Second Generation Beacons

SAR Controllers Training 2013
19 – 21 March2013

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Background

- Cospas-Sarsat (C/S) has defined operational requirements based on use of a second generation of beacons
  - Operational Requirements for Cospas-Sarsat Second Generation 406 MHz Beacons, C/S G.008
  - Second Generation Beacon Implementation Plan (BIP), C/S R.017

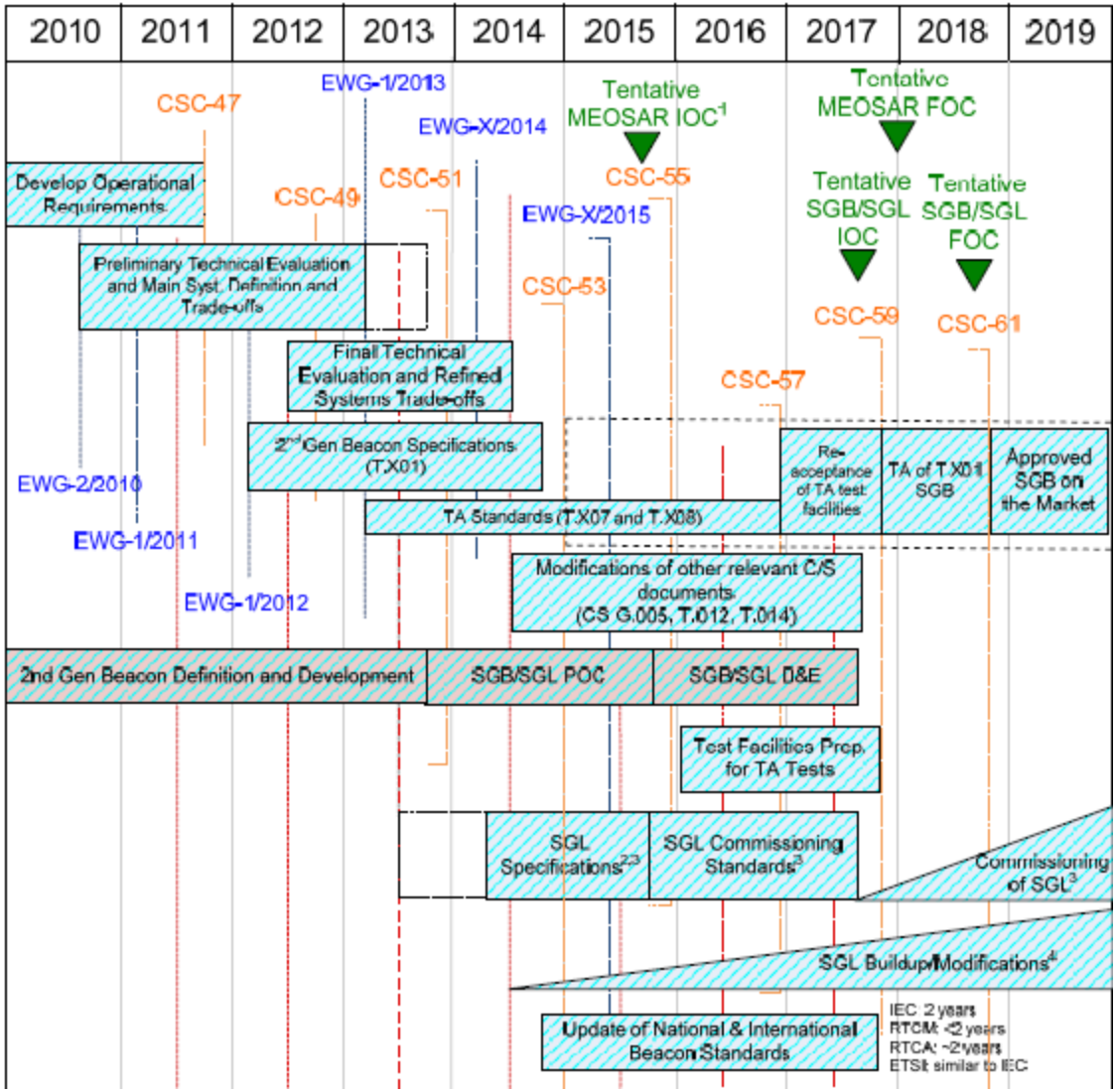
Operational Requirements from G.008

- Compatible with Cospas-Sarsat System
- Minimum Requirements
  - Independent location accuracy
  - First burst transmission timeliness [3] seconds
  - Increased performance in first 30 seconds
  - Cancellation function
  - Verification of Beacon Registration
- Objective Requirements
  - 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

BIP Timeline

- According to C/S Operational Requirements, C/S G.008
  - LEOSAR SARP processing constraints limit the possible evolution of first generation beacon specifications
  - 2nd gen beacons **after** MEOSAR FOC **not required** to be LEOSAR SARP interoperable
  - 2nd gen beacons **prior** to MEOSAR FOC **required** to be LEOSAR SARP interoperable
  - MEOSAR D&E not dependent on availability of 2nd gen beacons

BIP Timeline

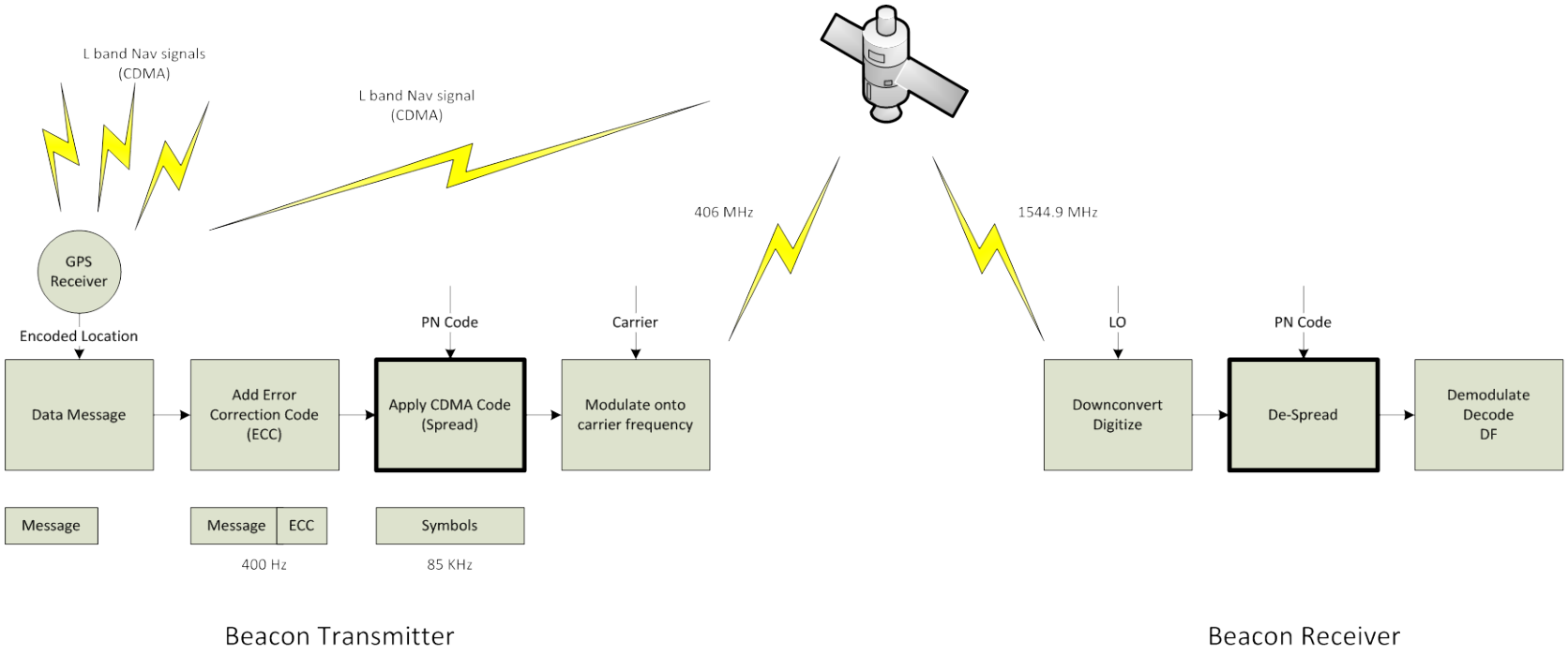


U.S. and French Goals

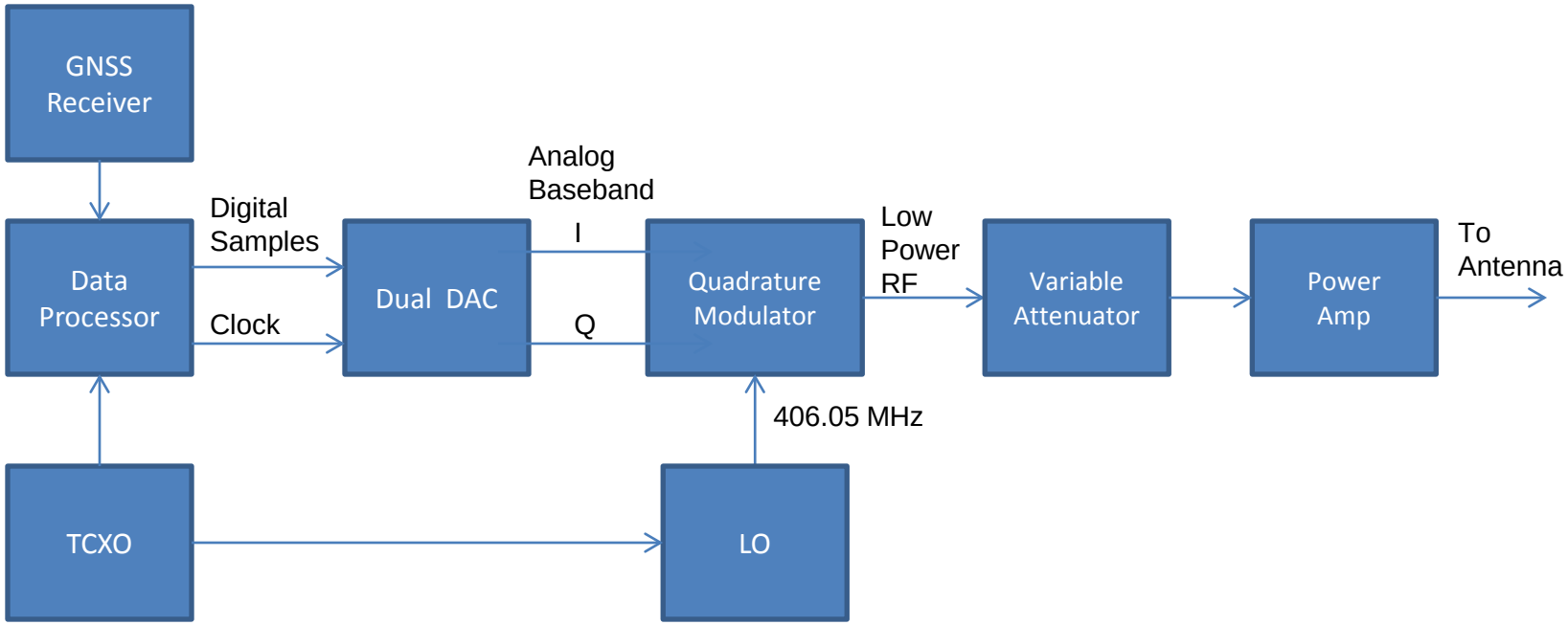
- Improve system performance to meet or exceed C/S requirements
  - including detection probability, location accuracy and system capacity
- Modernize beacon signal for MEOSAR system
- Relax beacon requirements to reduce cost and complexity
- Collaborate with manufacturers to obtain the most competitive end product

Fully realize ability of Cospas-Sarsat to provide the gold standard of emergency distress location

Beacon Model: Functional



Beacon Model: Physical



Message Format

- Simple and efficient
  - Single message structure with multiple protocols
  - Investigating use of a modified Type Approval Certification (TAC) data base to provide some required data that is currently carried in the message
  - Use of various schemes to encode some alpha-numeric data fields
  - Message length to meet requirements with some margin
  - Protected with a single BCH Forward Error Correction code to exceed Bit Error Rate requirement with minimal cost to beacon

RF Modulation

- Offset Quadrature Phase Shift Keying (OQPSK)
  - Industry standard
  - Many commercially available chip sets available
  - Relaxes requirements on amplifier
  - Increases system performance and efficiency of data transmission

Direct Sequence Spread Spectrum Code Division Multiple Access

- Industry standard basis for major performance improvements in detection, location and capacity
- Easy to implement – code applied to digital data in software
- Relaxes beacon requirements
  - Oscillator frequency stability of 5-10 ppmillion – orders of magnitude improvement over current 1-2 pp*billion*
  - All beacons transmit at same center frequency
    - never have to change oscillator
    - different codes applied in software.

Local Detection and Homing Signal

- 406 MHz signal designed for local detection and homing
  - Replace 121.5 MHz homing signal – simpler, single frequency beacon design
  - Collaborating with DF equipment manufacturers on signal design
  - Purpose built design will improve performance over current systems
  - Software configurable so beacon utilizes existing 406 MHz transmit chain

Contact Information

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