Overview

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  - SSAS Alerts
  - Uncorroborated Alerts
  - Located Alerts
  - Position Confirmation
- Alert Site Closure
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USMCC Operations Staff

Beth Creamer – USMCC Chief
Brent Vizbulis – Senior Controller/Analyst

Controller Staff
- 4 Duty Controllers
- 2 Backup Controllers

Analyst Staff
- Tom Griffin – Senior Analyst
- Eric Foster – Ground System Engineer/Analyst
- Rebecca Sibert – Beacon Test Coordinator

Technical Team
- Hardware & Software
- IT Security
- System Administrators
- Database Administrator
USMCC 24/7 Monitoring

• There is one controller on shift at a time
• Controllers work 12-hour shifts (7 AM to 7 PM ET)
• The USMCC Controller’s primary responsibility is to ensure that data flows smoothly and continuously:
  – Input from LUTs and MCCs
  – Output to the RCCs, MCCs, and SPOCs
• The USMCC Controller can assist the RCC Controller by:
  – Closing sites so an IHDB record will be created
  – Changing com paths when requested
  – Relaying messages to appropriate USMCC personnel
  – Answering alert message questions from RCCs
  – Resetting IHDB passwords
  – Sending US beacon registrations or narrative messages to MCCs
USMCC 24/7 Monitoring (Cont’d)

- Assisting in retrieving registration information for foreign beacons
  - Sending requests to other MCCs
  - Assisting with accessing the IBRD

- **Changing SRRs for sites, or forwarding alerts to another SRR**
  - Siting queries (O-plots) by geographic location
  - Suppressing alerts
  - Sending test messages to confirm good communications

• The USMCC Controller cannot:
  - Advise the RCC Controller about their SAR activities (e.g., such as whether or where to launch assets for an alert)
  - Assure that alerts were sent to RCCs outside of the US service area
  - Assure that a foreign RCC is actively prosecuting an alert for a US-coded beacon
MCC Processing

• The USMCC is a data stream processing system. Each input message from a ground station (LUT) is evaluated, validated, matched, and merged based on the Beacon ID.

• The current operational system includes LEOSAR/GEOSAR/MEOSAR data (LGM systems)
  – LGM early operations began December 2016
  – 5 nodal MCCs: USA, France, Spain, Japan and Australia
  – 10 non-nodal MCCs: Norway, United Kingdom, Qatar, Chile, Greece, Italy, Turkey, Algeria, Singapore and Cyprus

• LEOSAR/GEOSAR only (L/G) MCCs do not distribute MEOSAR data automatically
  – L/G MCCs must send MEOSAR data to their associated RCCs and SPOCs manually

• International Data distribution procedures are described in C/S A.001, the COSPAS-SARSAT Data Distribution Plan (DDP)
  – In addition, the USMCC follows national data distribution procedures
Ground Station Types

• MEOLUTs
  – Send a single Difference of Arrival (DOA) position computed using multiple MEOSAR satellites.
  – The DOA position is computed using differences in Time of Arrival (TOA) and/or Frequency of Arrival (FOA) data from different MEOSAR satellites
  – No inherent ambiguity
  – Encoded position may be sent in beacon message

• LEOLUTs
  – Send two positions known as Doppler A/B positions using one LEOSAR satellite
  – 1 real position and 1 image position
  – Inherent ambiguity
  – Encoded position may be sent in beacon message

• GEOLUTs
  – Send beacon detections for one GEOSAR satellite
  – No independent position
  – Encoded position may be sent in beacon message
Basic Alert Distribution Rules

• Each beacon event (detect time/satellite/beacon) is only sent once (redundant data is filtered)
• **Unlocated** alerts are distributed
  – Internationally based on beacon country code
  – Nationally based on beacon registration data (if available)
• Notification of Country of Registration (NOCR) messages are distributed based on country code
  – Sent when the alert is located outside the SRR of country of registration
• Ship security alert system (SSAS) alerts are distributed to the SSAS competent authority based solely on country code
  – For USA country codes, alerts are sent to LANTAREA and PACAREA
• Located alerts are usually distributed based on location (C/S GEOSORT for world, USMCC GEOSORT for USMCC service area)
Unlocated Alerts

• Per C/S MCCs, distribute based on country code of beacon
• For beacon IDs with a US country code (303, 338, 358, 366, 367, 368, 369, 379, 536, or 559)
  – If the beacon is registered in the US 406 MHz 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 owner’s mailing address
• If no SRR is assigned (and vessel or aircraft ID is encoded in the beacon ID), alert is distributed based on beacon type
  – EPIRB alerts to PACAREA
  – ELT alerts to AFRCC
  – PLB alerts to AFRCC
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 International Telecommunications Union (ITU) or other source
    - Unlocated EPIRB alerts sent to PACAREA
  - **ELTs:** 24-bit address, aircraft operator designator, etc.
    - RCC must look up using tail number database
    - Unlocated ELT alerts sent to AFRCC
- If no vessel or aircraft ID (i.e., no link to another registry) in beacon message, the unlocated alert is **not** distributed to a US RCC or SPOC
Unlocated Alerts – Non-USA-Coded Beacons

• Unlocated alerts for a non-USA-coded beacon within the US 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 US RCC in whose SRR the country is included
    • Example: Cuban beacon goes to CGD07
### Unlocated Alerts – SRRs for US Registered

#### RGDB SRR Assignments – Non-US Areas

<table>
<thead>
<tr>
<th>State Abbreviation</th>
<th>State Name</th>
<th>EPIRB SRR 01</th>
<th>EPIRB SRR 02</th>
<th>ELT SRR</th>
<th>PLB SRR 01</th>
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<tr>
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</table>
NOCR Distribution

• Per C/S, alert message sent based on country code and beacon location
  – Sent when the alert is located outside the SRR of country of registration

• The USMCC distributes an NOCR to a US RCC when it first receives a located alert for the alert site, and
  – The alert is for a US-coded beacon but not in a US SRR, or
  – The alert is for a non-US-coded beacon for a country supported by a US RCC (e.g., Bahamas), but not in that country’s SRR
  – Allows US RCC to ensure that there is a SAR response for (US) beacon

• Caution: If NOCR from a MEO alert and the beacon location is serviced by a LEOSAR/GEOSAR only MCC, the alert may not be sent to the responsible RCC!

• The USMCC:
  – Continues to send alerts to NOCR destinations until position is confirmed
  – Sends an NOCR indicating that position is confirmed, if position is confirmed on the first located alert
  – Will not send an NOCR if it previously sent an alert message with location to a RCC for the site
<table>
<thead>
<tr>
<th>Country Code</th>
<th>Associated RCC/SPOC</th>
</tr>
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<tbody>
<tr>
<td>MID: 307 ARUBA</td>
<td>NANTSP</td>
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<tr>
<td>MID: 308/309/311 BAHAMAS</td>
<td>CGD7</td>
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<tr>
<td>MID: 314 BARBADOS</td>
<td>SANJN (CG Sector San Juan)</td>
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<tr>
<td>MID: 310 BERMUDA</td>
<td>BERMUDASP</td>
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<td>MID: 378 GB VIRGIN ISLANDS</td>
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<td>MID: 319 CAYMAN ISLANDS</td>
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<td>MID: 730 COLOMBIA</td>
<td>COLMSP</td>
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<td>MID: 323 CUBA</td>
<td>CGD7</td>
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<tr>
<td>MID: 327 DOMINICAN REPUBLIC</td>
<td>DOMREPSp</td>
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<tr>
<td>MID: 330 GRENADA</td>
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<tr>
<td>MID: 750 GUYANA</td>
<td>GUYSP</td>
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<tr>
<td>MID: 336 HAITI</td>
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<td>MID: 339 JAMAICA</td>
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<td>MID: 538 MARSHALL ISLANDS</td>
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<td>MID: 510 MICRONESIA</td>
<td>MARSEC (CG Sector Guam)</td>
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<td>MID: 306 NETHERLANDS ANTILLES</td>
<td>NANTSP</td>
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<tr>
<td>MID: 511 PALAU</td>
<td>MARSEC (CG Sector Guam)</td>
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<td>MID: 351/352/353/354/355/356 PANAMA</td>
<td>PanSP</td>
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<tr>
<td>MID: 357/370/371/372/373/374 PANAMA</td>
<td>PanSP</td>
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<td>MID: 375/376/377 SAINT VINCENT &amp; GRENADINES</td>
<td>SANJN (CG Sector San Juan)</td>
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<tr>
<td>MID: 362 TRINIDAD AND TOBAGO</td>
<td>TTSP</td>
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<tr>
<td>MID: 364 TURKS AND CAICOS ISLANDS</td>
<td>CGD7</td>
</tr>
<tr>
<td>MID: 775 VENEZUELA</td>
<td>VZMCC</td>
</tr>
</tbody>
</table>
SSAS Beacons and Alerts for Unreliable Beacon IDs

• Alerts for USA-coded 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 or Doppler location
    • If in US SRR, also sent to USCG LANTAREA and PACAREA (may be SSAS)
MEOSAR Uncorroborated Alerts

MEOSAR uncorroborated alerts are alerts based on a single beacon burst detected by one satellite, with no other detection for beacon

- Uncorroborated alerts may later be corroborated by another detection for the beacon (LEO, GEO, or MEO)
- Uncorroborated alerts never corroborated by another beacon detection have been used in SARSAT rescues (3 cases in 2017)
- Per C/S requirements, uncorroborated MEOSAR alerts are:
  - Distributed to LGM MCCs
  - Not distributed to LEOSAR/GEOSAR (L/G) only MCCs
  - Distributed to national RCCs as determined nationally
  - Distributed to SPOCs if the beacon is known to be registered or the source LUT is commissioned for low processing anomaly rate
Located Alerts/Detection Updates

Located alerts are usually distributed based on location (C/S GEOSORT for world, USMCC GEOSORT for USMCC service area)

- Detection update sent when 30 minutes has passed since the previous alert for beacon or MEOSAR uncorroborated alert is corroborated (USMCC rule only)

- A new MEOSAR alert is expected (per C/S rules):
  - Within 5 minutes before position confirmation*
  - Within 15 minutes after position confirmation*

*Based on latest data time of new vs. most recent data time of sent DOA alerts
Located Alerts

The USMCC:

• Distributes alerts to US RCCs within 50-km buffer zone
• Distributes alerts to US RCCs within 348-km buffer zone for some US SPOCs, based on the 200 nautical mile US Exclusive Economic Zone (EEZ)
• Sends same pass update, prior to position confirmation, if the “A” side probability increases by at least 15%
• Sends located and unlocated alerts for US special program beacons specially (i.e., in append or replace mode)
Located Alerts

New alert with DOA or Doppler location distributed when:

- DOA or Doppler location first received
- Subsequent DOA location has improved Expected Horizontal Error (EE):
  - Less than 150 NM (277.8 km) and
  - At least 2 NM (3.7 km) less than lowest previously sent DOA expected error and
  - At least 50% less than lowest previously sent DOA expected error
- Before position confirmation, DOA position update every 5 minutes*
- Before position confirmation, position conflict occurs (20 km threshold)
- Position confirmation is achieved; for 2 DOA positions this requires:
  - Each DOA alert to include data from one satellite not included on the other alert and
  time separation of at least 2 seconds in some portion of the periods for the two
alerts (i.e., separate bursts); or
  - At least 30-minute time separation for the two DOA alerts
  - Position can also be confirmed by DOA, with Doppler or encoded position
- After position confirmation, DOA position update every 15 minutes*
- After position confirmation, DOA position conflict as often as every 10
  minutes*

*Based on latest data time of new vs. most recent data time of sent DOA alerts
Position Confirmation

• Position confirmation requires independent positions that match within 20 km

• Matching positions can come from:
  - Independent Doppler positions
  - Independent DOA positions
  - A Doppler and DOA position
  - A Doppler and encoded position
  - A DOA and encoded position

• Position confirmation alert sent to all previous alert recipients for beacon activation

• By default, messages are sent after position confirmation to the destination associated with the real position (MCC per C/S rules; US RCC or SPOC if location within USMCC service area)
Alert Site Closure

• Sites close automatically
  – 2 hours without a detection, if the beacon was detected by a USA MEOLUT with DOA position or a USA GEOLUT, or
  – 6 hours without a detection; otherwise,
  – 72 hours since alert site opened (regardless of time since last detection)

• Sites close manually
  – USMCC Controller closes site at RCC request

• IHDB record created waiting for RCC or SPOC input
  – RCC updates IHDB directly
  – SPOC provides Incident Feedback from USMCC site closure message to USMCC for entry by USMCC personnel
RCC Messages Manual

The RCC Messages Manual describes the messages transmitted to national RCCs and national SPOCs by the USMCC. The document is structured so that the user may use it as a reference and go directly to a specific type of alert message.


Updates in this version include –
– Clarify the distribution of uncorroborated MEOSAR alert (section 3.2.7)
– Updated information on EHE (section 3.2.3.2)
– Change the time gap to send a SIT 176 “no detection” message from 30 to 35 minutes
– Annex 3 updated to identify LGM capable MCCs
– Document History at start of Manual identifies all revisions
Conclusion

Questions?