



MEOSAR Overview

SAR Controllers Training 2012
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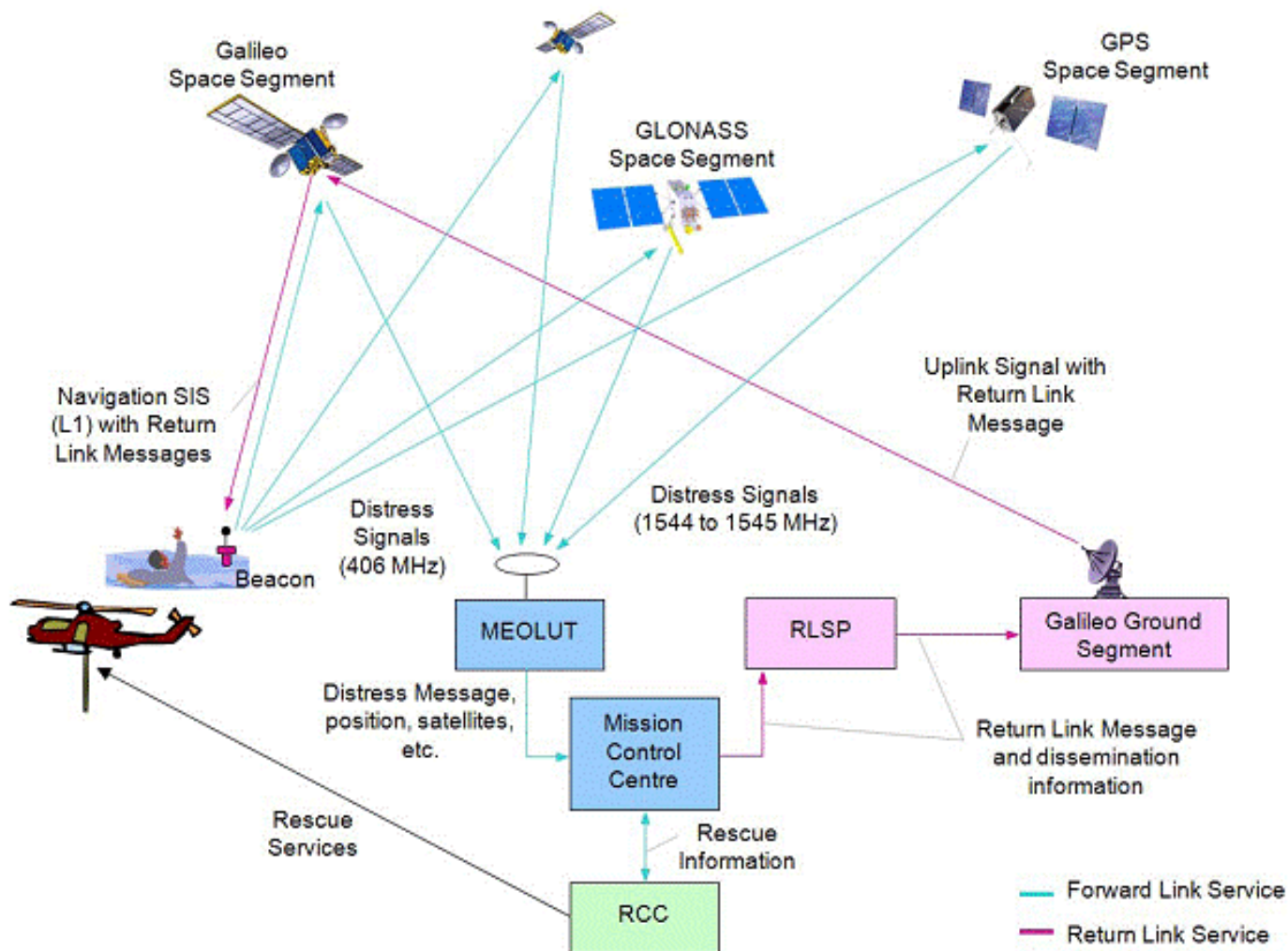


Agenda

- MEOSAR/DASS Overview
- Space Segment
- Ground Segment
- DASS POC
- MEOSAR Timeline
- Demonstration and Evaluation
- 2nd Generation Beacons



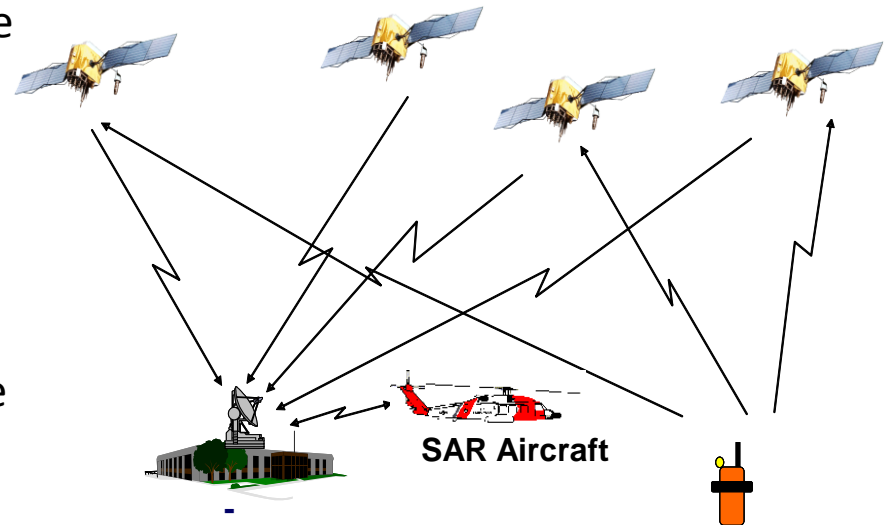
MEOSAR/DASS Overview



MEOSAR/DASS Overview

- MEOSAR/DASS Concept

- Utilize multiple satellites with SAR repeaters, or “bent pipe”
- Multiple antennas are used to receive the same beacon burst
- The time difference of arrival (TDOA) and frequency difference of arrival (FDOA) is then used to determine location
- One burst, received through 3 unique satellites, is capable of producing a location
- Essentially, GPS location in reverse





MEOSAR/DASS Overview

- Medium Earth Orbit (MEO) SAR / Distress Alerting Satellite System (DASS)
 - Various studies determined that medium-earth orbiting (MEO) satellites provide a vastly improved space-based distress alerting and locating system.
 - NASA, with USAF Space and Air Combat Command, NOAA, and USCG are developing a capability on GPS satellites– Distress Alerting Satellite System (DASS)
- MEOSAR provides
 - A combination of the best assets of GEOSAR and LEOSAR
 - Near instantaneous notification and location of distress
 - Near 100% Availability
 - Better location accuracy
 - Global coverage
 - Full compatibility with current and future beacons



Space Segment

- Repeaters will be flown on Medium Earth Orbit satellites (MEOSATs)
- Will utilize 3 Global Navigation Satellite System (GNSS) constellations
 - GPS (USA)
 - GLONASS (Russia)
 - Galileo (ESA)
- Current plan is to have 24 US MEOSAR instruments
- 72 MEOSAR instruments total



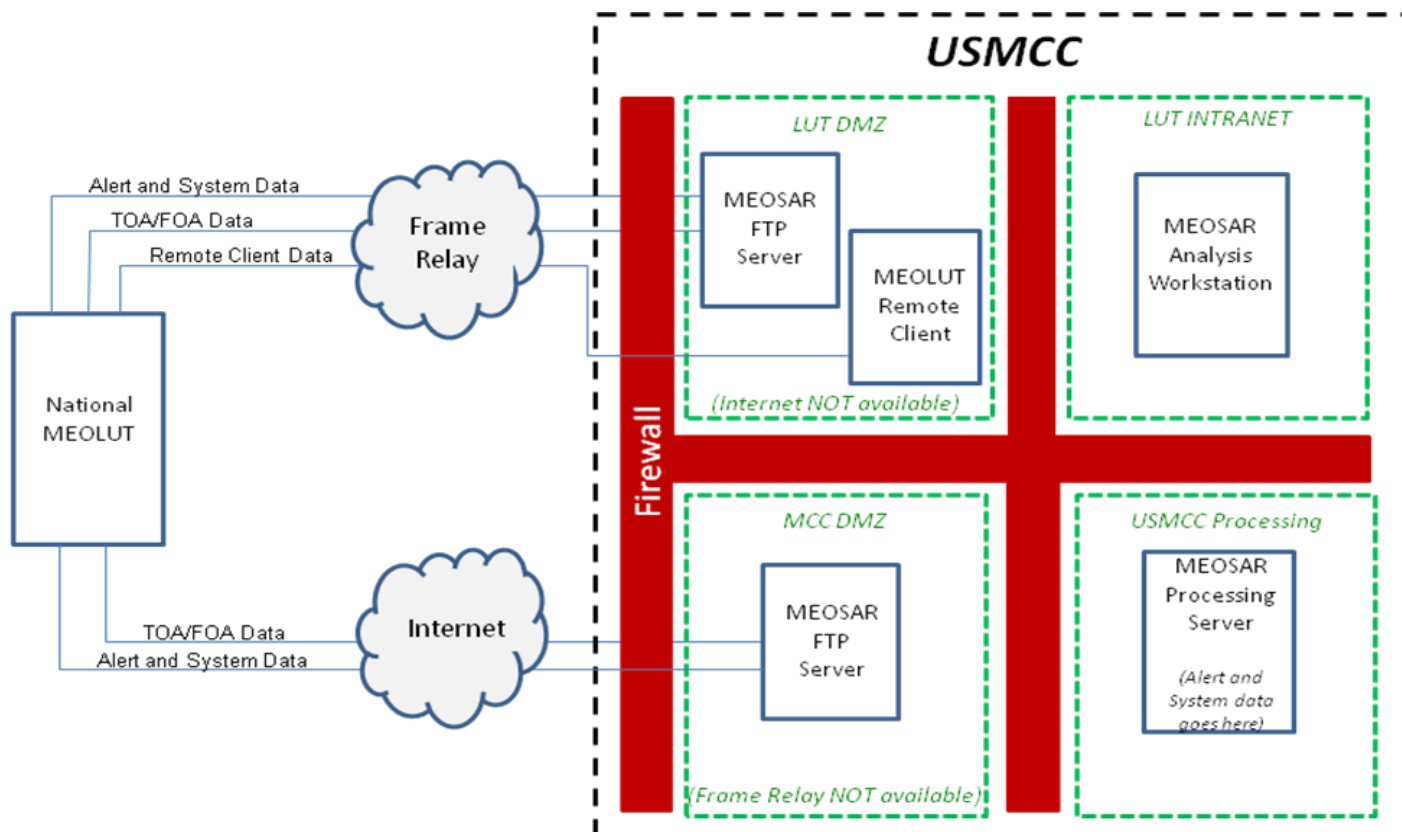


MEO vs. LEO Coverage





US MEOSAR Ground Segment Design





Ground Segment

- Prototype ground station at NASA Goddard Space Flight Center
 - 4 antennas – capable of independently tracking 4 satellites
 - Completed in 2008
 - Successfully passed acceptance testing
 - May become future operational MEOLUT
 - Full participation in MEOSAR D&E testing



Ground Segment

- Accepted MEOLUT Wahiawa, Hawaii
 - 6 antenna – capable of tracking 6 satellites either S-band or L-band
 - Constructed in September 2011 and passed acceptance testing
- Proposed MEOLUT in Miami, Florida
 - 6 antenna – capable of tracking 6 satellites either S-band or L-band
 - Procurement will be released by Sept 2012
 - Construction will begin Sept 2013, completed by Dec 2013



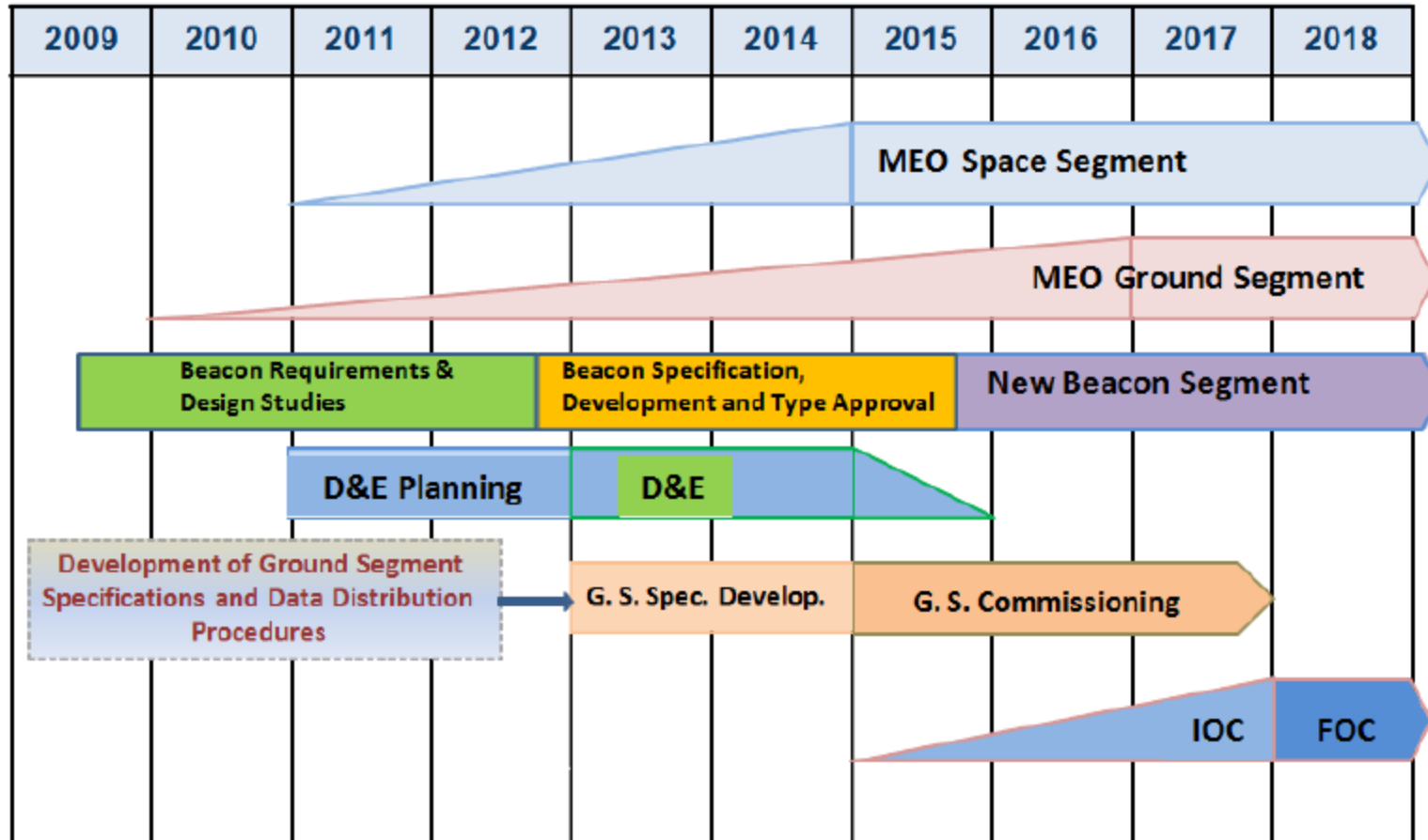


DASS Proof-of-Concept

- DASS Proof-of-Concept (POC) Space Segment
 - Ten current on-orbit GPS Block IIR and IIF satellites carry DASS repeaters
 - POC system uses existing GPS. Downlink at S-Band (Not ITU-allocated for SAR, but may possibly be used operationally)
- Proof-of-Concept results to date:
 - Demonstrated ability to locate beacons to greater than current Cospas-Sarsat accuracy using two or more satellites
 - System meets/exceeds theoretical capabilities
 - Tests are on-going



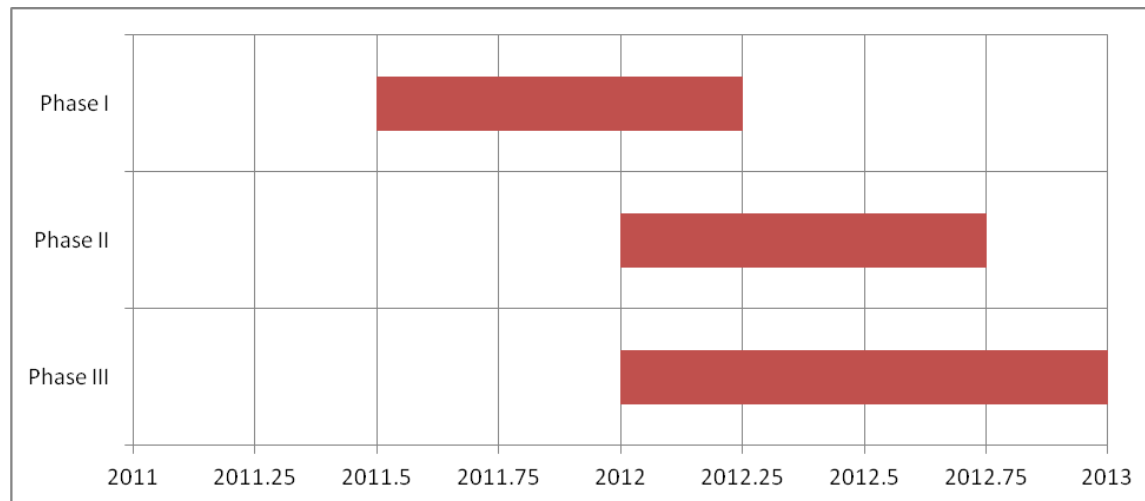
MEOSAR Timeline





US MEOSAR Timeline

- Phase I – Installation of Hawaii MEOLUT
- Phase II – Networking of Data
- Phase III – MEOSAR D&E



MEOSAR Demonstration and Evaluation (D&E)



- Goals
 - Characterize technical and operational performance
 - Evaluate operational effectiveness
 - **Provide basis for recommendations on the integration of MEOSAR system into C/S**
 - **Basis for commissioning criteria**

MEOSAR Demonstration and Evaluation (D&E)



- Technical tests
 - Processing threshold and system margin
 - Impact of interference
 - Valid and complete message acquisition
 - Location accuracy
 - System Capacity
 - Networked MEOLUT advantage
 - Combined MEO/GEO performance

MEOSAR Demonstration and Evaluation (D&E)



- Operational Tests
 - Time advantage
 - Unique detections
 - Volume of ground segment traffic
 - SAR/Galileo RLS
 - Direct and indirect benefits of MEOSAR system



Second Generation Beacons

- Compatible with Cospas-Sarsat System
- Minimum Requirement Improvements
 - Independent location accuracy
 - First burst transmission timeliness [3] seconds
 - Increased performance in first 30 seconds
 - Cancellation function
- Objective Requirement Improvements
 - Better encoded location
 - 30 m, 95% of the time within 5 minutes of activation
 - Return Link Service (RLS)
 - Additional data encoded in beacon message
 - Automatic ELT activation on indication of emergency