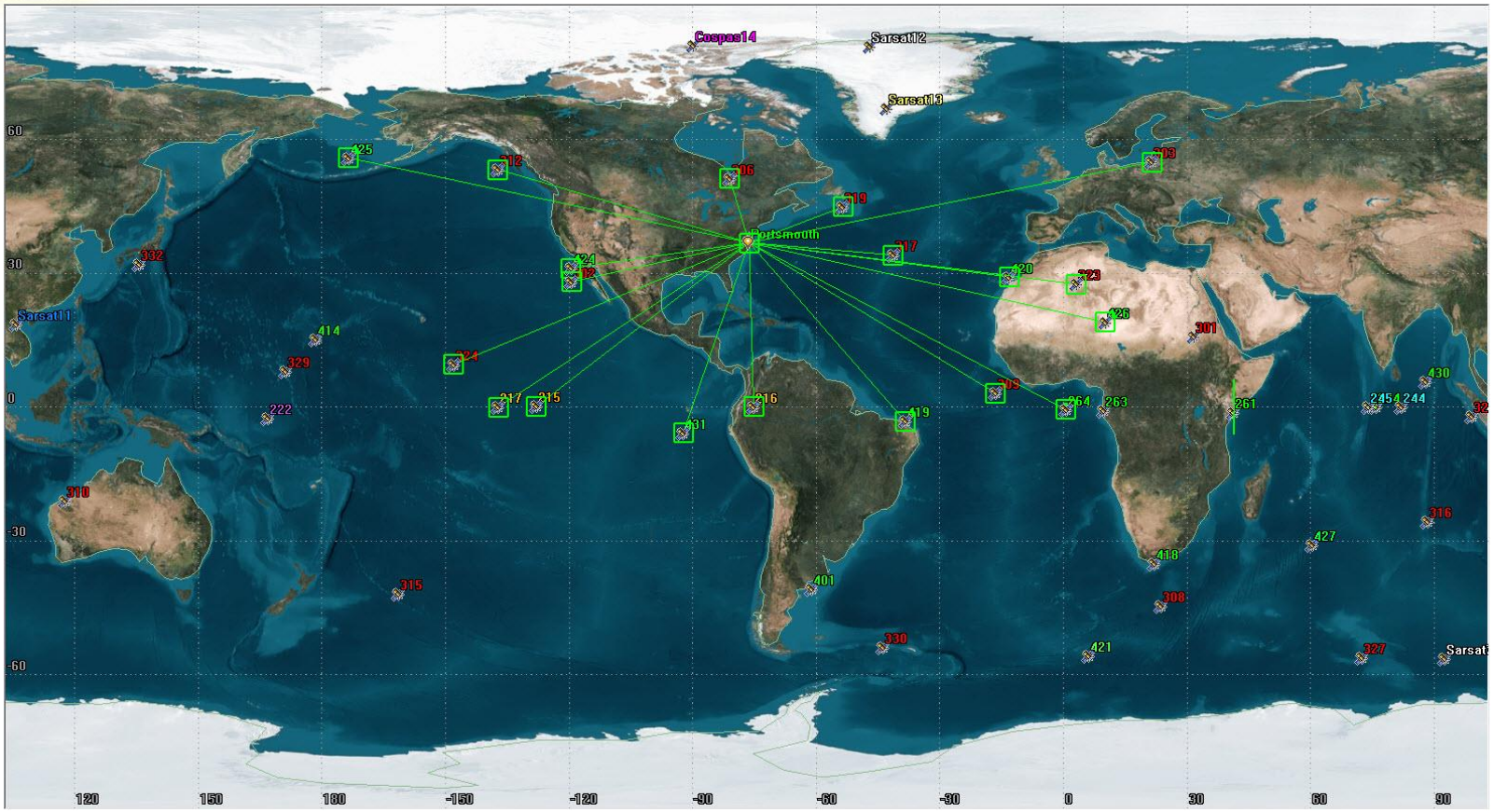
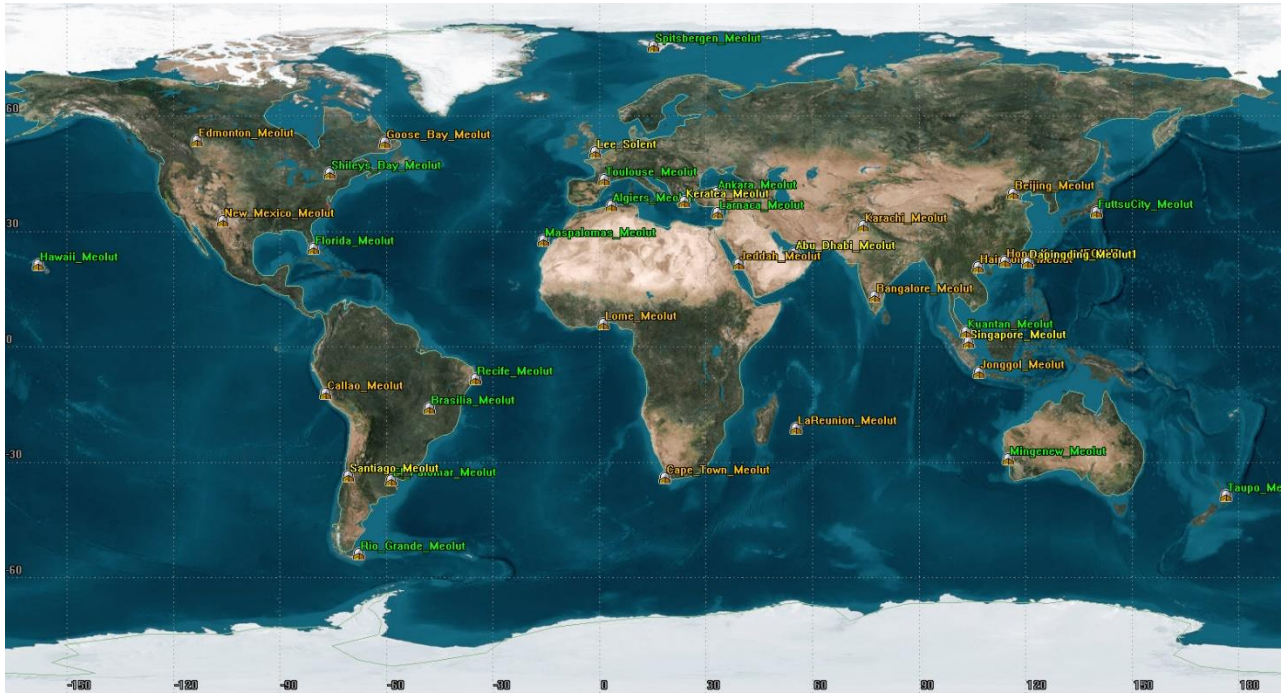
C/S payloads: Portsmouth example



19 Operational C/S assets in view of Portsmouth at 13:45 UTC 20 Sept 2019 (16 MEOSAR, 3 GEOSAR)

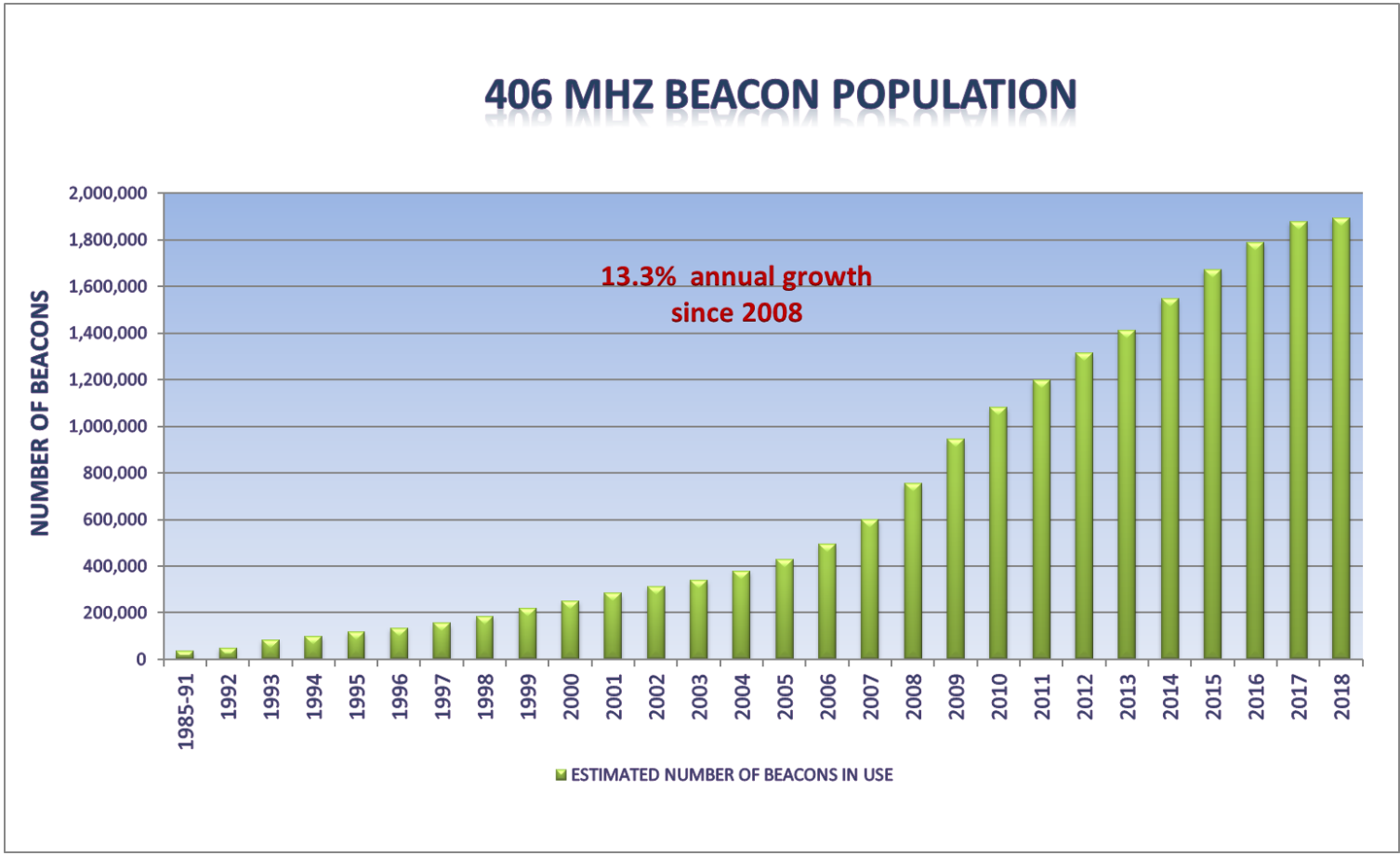
MEOSAR Ground Segment updates

- 17 commissioned MEOLUTs at EOC (6 new MEOLUTs to be approved at CSC-62)
- 5 commissioned LGM MCCs.



13 more MEOLUTs planned to be commissioned by 2020. The MEOSAR system is expected to become the Cospas-Sarsat main operating system once it is declared at FOC.

Beacon Population Evolution



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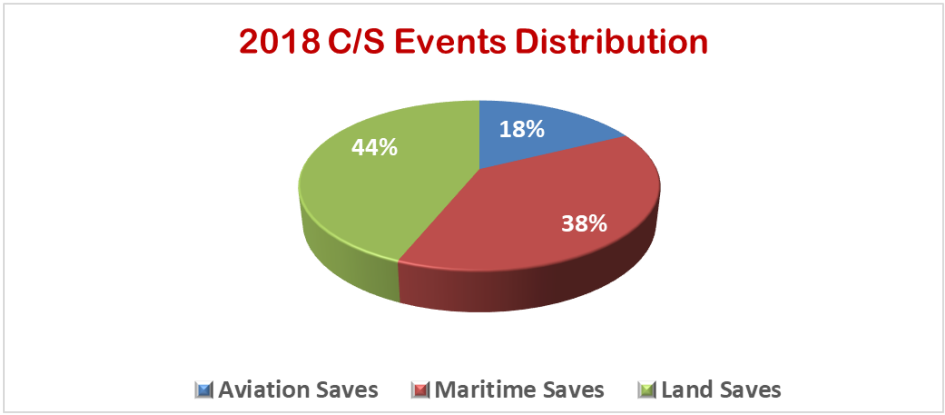
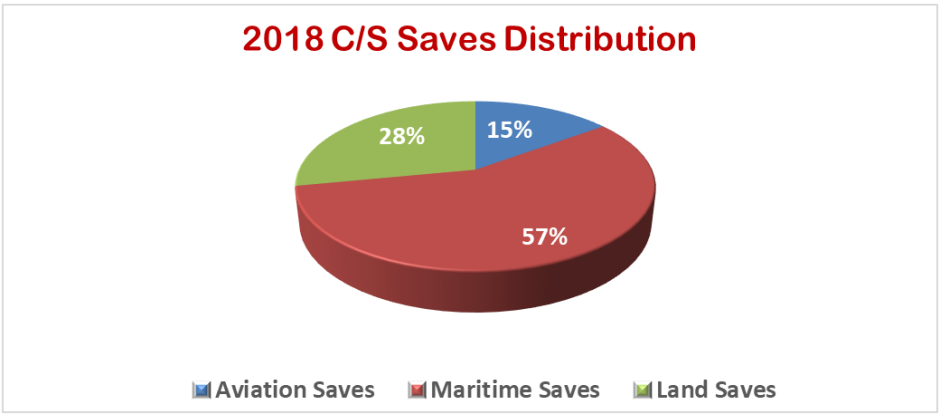
Cospas-Sarsat
SAR Events and Assisted Saves

	2018
SAR Events:	904
P. Rescued:	2185

SAR Events (1982 / 2018) : **14,531**

P. Rescued (1982 / 2018) : **48,738**





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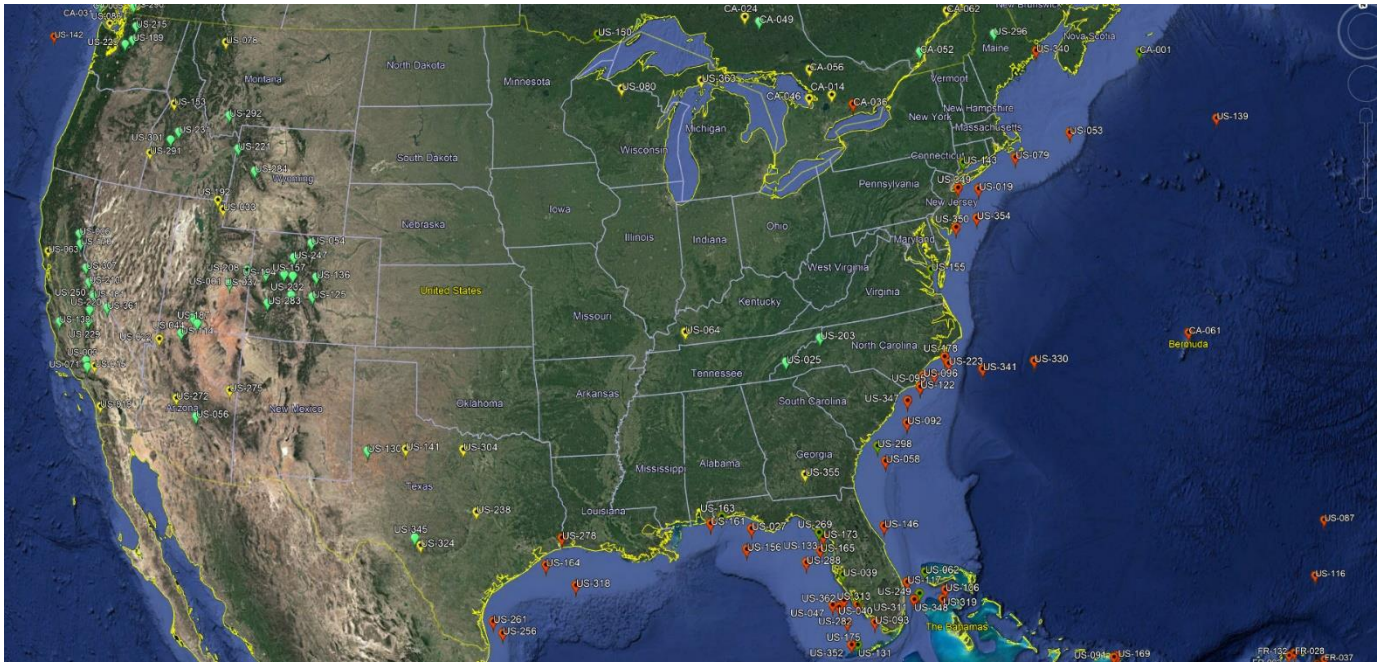
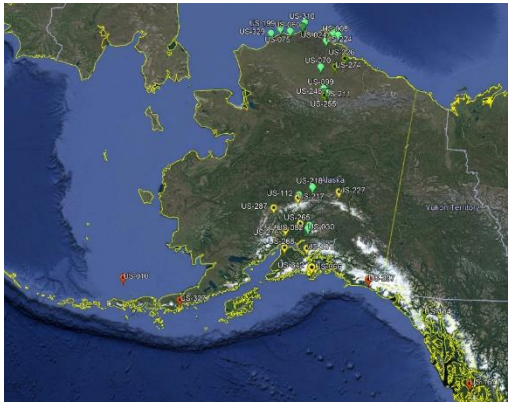
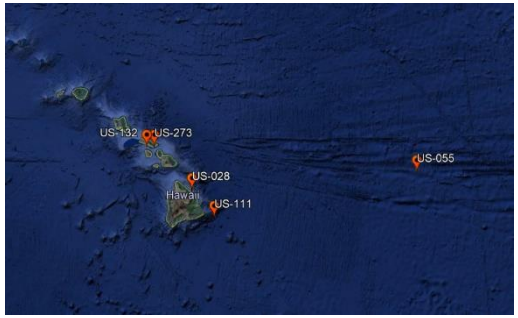
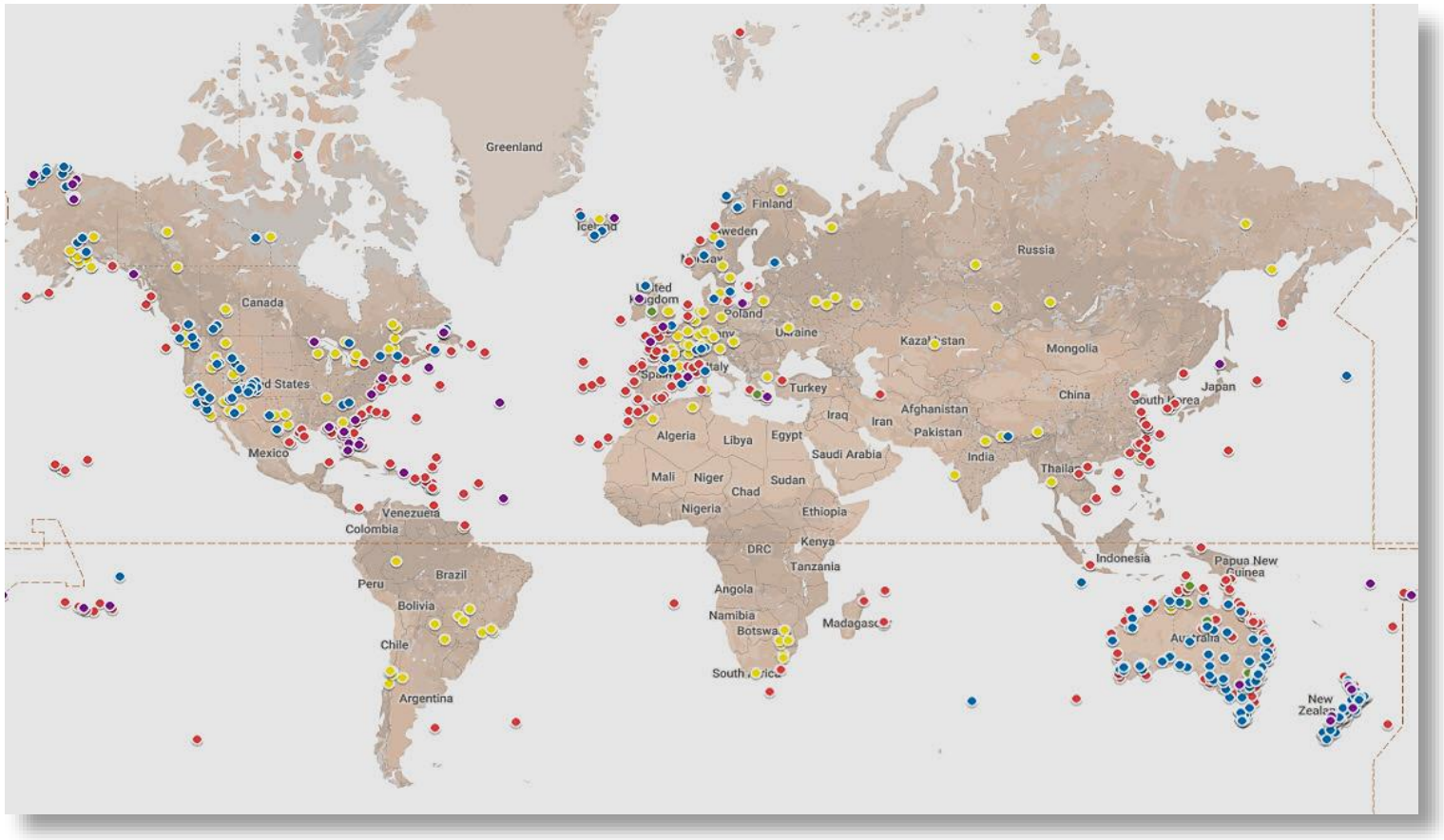
2018 USA Alert Locations







2018 Worldwide Alert Locations



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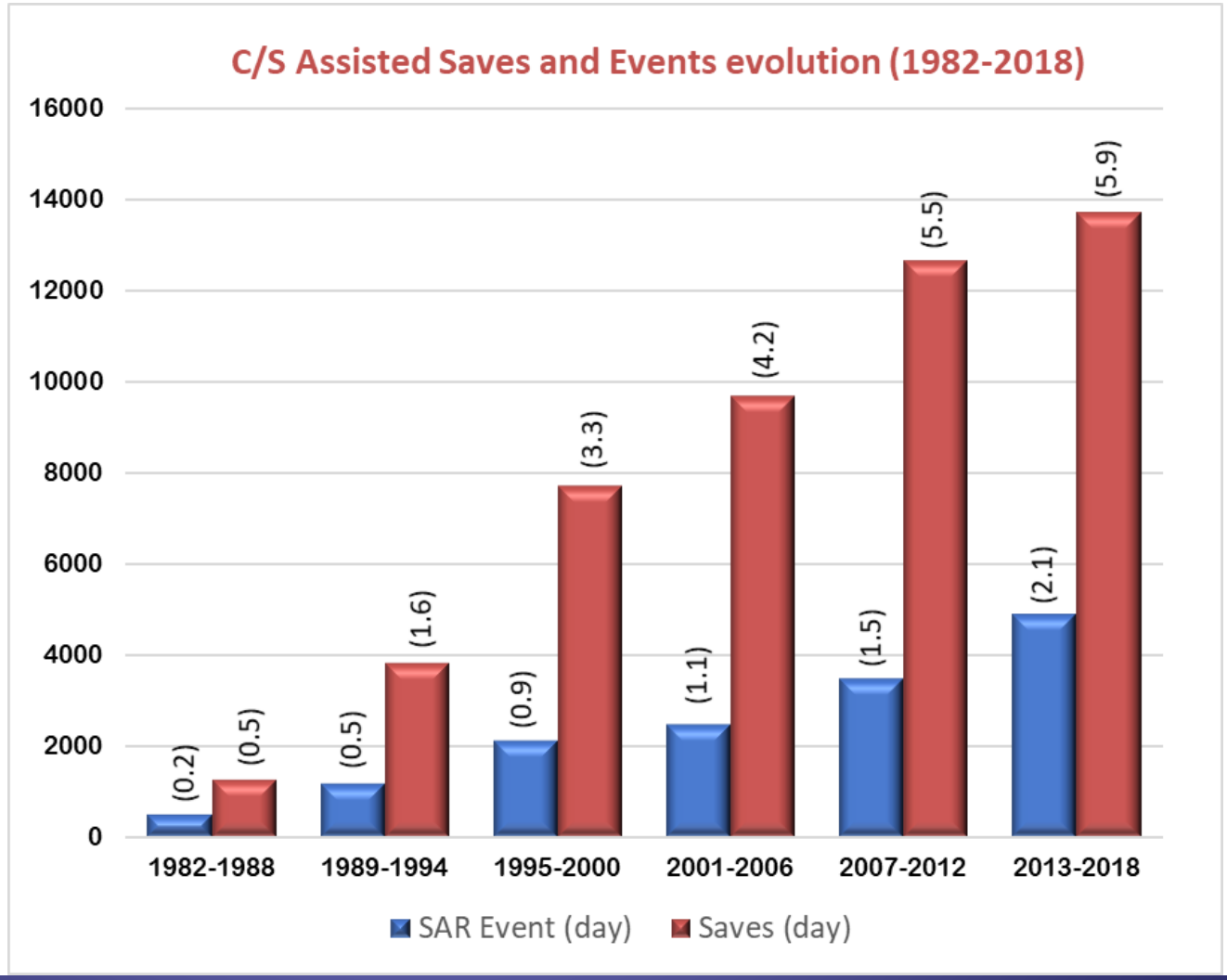
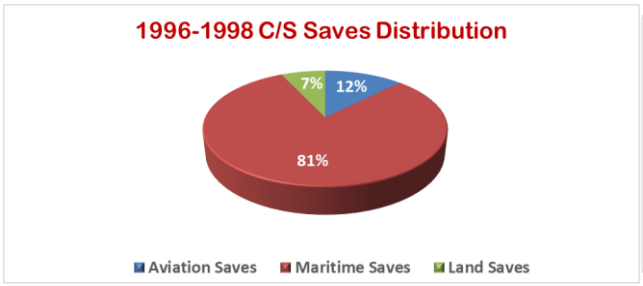
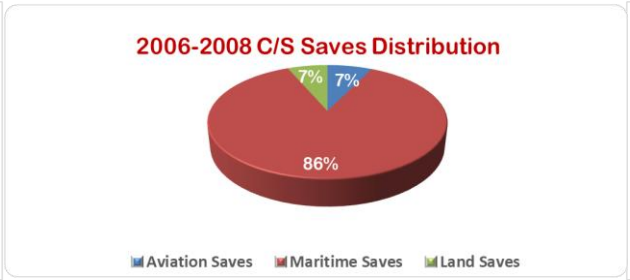
Cospas-Sarsat events and assisted saves evolution

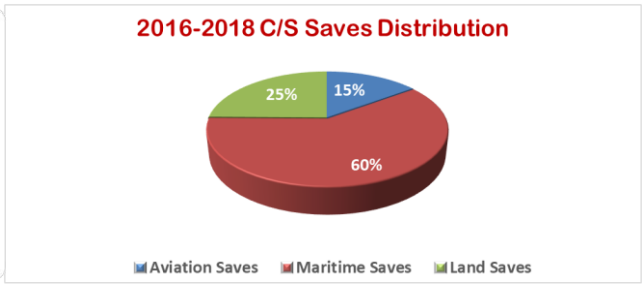
AN AVERAGE OF 6 ASSISTED SAVES IN 2 EVENTS PER DAY IN THE LAST 5 YEARS

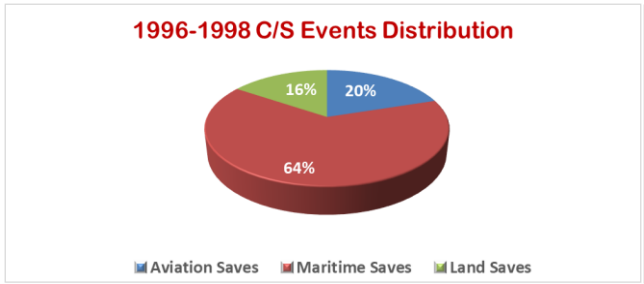


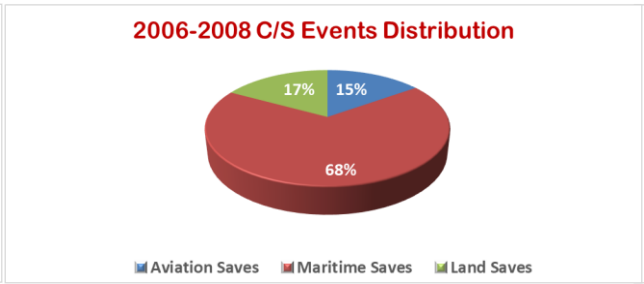
Cospas-Sarsat
SAR Events and Assisted Saves Evolution

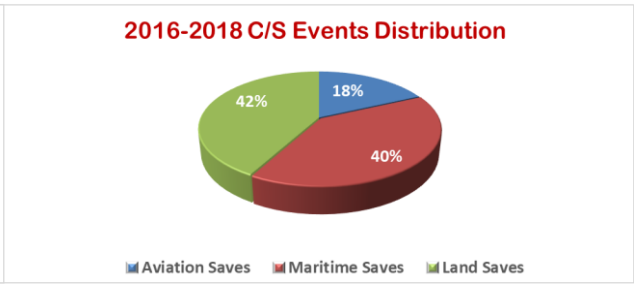












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Cospas-Sarsat Short-Term Upcoming Developments

	Goals	Comments
MEOSAR	• Reduce time to deliver distress alerts and positions • Allow better tracking of moving beacons • More flexibility in beacon design • Allow more services to be provided	Expected to replace LEOSAR as main Cospas-Sarsat Operating System
ELT(DT)	• Enhance the likelihood of locating an aircraft accident site • Compliance to new ICAO and EASA requirements	ELT automatically triggered when an in-flight distress situation is determined
SGB	• Allow more accurate beacon positions to be determined (one order of magnitude better compared to T.001 compliant beacons) • More information possibly conveyed to RCCs (longer and flexible message content)	Expected to replace T.001 compliant beacons in the near future
RLS (Acknowledgment Type 1)	• New service to enhance beacon user experience	Acknowledgment of distress alert and (confirmed) position reception

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Additional development under considerations

	Goals	Comments
Remote Activation and deactivation via navigation signals (ELT-DTs)	Address possible non-cooperative cockpit issues (such as MH370)	• MASPs under development by WG-98 SG-1 Group • Service still to be approved by the Cospas-Sarsat Council
Type 2 RLS	Allow RCCs to forward information to beacon users	• Possible optional service which could be provided using the Galileo navigation signal • Under considerations by ICAO/IMO JWG
Two-way RLS services	Allow bi-directional exchanges between beacon user and RCCs, possible enhancing rescue operations	• Possible optional service which could be provided using the Galileo navigation signal
SINSIN position determination	Enhance the likelihood of position determination and position accuracy in difficult environments (mountainous areas, end of MEOLUT coverage situations)	• Discussed at JC-33, concept to be further reviewed by CSC-62

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ELT(DT)s historical perspective

- The original concept (triggered-in-flight ELT) was aimed at improving the reliability of ELT transmissions (especially for large aircraft which are usually impacting the ground at high velocities) by allowing for an ELT to be activated prior to an accident and continuously locating the signals using the MEOSAR system to eventually locate the accident site. From 2013 several tests have been undertaken by Cospas-Sarsat Participants using fast moving beacons or ELTs triggered-in-flight (ELT-DT concept) to demonstrate the technical feasibility of Cospas-Sarsat ELT(DT)s
- In December 2015, EASA published CAT.GEN.MPA.210 "Location of an aircraft in distress – Aeroplanes" which requires that aeroplanes of certain categories to be equipped with "robust and automatic means to accurately determine, following an accident where the aeroplane is severely damaged, the location of the point of end of flight". This MPA was applicable to certain categories of aircraft (large aircraft) certified after 1 January 2021
- In 2016, ICAO adopted ADT requirements for Distress Tracking, which became effective on 11 July 2016 with an implementation date of 1 January 2021. The requirements aim as providing the location of an aircraft accident site of 6 nm accuracy (Annex 6, chapter 6.18)
- The EASA and ICAO requirements became strong incentives for the Cospas-Sarsat programme to further develop and support the concept of ELT(DT)s.

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ICAO and EASA latest ELT(DT)-related developments

- In September 2019, the EU adopted EASA Regulation (EU) 2019/1384 postponing the applicability date of CAT.GEN.MPA.210 to 1 January 2023
- EASA is currently developing RMT.0400 (Guidance material for CAT.GEN.MPA.210), a draft version of the document was circulated for comments in May 2019. The NPA is expected to be made available in Oct/Nov 2019 for review
- ICAO is undertaking the development of an DTR (Distress Tracking Repository) to distribute alerts from future ADT compliant systems. In 2019 a functional specification for the DTR which has now evolved in a "Location of an Aircraft in Distress Repository (LADR) functional specification (currently at version 3.1) has been developed
- Possible postponement of the applicability of the ADT requirements for Distress Tracking (Annex 6, chapter 6.18) for 1 January 2021 will be discussed at the upcoming ICAO 40th general assembly (Sept 24 Oct 4 2019)

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National regulations latest ELT(DT)-related developments

- RTCA: DO-204B approved at the end of 2018
- FAA: TSO 126c (referring to the use of DO-204B) approved in March 7 2019 (applicable prior to September 7 2020)
- EUROCAE: ED-62B under final review, approval expected before the end of 2018
- EASA: ETSO C126c (referring to the use of ED-62B) circulated for review in 2019, EASA is currently completing the review of the feedbacks. Final version expected to be published in December 2019 or January 2020

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Cospas-Sarsat documentation latest ELT (DT)-related development (from JC-33)

- Cospas-Sarsat beacon specification changes recommended by JC-33
  - Changes in the ELT(DT) location protocol
    - Location protocol test protocol (FGBs)
    - Location Freshness indicators (FGBs)
    - In-flight Rotating Field definition (SGBs)
    - Alternate Aircraft Marking Protocol (FGBs) (note recommended for approval at this time)
  - Changes to specifications for ELT(DT) designed to withstand a crash (for the period after crash activation)
    - Relaxation of transmission rates after 30 minutes modification of the GNSS update rate after 30 minutes (FGBs and SGBs)
    - Modification of the GNSS update rates (FGBs and SGBs)
  - New section added for ELT(DT) combined with automatic ELT (FGBs and SGBs)
- Additional ground segment and operational specification changes might result from the proposed to beacon specifications. If so, amendments will be reviewed at CSC-62.

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Cospas-Sarsat type approval process latest ELT (DT)/SGB- development

- Beacon Type approval standards (C/S T.007 and C/S T.021) have been amended to remain up to date with modifications made in beacon specifications for C/S T.001 beacon (FGB) and C/S T.018 beacons (SGB)
- C/S T.021 is currently approved at Preliminary level B. This allows SGBs type approval to be granted only under specific conditions. A fully release version of C/S T.021 is expected to be approved in the near future
- The type approval of ELT(DT) and SGB will require additional parameters and capabilities to be verified. Test laboratories would need to be "accepted" as capable of assessing these parameters and capabilities prior for them to type approved the new beacon types.
- In 2019 a special working panel composed of expects from the Cospas-Sarsat Parties and the Secretariat has been created to review the test laboratory applications for extended capabilities (ELT(DT) and SGB). The panel has also been tasked to review the first ELT(DT) and SGB type approval applications from beacon manufacturers in parallel. The panel initiated its work in the summer of 2019 and is currently reviewing an application from a test laboratory for an extended SGB capability. Many more applications for extension of testing capabilities and/or (ELT(DT) and SGB type approvals are expected in the upcoming months.

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Cospas-Sarsat System as of 2021

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For More Information

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