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COSPAS-SARSAT APPLICABILITY TO GLOBAL FLIGHT TRACKING REQUIREMENTS

(Presented by the United States)

EXECUTIVE SUMMARY

Following the loss of Malaysia Flight 370, ICAO organized and tasked an ad-hoc working group (AHWG) to create a Concept of Operations to establish a global tracking standard. The Global Aeronautical Distress and Safety System (GADSS ConOps) was developed, reviewed and endorsed by States at the High Level Safety Conference in February 2015; and further updated in 2015, to reflect the outcomes of the ICAO Council approval for new Standards and Recommended Practices (SARPs). Given that ICAO SARPS promote the use of performance-based rather than prescriptive solutions, any requirements associated with global tracking should follow the same standard. The key aspects of GADSS which Cospas Sarsat may be able to assist with include global tracking, the capability for autonomous distress tracking (ADT), and aircraft accident location.

Strategic Objectives:	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
Financial implications:	No additional resources requested.

1. INTRODUCTION

1.1 ICAO tasked an ad-hoc working group (AHWG) to create a Concept of Operations for the Global Aeronautical Distress and Safety System (GADSS ConOps). Cospas-Sarsat participated in a meeting to inform the group that they are also developing an autonomous distress tracking (ADT) capability that may provide a means of satisfying the performance-based requirement for global tracking.

1.2 The GADSS concept provides that the location of an aircraft should always be known. It has been proposed that an objective in achieving this aim is for the aircraft to provide an automated 4-dimentional (4D) positional report that includes latitude, longitude, altitude and time, at prescribed intervals. For normal aircraft tracking, this would be an interval of 15 minutes or less (4D/15) where air traffic services are not provided. Building on the normal reporting rate, and to improve the effectiveness of a search and rescue (SAR) capability, the GADSS introduces the concept of ADT. An ADT system would transmit 4D information at least once every minute (4D/1) when an aircraft is in distress.

1.3 The full GADSS concept will be implemented by phases in the short, medium and long term. The ADT 4D/1 capability becomes applicable on 1 January 2021. The SARP is performance-based and not technology-specific. In addition to the on-aircraft solution, consideration must also be given to how the distress tracking position reports will be delivered and coordinated with SAR authorities. This coordination will require information sharing between the operator, ATS Unit and the SAR authority. Cospas-Sarsat is working to provide a framework for a whole-system approach which may be in a position to fulfil both the aircraft tracking and SAR alerting functions.

1.4 This paper is intended to educate the wider aviation community on Cospas-Sarsat's intent to provide infrastructure and processes capable of supporting ICAO's requirement for handling of distress alerts, and provides an example of what information SAR authorities are now using and what may be available in the future.

2. DISCUSSION

2.1 Today, the Cospas-Sarsat System supports ICAO and Contracting States through the utilization of a global, space-based distress notification system that uses ELTs, satellites and a terrestrial distribution system. This system provides coordination between operators, Rescue Coordination Centers (RCCs) with timely notification and location of aircraft in distress.

2.2 The Cospas-Sarsat System has a proven capability that has saved thousands of lives. Cospas-Sarsat in working to expand their capability by implementing the next generation space segment utilizing Medium Earth Orbit Search and Rescue (MEOSAR) satellites equipped with SAR processors, and by developing specifications for the next generation ELT. These efforts will ensure Cospas-Sarsat's continued support of ICAO distress notification requirements.

3. OVERVIEW OF THE COSPAS-SARSAT SYSTEM

3.1 The Cospas-Sarsat System is an intergovernmental cooperative of 41 countries and 2 agencies which coordinates the efforts of those governments to deploy the resources necessary to detect and locate 406 MHz distress beacons and report that information to SAR authorities. Since its formation in 1982, the Cospas-Sarsat System has assisted in the rescue of nearly 40,000 people.

3.2 The Cospas-Sarsat System consists of three main segments and is divided into six Data Distribution Regions

3.3 As distress signals are transmitted from the distress beacon, they are detected by the space segment and relayed to ground stations in view. The ground segment automatically processes and sorts the distress alert upon receipt, providing distress location information to the appropriate SAR authority in the distress beacon's vicinity. From any position on Earth, the global network is in place to ensure that SAR authorities in the beacon's vicinity are notified of the distress signal. *This is one of the greatest strengths of the Cospas-Sarsat system in place today; immediate detection and automatic routing to national SAR authorities.*

3.4 The program is undertaking an end-to-end modernization that will provide instantaneous global coverage with enhanced performance and reliability. The new system, referred to as Medium Earth Orbit Search and Rescue (MEOSAR), is currently being validated and expected to enter into initial operational capability in 2017.

3.5 The MEOSAR space segment will operate on three primary constellations: the Global Positioning Satellite (GPS) system operated by the United States, the Global Navigation Satellite System (GLONASS) of Russia, and the European Galileo global navigation satellite system. Located at a medium Earth orbit (19,000 to 24,000 km range), each constellation will consist of 24 satellites, each satellite hosting a SAR repeater payload. This space segment will provide global coverage for immediate distress alert detection and rapid locating capability utilizing a dedicated frequency spectrum designated and protected solely for safety of life use.

3.6 The MEOSAR space segment also allows for the development of a new generation of distress beacons that will be optimized to maximize MEOSAR system performance. Cospas-Sarsat is developing new distress beacon operational requirements that will represent a major enhancement in system performance and reliability of the next generation beacons. Major improvements are expected to include significantly improved independent-location and encoded-location accuracy, and more distress related information sent to SAR authorities that includes a 3-dimensional report. The new distress beacon will maximize performance in the crucial first seconds of an aircraft distress event (crash statistics show that seconds may be all the time there is before a crash).

3.7 The MEOSAR System has already demonstrated an impressive performance in the search for the recent Egypt Air Flight MS 804 incident, where Cospas-Sarsat was able to provide an accurate position utilizing the MEOSAR system.

4. CONCLUSION

4.1 In summary, Cospas-Sarsat 406 MHz ELTs may be in a position to provide one means of compliance with ICAO's performance-based Standards for autonomous distress tracking. Cospas-Sarsat's capabilities include:

a) a global system with a proven history of reliability operated and maintained by the intergovernmental cooperation of 41 countries and 2 agencies which deploy the resources necessary to detect and locate and report that information to national SAR authorities;

b) a robust space segment that can provide global coverage for immediate distress alert detection and rapid locating capability utilizing a dedicated frequency spectrum designated and protected solely for safety of life use;

c) an extensive ground data distribution network capable of rapid delivery of distress alerts to SAR authorities worldwide;

d) future system enhancements that may be capable of providing automatic activation upon detection of abnormal flight conditions (on command from aircraft avionics), in addition to possible manual activation by pilots; and

e) the capability for an accurate position to be redundantly determined using MEOSAR satellite system calculations and GNSS positions.

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