National Data Distribution

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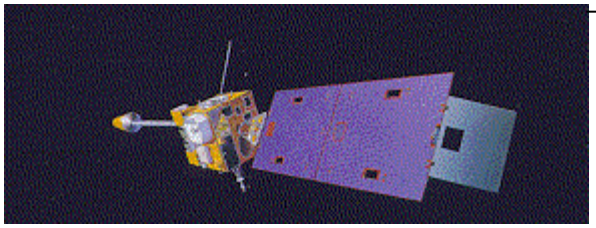
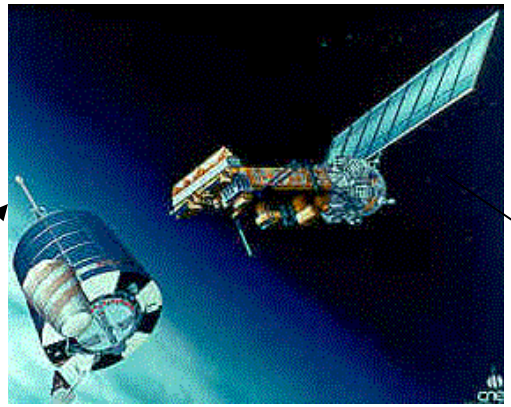
Overview

- Data Distribution for the C/S System
- MEOSAR Data
- Principles of National Data Distribution
- Unlocated Alerts
- Located Alerts
- Notification of Country of Registry (NOCR)
- Ship Security Alert System (SSAS) Beacons and Alerts for Unreliable Beacon IDs
- Next Pass / Missed Pass
- Suspect MEOSAR Alerts

Data Distribution for C/S System



GEO Satellites



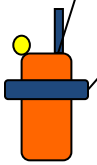
LEO / MEO Satellites

Rescue Coordination Centers (RCCs)

SAR Points of Contact (SPOCs)

Mission Control Center (MCC)

Other Mission Control Centers



Emergency Beacons

MEOSAR Data

- The current operational system only includes LEOSAR/GEOSAR data (L/G system)

- MEOSAR data will be added to the operational system, forming the LEOSAR/GEOSAR/MEOSAR (LGM system)
  - Initial operations requires commissioning of MEOLUTs and two associated MCCs (USMCC and FMCC planned)
  - Initial operations expected to start in August 2016

- In this presentation, references to MEOSAR data and the LGM system are provided in *italics*

- See “International Data Distribution” for more information on MEOSAR data distribution

Principles of National Data Distribution

- Largely the same as International Data Distribution
  - International based on Cospas-SARSAT requirements
- Where different, USMCC distributes more data nationally
- This presentation focuses on how National Data Distribution is different from International Data Distribution

Unlocated Alerts – U.S. Registered

- For 406 MHz beacon IDs with U.S. country code (303, 338, 358, 366, 367, 368, 369, 379, 536 or 559)
  - If the beacon is registered in U.S. 406 RGDB
    - Alert is distributed based on SRR in registration*
    - SRR in registration is based on
      - State or country of homeport, or
      - State or country of owners mailing address
    - If no SRR is assigned, alert is distributed based on type of beacon
      - EPIRB alerts to PACAREA
      - ELT alerts to AFRCC
      - PLB alerts to AFRCC

* SSAS alerts are sent to LANTAREA and PACAREA regardless of registration SRR

Unlocated Alerts – SRRs for U.S. Registered

RGDB SRR Assignments – non US areas

State Abbreviation	State Name	EPIRB SRR 01	EPIRB SRR 02	ELT SRR	PLB SRR 01
AN	Antigua	San Juan		AFRCC	AFRCC
BH	Bahamas	CGD7		AFRCC	AFRCC
BL	Belize	CGD7		AFRCC	AFRCC
BR	Bermuda	CGD5		AFRCC	AFRCC
CI	Cayman Islands	CGD7		AFRCC	AFRCC
CR	Costa Rica	PacArea		AFRCC	AFRCC
DR	Dominican Rep.	San Juan		San Juan	San Juan
ES	El Salvador	PacArea		AFRCC	AFRCC
GT	Guatemala	PacArea		AFRCC	AFRCC
HN	Honduras	CGD7		AFRCC	AFRCC
JA	Jamaica	CGD7		AFRCC	AFRCC
MR	Marshall Isl.	CGD14	`	CGD14	CGD14
NA	Neth. Antilles	San Juan		San Juan	San Juan
NI	Nicaragua	CGD7		AFRCC	AFRCC
PR	Puerto Rico	San Juan		San Juan	San Juan
RP	Panama	CGD7		AFRCC	AFRCC
SV	Saint Vincent	San Juan		San Juan	San Juan
VI	Virgin Islands	San Juan		San Juan	San Juan

Unlocated Alerts – U.S. Non-Registered

- Alerts for unregistered U.S. beacons with a craft ID (vessel or aircraft) encoded in the 406 MHz beacon message that can be used to access another registry are distributed based on beacon type:
  - EPIRB alerts to PACAREA
  - ELT alerts to AFRCC
  - SSAS alerts to LANTAREA and PACAREA
  - PLB alerts are not sent, no link to another registry
- Alerts for unregistered U.S. beacons with no craft ID (no link to another registry) are <u>not</u> distributed

Unlocated Alerts – Alternate Registry

- Craft ID decoded from the 406 MHz beacon message (15 hex ID) and provided on the RCC alert message can be used to access other registration databases:
  - EPIRBs: Radio Call Sign, Ship Station ID, etc.
    - RCC must look up using ITU or other source
  - ELTs: 24-bit address, aircraft operator designator, etc.
    - RCC must look up using tail number database
- Craft ID is provided in "Beacon Decode" section of RCC message

Unlocated Alerts – Non-U.S. Beacons

- Unlocated alerts for a non-U.S. beacon with country code in the U.S. Search and Rescue Region (SRR) are distributed based on country code:
  - To the country's SPOC if the USMCC communicates directly with the SPOC
    - Example, Colombian beacon goes to Colombia
  - Otherwise, to the U.S. RCC in whose SRR the country is included
    - Example, Cuban beacon goes to CGD7

Unlocated Alerts - Summary

- USMCC message distribution is based on
  - Country code (non-US beacons)
  - SRR in registration (registered U.S. beacons)
  - Beacon type (non-registered U.S. beacons with craft ID)

Located Alerts – Exceptions to C/S Procedures (1 of 2)

- Distributes alerts to U.S. RCCs within 50 km buffer zone
- Sends new alerts to all previous recipients for alert site (MCCs, RCCs and SPOCs) until ambiguity is resolved (L/G); *new alerts sent to all previous recipients until position confirmed (LGM)*, per C/S and US rules
- Continues to send to RCCs and SPOCs after ambiguity is resolved (L/G); by default , *new alerts are sent to MCCs, RCCs and SPOCs after position confirmed (LGM)*, per C/S and US rules
- Sends same pass update, prior to ambiguity resolution (L/G) or *position confirmation (LGM*), if A side probability increases by at least 30%
- Sends located and unlocated alerts for U.S. special program beacons specially (append or replace mode)
- Sends missed pass messages (L/G, *not LGM*)

Located Alerts – Exceptions to C/S Procedures (2 of 2)

- L/G: Unlocated alert is sent as "detection update" when:
  - Two hours have passed since previous alert for beacon or
  - Previous message for beacon was missed pass
  - Once position conflict occurs, no next pass or missed pass information is sent for alert site until ambiguity is resolved
  - Next pass and missed pass information is provided for resolved location, after ambiguity is resolved
- *LGM:* Detection update sent when 30 minutes passed since previous alert for beacon or suspect MEO alert is corroborated
  - No missed pass / next pass; MEOSAR satellites always in view of MEOLUT, a new MEOSAR alert is expected:
    - within 5 minutes (before position confirmation)
    - within 15 minutes (after position confirmation)

NOCR (1 of 4)

- Notification of Country of Registry (NOCR) distribution:
  - MCC to MCC based on country code and location of the beacon
    - When an MCC detects a beacon located in its service area for a country outside of its service area, an alert is sent
    - Alert must have a location
  - USMCC distributes an NOCR to a U.S. RCC when it has not previously sent a located alert for the alert site, and
    - It detects a beacon with a U.S. country code in another service area, or
    - An NOCR for a U.S. country-coded beacon is received from another MCC
  - The USMCC:
    - Only sends one NOCR per alert site
    - Sends alerts to RCC until ambiguity resolved (*LGM: position confirmed*)
    - If ambiguity is resolved on the first located alert the NOCR does not indicate that ambiguity is resolved (L/G); *if position is confirmed on the first located alert, the NOCR indicates that position is confirmed (LGM)*
    - Will not send an NOCR if it previously sent an alert message with location to a RCC for the site

NOCR (2 of 4)

- NOCRs are distributed to a U.S. RCC essentially using the same rules as an unlocated alert
  - NOCRs for registered U.S. beacons are distributed to a U.S. RCC based on the SRR in the beacon's registration
  - NOCRs for unregistered U.S. beacons are distributed to a U.S. RCC based on beacon type
    - EPIRBs are sent to PACAREA
    - ELTs and PLBs are sent to AFRCC
    - Unlike unlocated alerts, NOCRs are distributed regardless of whether a craft ID is encoded in the beacon ID

NOCR (3 of 4)

- Some RCCs request the USMCC Controller to confirm that the alert message was sent to the SPOC of the SRR associated with the beacon position.

- The intent of NOCR procedures is that the RCC contact the SPOC of the SRR directly.

NOCR (4 of 4)

- CH-1 TO THE U.S. COAST GUARD ADDENDUM TO THE UNITED STATES NATIONAL SEARCH AND RESCUE SUPPLEMENT (NSS) TO THE INTERNATIONAL AERONAUTICAL AND MARITIME SEARCH AND RESCUE MANUAL (IAMSAR), COMDTINST M16130.2D
- (7) **Notification of Country of Registry (NOCR).** Command Centers may occasionally receive messages through the SARSAT system providing "Notification of Country of Registry" or NOCRs. These messages provide notification of the activation of a U.S. registered EPIRB in a location outside of the U.S. SAR Region. In these instances, the beacon activation alert has been forwarded to the appropriate RCC in the nation that has SAR responsibility for the composite position of the beacon, and the United States SAR authorities are being notified as a follow up to the normal SAR response process. Whenever possible, RCCs should attempt to contact the responsible RCC to ensure that SAR response efforts are being taken to assist U.S. citizens in distress.

- http://www.cospas-sarsat.int (see “Contact Lists”, “SPOC”)

SSAS Beacons and Alerts for Unreliable Beacon IDs

- Alerts for U.S. Ship Security Alert System (SSAS) beacons
  - Distributed to LANTAREA and PACAREA
  - After a SSAS beacon is detected, LANTAREA/PACAREA may request alerts be sent to other RCC(s)
- Alerts for unreliable beacon IDs:
  - 406 MHz beacon message failed validation checks due to
    - Malfunctioning beacon or miscoded beacon
    - LUT or satellite processing
  - When 406 MHz beacon message fails validation checks:
    - All encoded data is considered unreliable, therefore
      - Unlocated alerts are not distributed because unlocated alerts are distributed based on the country code in the beacon message
    - Alerts are only distributed based on *DOA (LGM)* or Doppler location
    - If in US SRR, also sent to USCG LANTAREA and PACAREA (may be SSAS)

Next Pass / Missed Pass (1 of 2)

- Next pass / missed pass only computed for L/G (*not for LGM*)
- Next pass prediction is based on 3 minutes of mutual visibility; the satellite is simultaneously visible to
  - A U.S. LEOLUT that is scheduled to take the pass and
  - The beacon (based on the reported location)
  - Also, the satellite elevation must reach 5 degrees above the horizon
- Next pass data is only provided if the above criteria are met
- Next pass is not computed for foreign LUTs
- A missed pass message is sent when the beacon is not detected, the mutual visibility criteria above is met and satellite passes at least 10 degrees above the horizon

Next Pass / Missed Pass (2 of 2)

- Missed pass message is not sent when an unlocated alert is received (T3) before a predicted pass is received (T5) with a detect time after the predicted detection time (T2)
  - T1: 1201 - LUT AOS
  - **T2: 1208** - Predicted detection of located alert
  - **T3: 1209** - GOES detection received (USMCC receives updates every 20 minutes from U.S. GEOLUTs)
  - T4: 1216 - LUT LOS
  - **T5: 1217** - Data at USMCC received for LEO pass with no location for the beacon (pass may have an unlocated alert for the beacon)
- Unlocated alerts with a detect time after most recent missed pass time will zero the missed pass counter, even when the unlocated alert is not distributed

- *LGM – Missed detection message sent if no alert has been sent within 30 minutes*

MEOSAR Suspect Alerts

- MEOLUTs currently distribute many “suspect” alerts: alerts based on a single beacon burst detected by one satellite through one antenna, with no other detection for beacon
- Most suspect MEOSAR alerts (perhaps 80%) appear to be system generated anomalies
- A “suspect” MEOSAR alert may later be corroborated by another detection for the beacon (LEO, GEO or MEO)
- Per C/S requirements, suspect MEOSAR alerts are:
  - Distributed to LGM MCCs
  - Not distributed to SPOCs or L/G only MCCs
  - Distributed to national RCCs as determined nationally

MEOSAR Suspect Alerts

- Per US rules, suspect MEOSAR alerts are distributed to RCCs:
  - For registered US coded beacons
  - For US coded beacons with encoded position in SRR of a LGM MCC (to ensure that US RCC knows about the alert sent to the LGM MCC)
  - For non-US coded beacons with encoded position in US SRR
  - (the RCC can acquire foreign registration data to assist its response)
- Suspect MEOSAR alerts are flagged on the RCC message
- If a suspect alert was the only alert distributed for an alert site, a new alert for the beacon is distributed as a Detection Update, if the alert is not distributed for another reason

Conclusion

Questions?