



Cospas-Sarsat ELT(DT)s and GADSS support

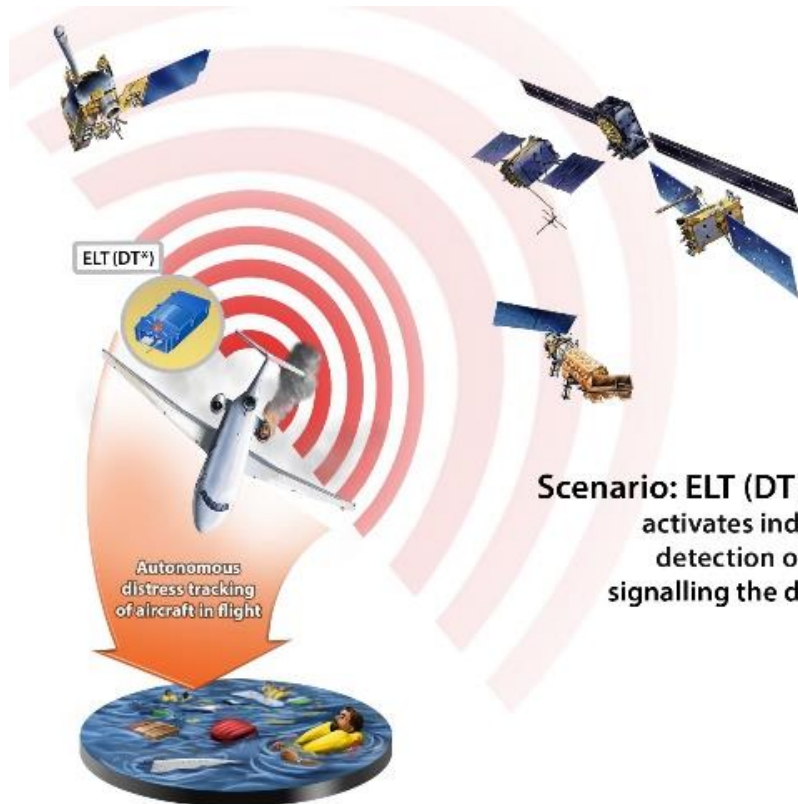
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GADSS Workshop and Seventh Meeting of the
ICAO Asia/Pacific Search and Rescue Working Group
(AP SAR/WG/7) (Video Teleconference, 23 - 27 May 2022)



ELT(DT)s for Distress Tracking



**Scenario: ELT (DT) “Distress Tracking” 406 Beacon
activates independently upon autonomous
detection of in-flight aircraft emergency,
signalling the distress to Cospas-Sarsat satellites**

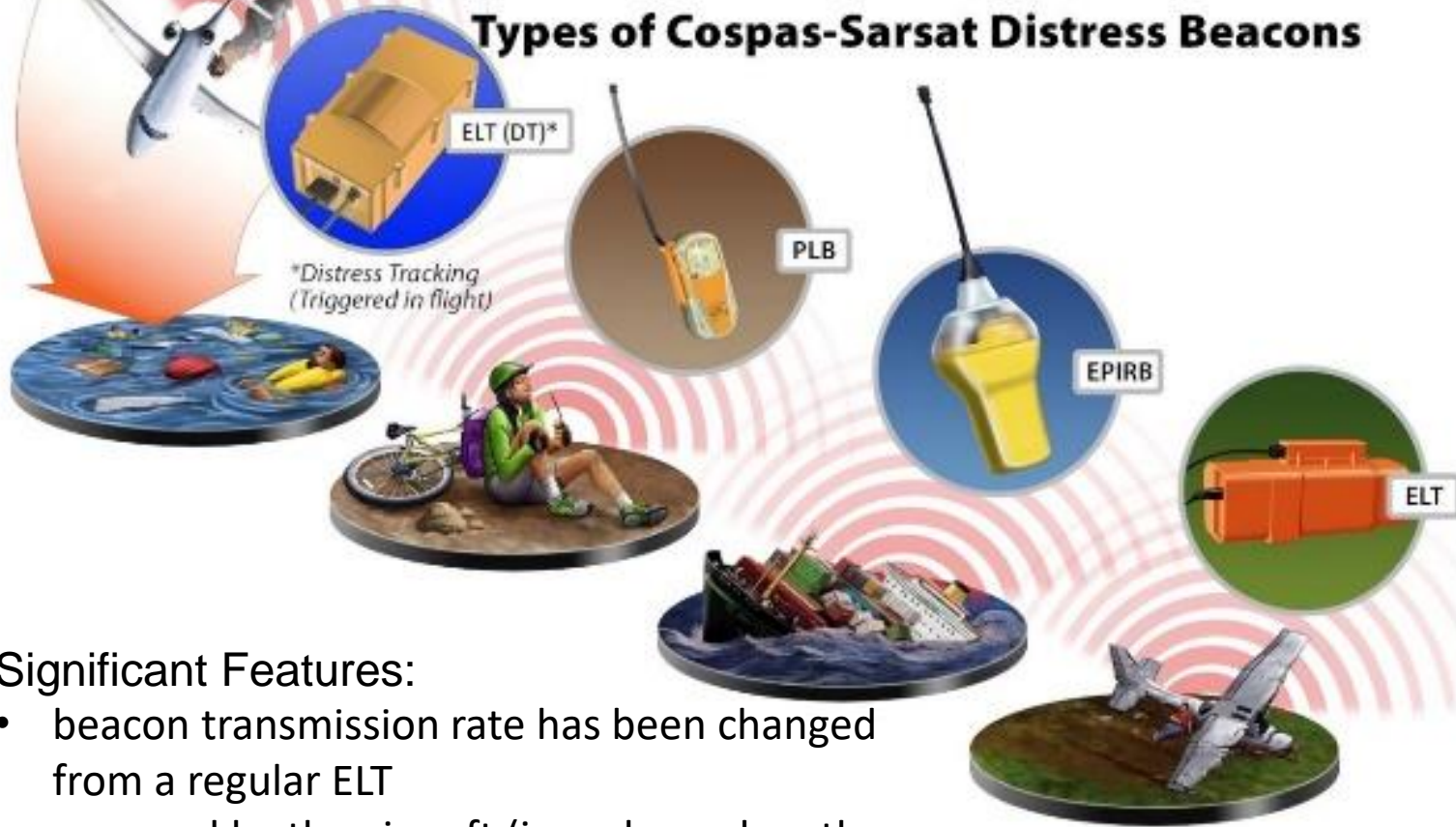
ICAO: performance based, non-technology specific specifications

Major aircraft manufacturers of which we are aware have selected the ELT(DT) to comply with the new **ICAO Annex 6** requirements.



Airbus, Boeing, Bombardier, and Embraer (OEMs) have selected the ELT(DT) to satisfy the European operational requirements (see ED-237) and ICAO GADSS recommendations.

Types of Cospas-Sarsat Distress Beacons

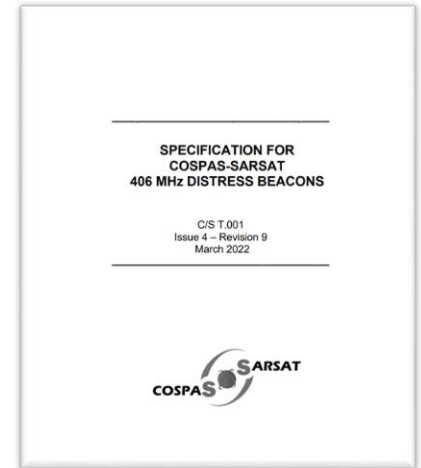


Significant Features:

- beacon transmission rate has been changed from a regular ELT
- powered by the aircraft (i.e., plugged on the aircraft system) and if disconnected from the aircraft power, they will have enough battery lifetime to transmit during at least 370 minutes,
- a cancellation function has been implemented for ELT(DT)s

ELT(DT) Characteristics

- will provide a GNSS position, altitude and how current this information is
- start transmitting after a maximum of 5 seconds after its activation
- transmit as frequently as once every 5 seconds
- will provide the Aircraft Operator 3-letter designator (3LD)
- will include a user cancellation function
- provide data in rotating fields

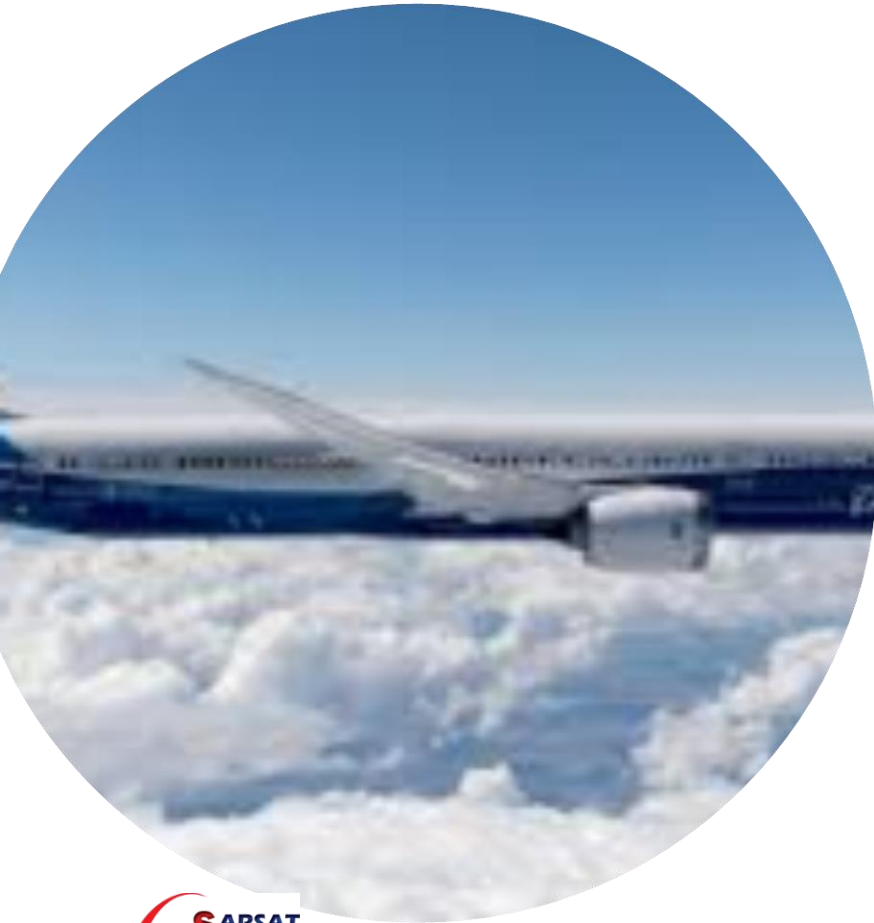


Possible loss of 121.5 MHz Homing

- ELT(DT) is an ADT device, and differs from the ELT which has additional requirements (survive accidents, 121.5 homing)
- Some ELT(DT) devices will combine with ELT functionality



**121.5
MHz**



ELT(DT) and GADSS Data Distribution

Implementation Timeline

- The new SARPs are applicable to new aeroplanes with take-off mass greater than 27,000 kg from **1 January 2023** (and Recommended for >5,700 kg)
- This implies a deadline for ELT(DT) readiness for deployment by **late 2022**, to support timely installation by Airline Operators



Rationale for ADT early alerting to RCCs: Triggered Transmission of Flight Data Report, March 2011



- For all accidents studied, after triggering criteria* are met:
 - 50% of aircraft impact the ground within 30 seconds,
 - 85% of aircraft impact the ground within 3 minutes, and
 - 95% within 6 minutes
 - Draft letter to SPOCs to provide guidance on actions to take after receipt of an ELT(DT) alert will be discussed at JC-36
- * based on ED-237, i.e., a/c very likely to be in distress



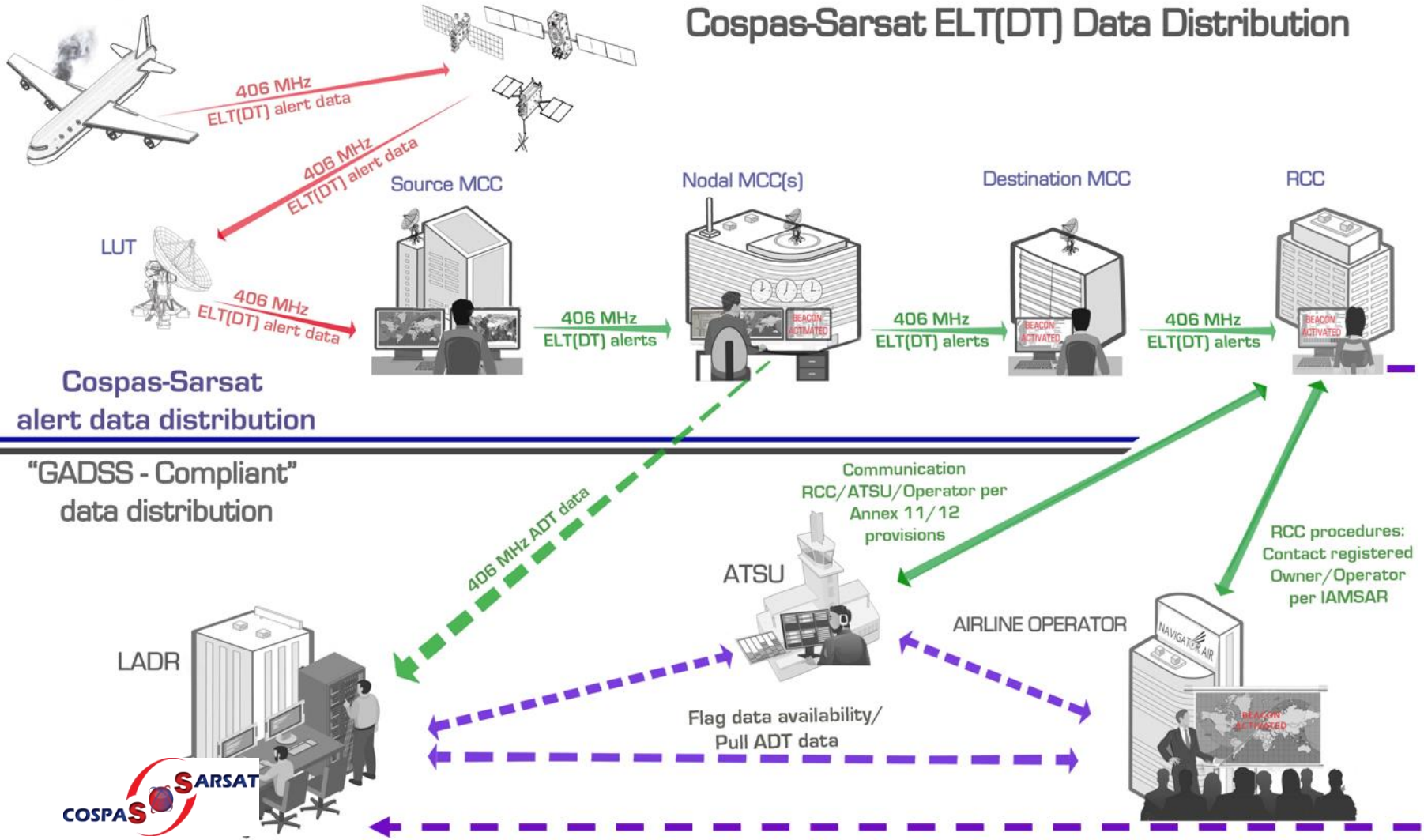
ICAO LADR (Location of an Aircraft in Distress Repository)



EUROCONTROL

- ICAO requires that the last known position of an aircraft in distress shall be made available to RCCs, air-traffic service units (ATSUs) and the aircraft operator (airline)
- ICAO plans to implement a Location of an Aircraft in Distress Repository (LADR) as a single database, to collect and distribute the required information.
- To satisfy the ICAO data-sharing requirements, Cospas-Sarsat nodal MCCs will input ELT(DT) data received in alert messages into the LADR.
- ICAO has announced that the LADR will be hosted by EUROCONTROL (Brussels, Belgium)

Cospas-Sarsat ELT(DT) Data Distribution



• Sample ELT(DT) SIT message

FGB ELT(DT)

1. **DISTRESS TRACKING** COSPAS-SARSAT DOA POSITION CONFLICT ALERT

2. MSG NO 21013 CMCC REF 1D1200F03BBFDFF

3. BEACON MESSAGE INFORMATION

BEACON TYPE **ELT DISTRESS TRACKING**

AIRCRAFT 24 BIT ADDRESS 01E077 ASSIGNED TO G BRITAIN

AIRCRAFT OPERATOR DESIGNATOR MMB

HEX ID 1D1200F03BBFDFF

COUNTRY OF BEACON REGISTRATION 232/G BRITAIN

ACTIVATION TYPE MANUAL

GNSS POSITION PROVIDED BY EXTERNAL DEVICE

4. ALERT POSITION INFORMATION

DETECTED AT 04 AUG 20 101501 UTC BY MEOSAR

ALERT LAST DETECTED AT 04 AUG 20 101501 UTC

GNSS - 01 54.40 N 045 37.53 E

UPDATE TIME WITHIN 2 - 60 SECONDS OF DETECTION TIME

ALTITUDE OF GNSS LOCATION BETWEEN 1600 AND 2200 METRES (BETWEEN 5200 AND 7200 FEET)

DOA - 02 00.1 N 046 06.2 E

5. OTHER INFORMATION

GNSS POSITION UNCERTAINTY PLUS-MINUS 2 SECONDS OF LATITUDE AND LONGITUDE

DETECTION FREQUENCY 406.0400 MHZ

POSITION CONFLICT BASED ON DISTANCE SEPARATION OF AT LEAST 20 KM

ELT(DT) POSITION DOES NOT REFERENCE ANY PREVIOUS POSITION

6. REMARKS

THIS DISTRESS TRACKING MESSAGE IS BEING SENT TO APPROPRIATE SAR AUTHORITIES

PROCESS THIS ALERT ACCORDING TO RELEVANT REQUIREMENTS

END OF MESSAGE

• Sample ELT(DT) SIT message

SGB ELT(DT)

1. **DISTRESS TRACKING** COSPAS-SARSAT DOA POSITION MATCH ALERT
2. MSG NO 00192 AUMCC REF B27400F81FD4710
3. BEACON MESSAGE INFORMATION
BEACON TYPE SGB - **ELT DISTRESS TRACKING**
AIRCRAFT 24 BIT ADDRESS 7100CE ASSIGNED TO SAUDI
TAC 62 SERIAL NO 509
HEX ID B27400F81FD4 7100CE00000
COUNTRY OF BEACON REGISTRATION 403/SAUDI
ACTIVATION TYPE AUTOMATIC BY BEACON (G-SWITCH/PROBABLE CRASH)

4. ALERT POSITION INFORMATION
DETECTED AT 03 MAY 19 085310 UTC BY MEOSAR
ALERT LAST DETECTED AT 03 MAY 19 085310 UTC
GNSS - 02 24.40 N 046 04.11 E
TIME OF GNSS POSITION UPDATE: 03 MAY 19 085308 UTC
TIME SINCE GNSS LOCATION GENERATED: 0 MINUTES
ALTITUDE OF GNSS LOCATION: 125 METRES (410 FEET)
DOA - 02 25.1 N 046 06.2 E

5. OTHER INFORMATION
BEACON CHARACTERISTICS PER TAC DATABASE PROVIDED IN A SEPARATE MESSAGE
GNSS POSITION UNCERTAINTY PLUS-MINUS 1.7 METRES
ELAPSED TIME SINCE ACTIVATION: 0 HOURS
REMAINING BATTERY CAPACITY BETWEEN 75 AND 100 PERCENT
DETECTION FREQUENCY 406.0500 MHZ
ELT(DT) POSITION DOES NOT REFERENCE ANY PREVIOUS POSITION

6. REMARKS
THIS DISTRESS TRACKING MESSAGE IS BEING SENT TO APPROPRIATE SAR AUTHORITIES.
PROCESS THIS ALERT ACCORDING TO RELEVANT REQUIREMENTS.
END OF MESSAGE

ATS and RCCs should adapt their operating procedures and practices to handle ELT(DT) alerts, originating from an a/c that may still be in flight

1. Take into account the new ELT(DT) beacon type generating the distress alert message, noting that Paragraph 1 will contain “**DISTRESS TRACKING**”, and Paragraph 3 will clearly identify the source of the message as an “ELT DISTRESS TRACKING”
 2. Study the basic event information provided in the ELT (DT) SIT 185:
 - Paragraph 3 will provide **flag of the aircraft** decoded from the **ICAO 24-bit address** and the **aircraft operator 3LD** from the rotating field.
 - Paragraph 4 will provide the **aircraft position**.
3. **Login to ICAO’s LADR** to access all available information for this distress event, including the aircraft’s **last known position (LKP)**.
4. Using the point of contact information available in the **ICAO Ops Control Directory**, contact the appropriate **ATSU(s)** (and possibly the airline operator) per ICAO Annexes 11 and 12 to determine more information about the possible distress event.

ATS and RCCs should adapt their operating procedures and practices to handle ELT(DT) alerts, originating from an a/c that may still be in flight

5. If necessary, request that the sending MCC limit the continuous transmission of SIT 185 alerts for this beacon event (to reserve the AFTN/AMHS terminal for other important information related to this event or other possible distress alerts in your SRR).

6. Monitor the LKP available in the LADR to assist in determining whether the aircraft is a **fixed or moving target**, in coordination with the appropriate ATSU and neighboring RCCs, as appropriate.

7. **Contact your supporting MCC** for any necessary clarifications about the content or the distribution of a SIT 185 message.

8. **Prepare for a SAR operation**, while monitoring incoming alerts for a possible cancellation message (SIT 185 **cancellation message**, Paragraph 1 will contain “DISTRESS TRACKING COSPAS-SARSAT USER CANCELLATION ALERT”).

9. Launch SAR per national procedures (and IAMSAR manual guidance).



RCC Handbook

Further guidance for RCCs will be available (after JC-36) in the Cospas-Sarsat RCC Handbook, available at <https://www.cospas-sarsat.int/images/stories/SystemDocs/Current/G007-MAR-26-2021.pdf>.

**HANDBOOK ON DISTRESS ALERT MESSAGES
FOR
RESCUE COORDINATION CENTRES (RCCs),
SEARCH AND RESCUE POINTS OF CONTACT (SPOCs)
AND
IMO SHIP SECURITY COMPETENT AUTHORITIES**

C/S G.007
Issue 3
March 2022

ELT(DT)s

The operational capability of the System to support FGB ELT(DT)s and SGB ELT(DT)s will be based on:

- **System tests**
 - End-to-end FGB and SGB ELT(DT) tests successful, with modification of ELT(DT) distribution procedures
 - Do No Harm test demonstrated no risk for SGB ELT(DT) operations
- **Current and projected (MEOLUT) coverage**
 - already global for FGB ELT(DT)
 - planned to be global by Oct. 2022 for SGB ELT(DT)
- **MCC commissioned capabilities**
 - FMCC-USMCC cross commissioning in progress
- **Confirmed availability of type approval test laboratories**
- **Interface with LADR**
 - Technical workshop with LADR developer planned in May 2022.

Progress towards ELT(DT) FOC declaration

At CSC-66/OPN (March 2022)

- The Parties anticipate that their extraordinary decision-making process for declaration of ELT(DT) operational status will occur by correspondence, as soon as possible after JC-36, preferably before the end of July 2022
- Parties invite Ground Segment Providers to implement and commission the necessary ground-segment equipment

CSC-66 ELT(DT) Checklist

CSC-66/OPN/SR/Annex 18

ANNEX 18

ELT(DT) DEVELOPMENT PHASES AND CRITERIA (REQUIREMENTS)

Phase 1 - Development

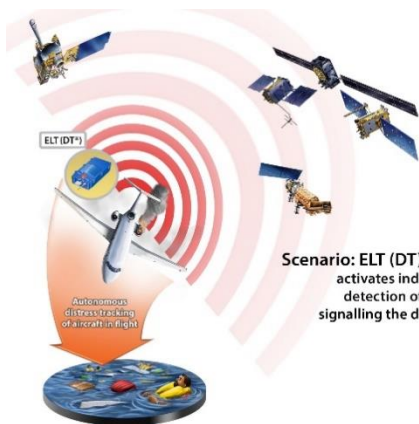
Proof of Concept

Development of ELT(DT) Type Approval Standards and Acceptance of Test Facilities

- Test Facilities Prepare for ELT(DT) Type Approval
- Progress the acceptance of Type Approval Test Facilities for ELT(DT) Type Approval – Currently in progress, but only partially completed and moved as priority to Phase 2

Documentation Revisions and Finalizations for ELT(DT)s

- A-Docs including MCC Specifications and Commissioning Standards for ELT(DT) Processing
- LUT Specifications and Commissioning Standards for ELT(DT) Processing
- Estimated Global Detection Coverage for ELT(DT)s
- Planned MEOLUT Implementations with ELT(DT) Capability
- Planned Commissioned ELT(DT) Capable LGM MCCs
- Supporting MEOSAR Coverage Simulations based on planned Ground Segment
- Proven ELT(DT) End-to-End Connectivity
 - End-to-End Test Plans Network of Development ELT(DT)-Capable MEOLUTs
 - Prototype LADR Connectivity at Nodal MCCs – Checked by one Nodal MCC
 - ELT(DT) Narrative Traffic Capability to support all Non-ELT(DT)-Capable Nodals and MCCs
 - ELT(DT) Ground Segment End to End Test System Testing



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ELT(DT) Checklist (cont)

Phase 2 – Transition to Operation

- Global Detection Coverage and Data Distribution of ELT(DT) alerts by commissioned MEOLUTs associated with commissioned LGM/ELT(DT) MCCs, including the necessary intermediary commissioned ELT(DT) capable Nodal MCCs
- Confirm that baseline versions of documentation for ELT(DT)s are complete
- Acceptance of Test Facilities for ELT(DT) Type Approval
- Type approved ELT(DT)s available to the aircraft manufacturers
- Two Nodal MCCs
 - Cross-Commissioned for ELT(DT)s
 - LADR Connectivity
- ELT(DT) Narrative Traffic Capability to support all Non-ELT(DT)-Capable MCCs (i.e., unable to handle automated traffic)

Phase 3 – Continued Implementation

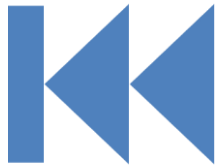
- Increased redundancy, and resiliency of Global Detection Coverage for ELT(DT)s
- All Nodal MCCs
 - Commissioned for ELT(DT)s
 - LADR Connectivity
- Majority of MCCs Commissioned for ELT(DT)s
- ELT(DT) Narrative Traffic Capability to support remaining Non-ELT(DT)-Capable MCCs (i.e., unable to handle automated traffic)
- ELT(DT)s integrated into Annual System Testing
- Sufficient Complement of Test Facilities accepted for ELT(DT) type-approval
- Type-approved ELT(DT) beacons

Legend: Completed Not completed



→ Progress to be assessed by a dedicated CWG meeting every month

CWG to MONITOR PROGRESS TOWARD ELT(DT) FOC READINESS



The CWG on ELT(DT) implementation will actively monitor and summarize progress



The list of MEOLUTs and MCC commissioned for the ELT(DT) capability is provided at:

<https://cospas-sarsat.int/en/system/meosar-system-status/mcc-configuration>

<https://cospas-sarsat.int/en/system/meosar-system-status/meolut-configuration>



MEOSAR Coverage for ELT(DT)s

ELT(DT)s rely on the MEOSAR system to provide real-time, global coverage

FGB ELT(DT) Global coverage is now provided by the 7 MEOLUTs currently commissioned for ELT(DT)s

However, MCC commissioning for ELT(DT) processing is required for distribution of MEOLUT data, critically including AUMCC and SIMCC

Global coverage for **SGB** ELT(DT)s is anticipated by October 2022 with new SGB-commissioned MEOLUTs in Florida, Hawaii, Toulouse and La Reunion



MEOSAR Coverage for ELT(DT)s

A MEOSAR satellite can see 1/3 of the world

For ELT(DT) coverage and redundancy, C/S needs only “detection” and not “independent location” because all ELT(DT)s will have a GNSS processor

Some MEOLUTs can track up to 20 satellites



Commissioning of New MEOLUTs after 1 April 2022

- New MEOLUTs must be commissioned at the MEOSAR IOC/FOC performance level
 - Waiver to exempt MEOLUT commissioning from mandatory performance testing at beacon speeds above 2 m/s, until to CSC-67.
 - A letter will soon be sent to Ground Segment Providers to inform them of this decision
- Commissioning of SGB capability may be omitted in test campaign between CSC-66 (March 2022) and CSC-67 (November 2022)



Recommissioning of Existing MEOLUTs

- MEOLUTs that are already commissioned at the MEOSAR **EOC** performance level must be recommissioned for compliance with the MEOSAR **IOC/FOC** performance level
- the FGB ELT(DT) capability
- the SGB capability (including SGB ELT(DT)s)



Action for participants

- At CSC-66/OPN “The Council DECIDED to invite Ground Segment Providers to continue work to upgrade their MEOLUTs to the IOC performance level, implement ELT(DT) and SGB processing capabilities, and complete commissioning processes, particularly for the MEOLUTs associated with a nodal MCC.”
- MEOLUT and MCC (re)commissioning for ELT(DT)s in the short term is of paramount importance to achieve global coverage (especially in the SWPDDR but relevant for all MCCs/MEOLUTs)
- Coordinate with nodal MCC and inform the Secretariat of your upcoming plans in for MEOLUT and MCC commissioning in 2022 and 2023

7. MCC Operator Training (playlist)



Includes:

- MEOSAR Average Carrier to Noise Ratio
- GNSS Position Encoded in First Generation Beacon (FGB) Messages
- MEOSAR Encoded Location Error Estimate

<https://www.cospas-sarsat.int/en/search-and-rescue/programme-videos-en>

<https://moodle.406.org/>



Programme Videos and Graphics