International Civil Aviation Organization

Eighth Meeting of the ICAO Asia/Pacific Search and Rescue Working Group (APSAR/WG/8)

Bangkok, Thailand, 22 – 25 May 2023

Agenda Item 3: Global update

STATUS OF THE COSPAS-SARSAT PROGRAMME

(Presented by the Cospas-Sarsat Secretariat)

SUMMARY

This paper presents a status report on the Cospas-Sarsat System, including System operations, significant developments, Space and Ground Segments, beacons, false alerts, reporting by RCCs on use of the distress alert data provided, and results of MCC-SPOC communication tests, and seeks APSAR views on these matters.

1. INTRODUCTION

System Operation

1.1 In 2021, the latest year for which statistics have been compiled and reviewed, Cospas-Sarsat alert data assisted in 1,149 distress incidents (951 in 2020) and 3,623 persons were rescued (2,278 in 2020). Since September 1982, the Cospas-Sarsat System has provided assistance in rescuing at least 57,413 persons in 17,663 SAR events (**Figure 1**).

1.2 The geographic distribution of all reported SAR events for which Cospas-Sarsat alert data was used in 2021 is presented in **Figure 2** and the distribution of all SAR events is 18% for aviation, 45% for land and 37% for maritime. Participants often provide synopses of recent SAR cases supported by Cospas-Sarsat for publication on the Cospas-Sarsat webpage and Facebook page. ICAO/IMO JWG-SAR working group participants are invited to monitor this page and contribute to it by sending stories to mail@406.org.

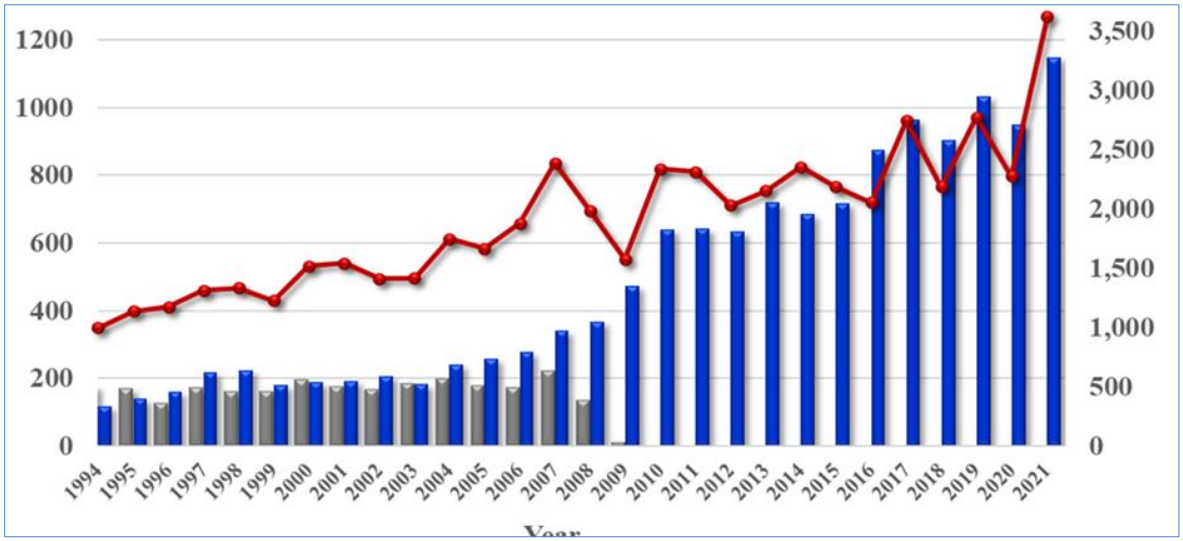

Figure 1: SAR Events with the Assistance of Cospas-Sarsat Data (Jan. 1994 - Dec. 2021)

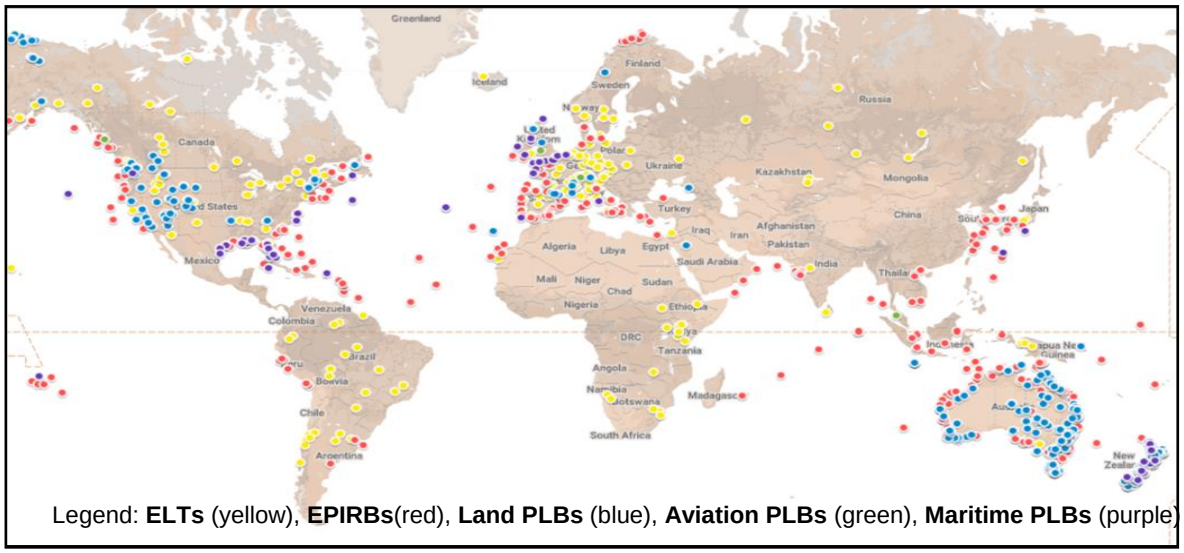

Figure 2: 2021 Geographic Distribution of SAR Events

2. DISCUSSION

406 MHz Beacons

2.1 Based on estimates made using beacon-registration data and the number of activated beacons that had been registered, there were about 2,955,000 Cospas-Sarsat beacons deployed worldwide at the end of 2021, an increase of about 16% over that reported in 2020 (2,534,000). We estimate that more than 75% of beacons deployed globally are equipped with global navigation satellite system (GNSS) receivers that allow the beacon location to be reported in the distress message (in addition to independent localization of the beacon by "trilateration" of the Cospas-Sarsat System).

2.2 The Cospas-Sarsat Secretariat maintains an International Beacon Registration Database (IBRD) as an internet portal that is available for beacon registration for 167 Administrations (national and territorial) that allow its use in place of a national registration mechanism for at least one type of beacon. The IBRD also allows bulk upload of national databases as a means of making the data easily available on a 24/7 basis. As of 1 May 2023, there were 105,546 beacons registered in the IBRD (100,047 in April 2022). In 2022, Cospas-Sarsat deployed a new IBRD user interface to accommodate the registration of new beacon types, such as the ELT(DT)s, and "second generation" beacons (SGBs) that use more modern "spread spectrum" transmission technology. The new IBRD, with a more user-friendly interface, is available at www.406registration.com/.

The System

2.3 Cospas-Sarsat relies on three satellite-constellation types: the original low-altitude Earth orbiting satellites (LEO); geostationary Earth orbiting satellites (GEO); and the newest-technology payloads aboard medium-altitude Earth orbiting satellites (MEO).

2.4 As of 1 May 2023, twenty-nine MEO earth stations (local user terminals known as MEOLUTs), capable collectively of simultaneously tracking up to 400 satellites, were commissioned for MEO search-and-rescue satellite payloads (MEOSAR), and at least 18 more MEOLUTs (with multiple antennas each) are planned between 2023 and 2025.

2.5 In November 2022, the "Declaration of Intent Between the Co-Operating Agencies of the International Cospas-Sarsat Programme and the Maritime Safety Administration of the People's Republic of China for Co-Operation on the Cospas-Sarsat MEOSAR Satellite System" was signed, associating the six SAR/BDS (BeiDou) payloads to the System as the fourth MEOSAR constellation (in addition to Galileo, GLONASS and GPS). Full details of the operational Space and Ground Segments are available at 406.org.

SPOC Communication

2.6 Since 2008, Cospas-Sarsat has conducted regular testing of communications links between Cospas-Sarsat mission control centers (MCCs) that distribute distress alerts to their supported SPOCs. COMSAR 13 requested Cospas-Sarsat to report on these MCC/SPOC communication tests.

2.7 The following **Table 1** information is a summary of results for the period 2018-2022. For that period, 19 of 31 operational MCCs reported results of MCC/SPOC communication tests results. Some MCCs do not support SPOCs outside of their country and therefore are not required to conduct these tests.

	2018	**2019**	**2020**	**2021**	***2022****
Number of SPOCs tested by MCCs	154	161	165	171	*171*
Non-responsive SPOCs (no response to tests)	8.44%	8.70%	7.23%	8.19%	*5.85%*
Rarely responsive SPOCs (less than 20% successful tests)	6.49%	5.59%	6.02%	3.51%	*5.85%*
SPOCs with low success ratio (between 20 and 50% successful tests)	10.39%	9.94%	7.23%	9.94%	*7.0%*
Insufficiently responsive SPOCs	**25.32%**	**24.22%**	**20.48%**	**21.44%**	***18.70%***
Note (*) 2022 information yet to be reviewed by the Cospas-Sarsat Joint Committee in June 2023.					

Table 1: SPOC Communication Test Results (2018 – 2022)

2.8 The statistics in Table 1 and Figure 3 are based on the proportion of successful tests between MCCs and SPOCs. A successful test means that the requested positive feedback (not an automatic acknowledgement) was received from the SPOC. When available, several communication links (e.g., AFTN, Fax, Phone, E-mail, FTP, Telex, X.25) were tested each month. In many cases, each available link was tested separately and counted as a unique test.

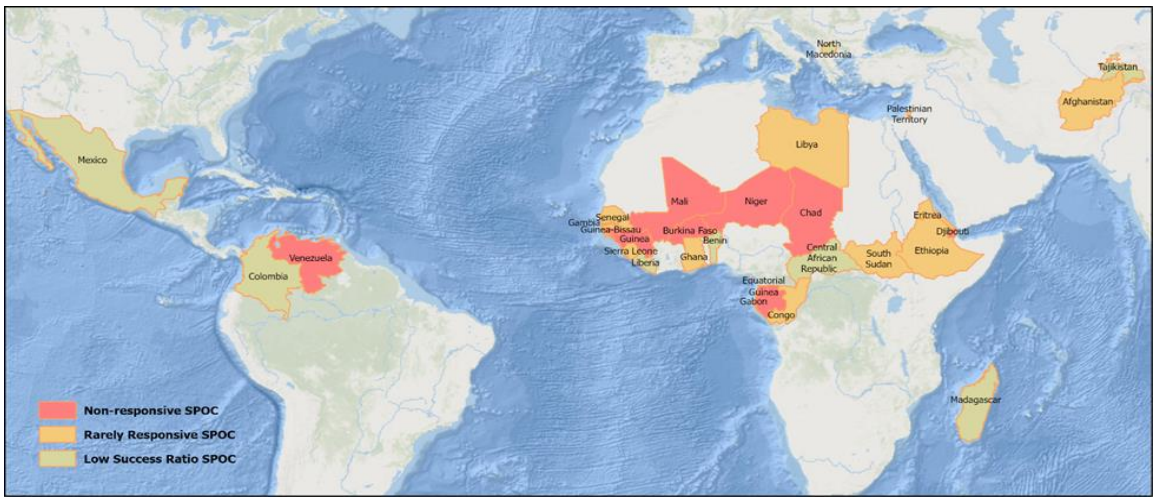

Figure 3: Map of Non-Responsive and Poorly Responsive SPOCs (2022)

2.9 With the assistance of members of the ICAO/IMO Joint Working Group on Harmonization of Aeronautical and Maritime Search and Rescue (ICAO/IMO JWG-SAR), ICAO and Cospas-Sarsat have hosted a series of seminars aimed at improving the ability of rescue coordination centres (RCCs) to effectively respond to distress alerts sent by Cospas-Sarsat and to reduce the poor response rate to test messages sent to SPOCs.

2.10 The first such workshop was hosted by the ICAO Dakar Regional Office in September 2021 using a virtual meeting platform. A follow-on seminar was conducted (virtual platform) in October 2022. An ICAO Africa – Indian Ocean Regional GADSS Workshop held (virtual platform) in August 2022 and in addition to GADSS, also addressed SPOC communication matters.

2.11 In 2022-2023, eight new agreements between MCCs (Algeria, Italy and Spain) and their supported SPOCs (Albania, Benin, Cameroon, Gambia, Kenya, Niger, North Macedonia, San Marino) were signed and deposited with the Secretariat (as bolded in the list provided in section 2.12). Of note as well is the significant improvement in the SPOC response rate to communication tests conducted in 2022, the first time that the insufficiently responsive rate has dropped below 20%

2.12 The Secretariat currently holds copies of agreements/arrangements between:

- **Algerian MCC – Niger**
- Chilean MCC – Paraguay (Rep. of)
- French MCC – Austria (Austrocontrol),
- French MCC – France, MRCC Antilles-G.
- French MCC – France, MRCC Gris-Nez
- French MCC – France, ARCC Lyon
- French MCC – France, MRCC La Réunion
- French MCC – France, JRCC Tahiti
- French MCC – Germany, ARCC Münster,
- French MCC – Morocco, ARCC Rabat
- French MCC – Switzerland
- French MCC – Tunisia, ACC Tunis
- Indian MCC – Nepal (CAA)
- **Italian MCC – Albania**
- **Italian MCC – Kenya**
- **Italian MCC – North Macedonia (Rep. of)**
- **Italian MCC – San Marino**
- Italian MCC – Serbia (Rep. of)
- Italian MCC – Somalia
- Italian MCC – Sudan (CAA)
- Norwegian MCC – Sweden (Maritime Admin.)
- Saudi Arabian MCC – Lebanon
- South African MCC – Mozambique
- **Spanish MCC – Benin**
- **Spanish MCC – Cameroon**
- **Spanish MCC – Gambia**
- Spanish MCC – Ghana
- UK Maritime and Coast Guard Agency – Irish Coast Guard
- USA MCC – Bermuda (Gov. of)
- USA MCC – COCESNA
- USA MCC – Dominican Republic
- USA MCC – Dutch Caribbean Coastguard
- USA MCC – Ecuador (Rep. of)
- USA MCC – Haiti (Rep. of)
- USA MCC – Panama (Rep. of)
- USA MCC – Trinidad and Tobago
- Vietnam MCC – Cambodia
- Vietnam MCC – Laos

Providing Feedback on Actions Taken by an RCC

2.13 At its 27th meeting in September 2020, the ICAO/IMO Joint Working Group (JWG) on the Harmonization of Aeronautical and Maritime Search and Rescue provided draft amendments to the IAMSAR Manual, Volume II, appendix B, to provide sample ELT(DT) alerts and cancellation messages.

2.14 Distress-alert messages are sent to SAR authorities in the "SIT 185" human-readable text format. As the Cospas-Sarsat System developed, the size and content of the distress messages increased, but no significant changes were made to the message format. Beginning in 2023, distress information is now delivered by their supporting MCCs to Cospas-Sarsat SPOCs in a revised SIT 185 format message, designed for greater clarity. The goal of this reorganisation was to use clear terminology and labelling and to provide distress position information in a more readily usable order. Two significant changes were made, to use the term "MCC Reference position" instead of "Confirmed position", and to use the term "GNSS position" to replace "Encoded position". Full details of the new SIT 185 message format can be found in the RCC Handbook, document C/S G.007, section 1.4.5, and sections 5 and 6 available at https://www.cospas-sarsat.int/images/stories/SystemDocs/Current/G007-NOV-29-2022.pdf

System Enhancements

2.15 Enhancements to System operations have focused primarily on advancing the MEOSAR system to its next operational phases. MEOSAR Initial Operational Capability (IOC) phase was declared by the Cospas-Sarsat Council in April 2023. The MEOSAR system was designed to provide a faster, more robust and more accurate distress alerting service. and is fully backwards compatible for all beacon types.

2.16 Cospas-Sarsat announced full operational capability (FOC) for FGB ELT(DT)s from January 2023. In some cases, the ELT(DT) will replace the ELT(AF), which may result in the loss of the 121.5 MHz homing signal. Cospas-Sarsat has developed guidance for use by RCCs when in receipt of an alert from an ELT(DT), available on the Cospas-Sarsat website.

2.17 Cospas-Sarsat also focused developments necessary to begin operational phases for second-generation beacons (SGBs) (that will transmit more information in their distress message and have greater location accuracy) and second-generation ELT(DT)s. This work principally involves commissioning of new or upgraded Ground Segment equipment within Cospas-Sarsat Participant states and territories to augment global coverage.

2.18 The Return Link Service (RLS), that provides an acknowledgement to the user of a beacon (with the RLS feature (**Figure 4**)) that the distress signal has been received and located, was declared at full operational capability (FOC) within Cospas-Sarsat effective 26 March 2021.

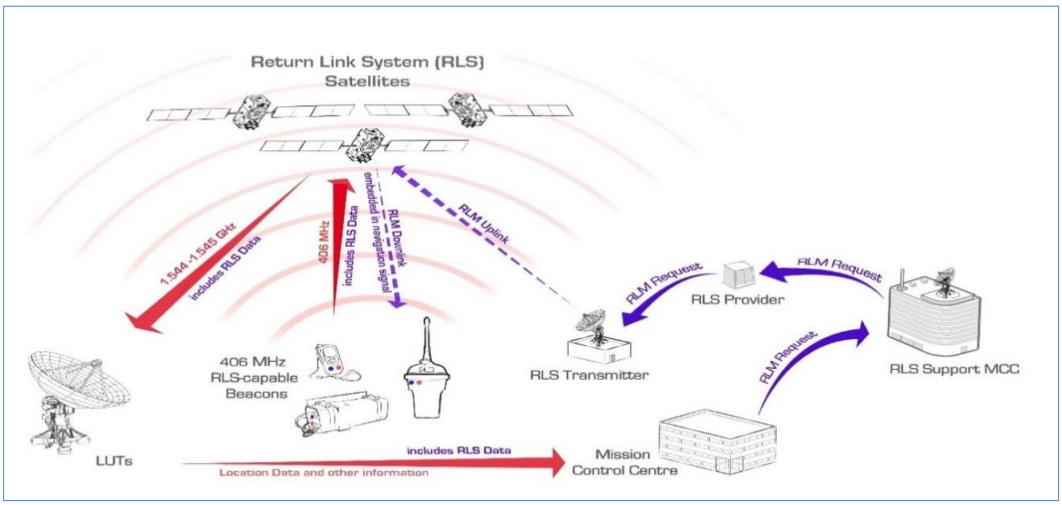

Figure 4: The Return Link Service - Type 1 and the Cospas-Sarsat System Concept

2.19 Cospas-Sarsat has begun consideration of the use of two-way communication in 406 MHz distress beacons. Two-Way Communication (TWC) for distress beacons could provide a number of benefits in emergency situations, including:

- providing confirmation of receipt of the distress signal by SAR services (RCCs),
- improving situational awareness by allowing the person in distress to provide additional information, allowing rescue teams to better understand the nature of the emergency and respond appropriately,
- reducing false alarms,
- providing important safety benefits by allowing the SAR services to communicate with the person in distress, possibly providing guidance on how to stay safe, and to monitor their circumstances until help arrives.

2.20 Consistency in the TWC system is part of the design, as TWC is envisaged for several different MEOSAR satellites systems. Based on the RLS technology, this TWC service should be the enhancement of the RLS - Type 1. Cospas-Sarsat has established a correspondence working group led by the European Commission to further consider matters related to TWC. Interested participants are invited to join the working group on Two-Way Communications to monitor and contribute to the work being done and to assist in the further development of the planned two-way communication capability for RLS second generation beacons.

Training Material and Public Relations

2.21 Development of video material continued with the creation of a series of video FAQs. All videos are available free-of-charge in English on YouTube (406.org/en/search-and-rescue/programme-videos-en) and at https://moodle.406.org/ with subtitles in the French and Russian languages available. Production of videos on ELT(DT), new SIT 185 format message and use of the new IBRD is in progress.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information provided on the status of the Cospas-Sarsat Programme;

b) provide feedback on notifications about Cospas-Sarsat System developments;

c) provide details of any existing MCC-SPOC agreements/arrangements, and proposals for improving MCC-SPOC communications during tests and real alerts;

d) note that Cospas-Sarsat declared the ELT(DT) operational in January 2023, and consider making available to RCCs in their national/regional documentation advice on management of distress alerts emanating from an aircraft which might still be in flight;

e) encourage APSAR WG Member States to join the Cospas-Sarsat Correspondence Working Group on Two-Way Communications to assist in the further development of the planned two-way communication capability for RLS second-generation beacons; and

f) provide feedback on the video library made available publicly for use by SAR professionals.

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