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Cospas-Sarsat Ground Stations LEOLUTs & GEOLUTs

Chris Payne

Manager

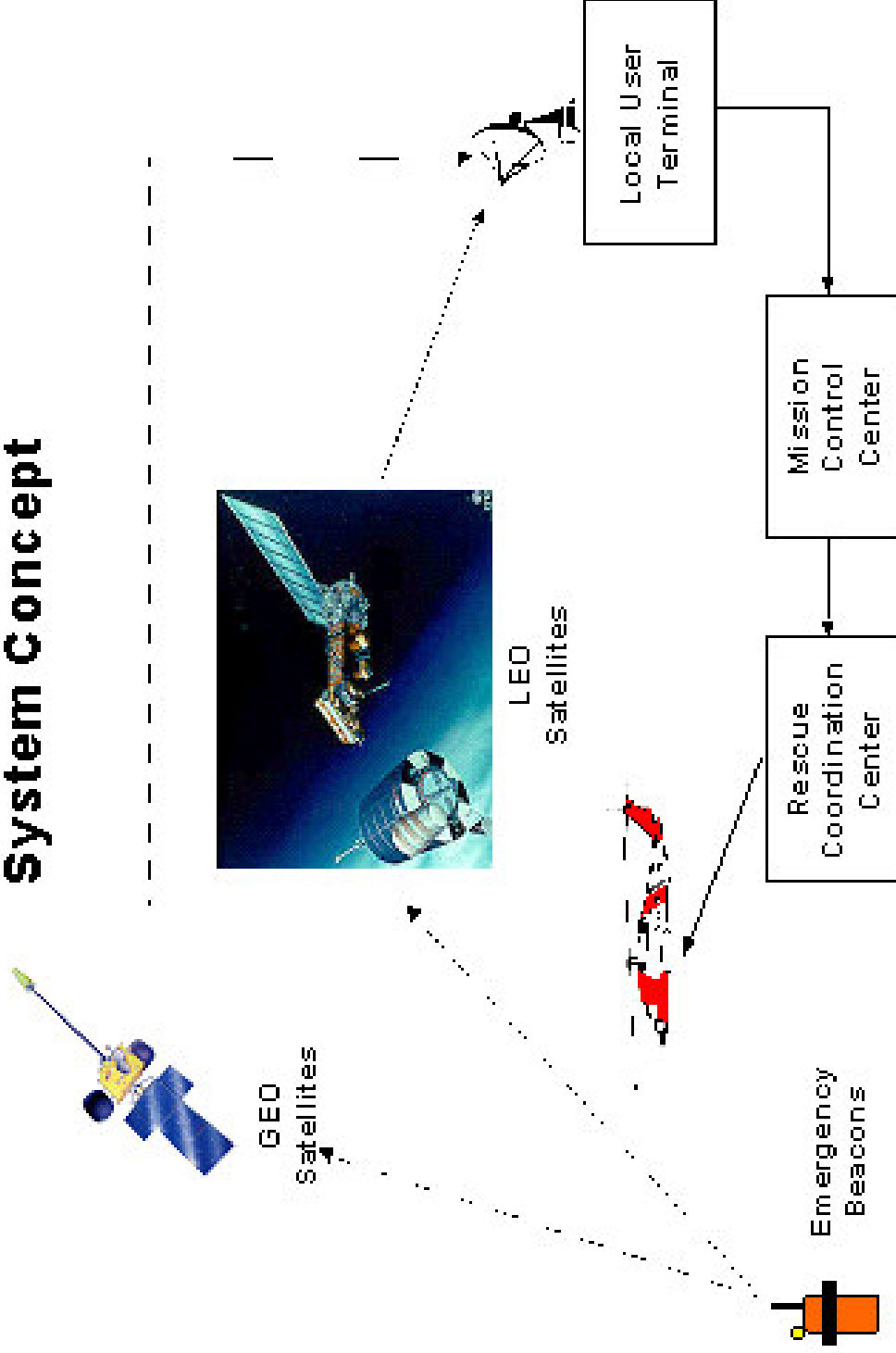
Australian Mission Control Centre



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System Concept





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WHAT'S IN A NAME?

LUT – Local User Terminal

LEOLUT

GEOLUT

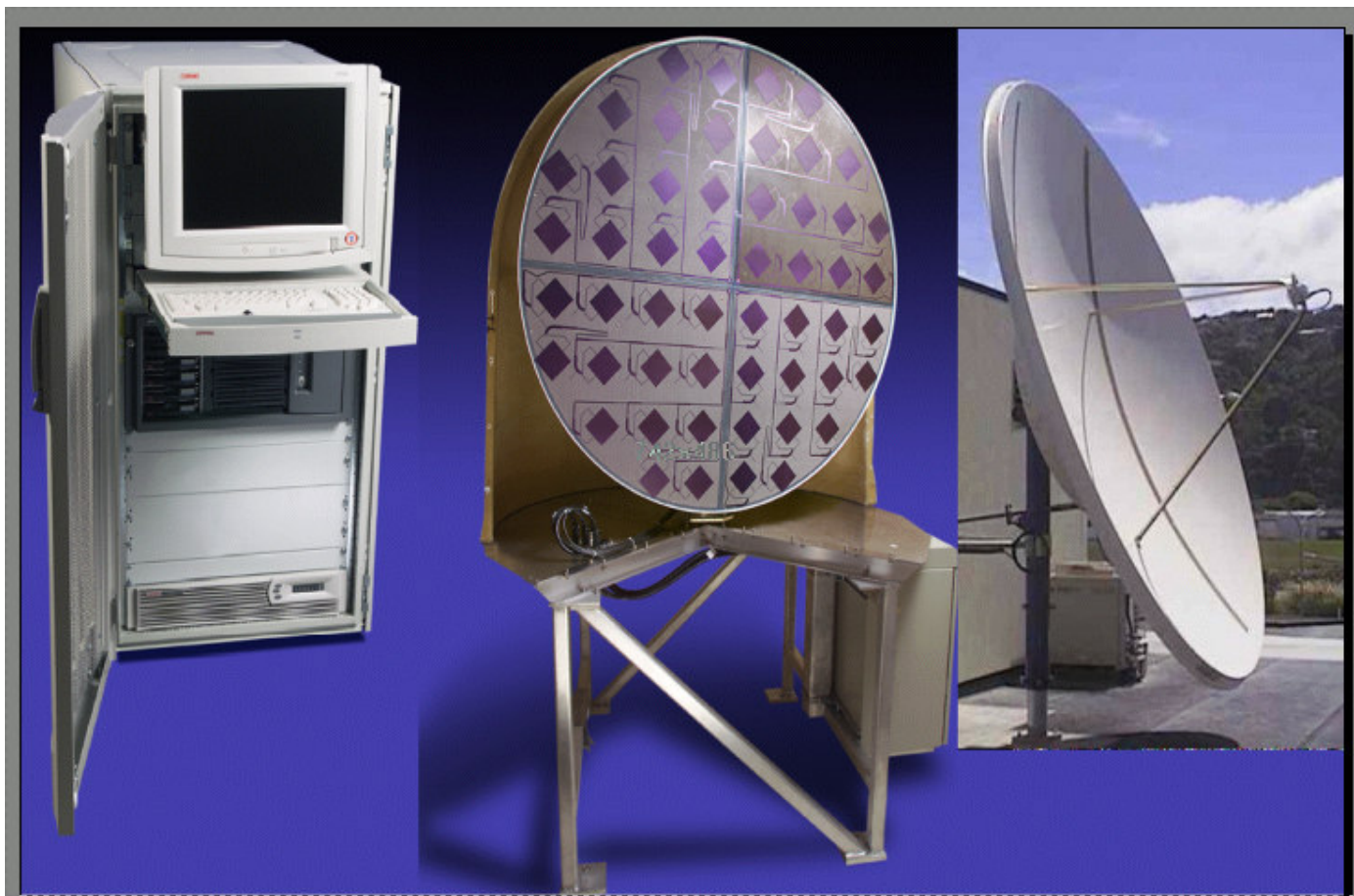
MEOLUT



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LEOLUT & GEOLUT





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NEW ZEALAND LUT SITE

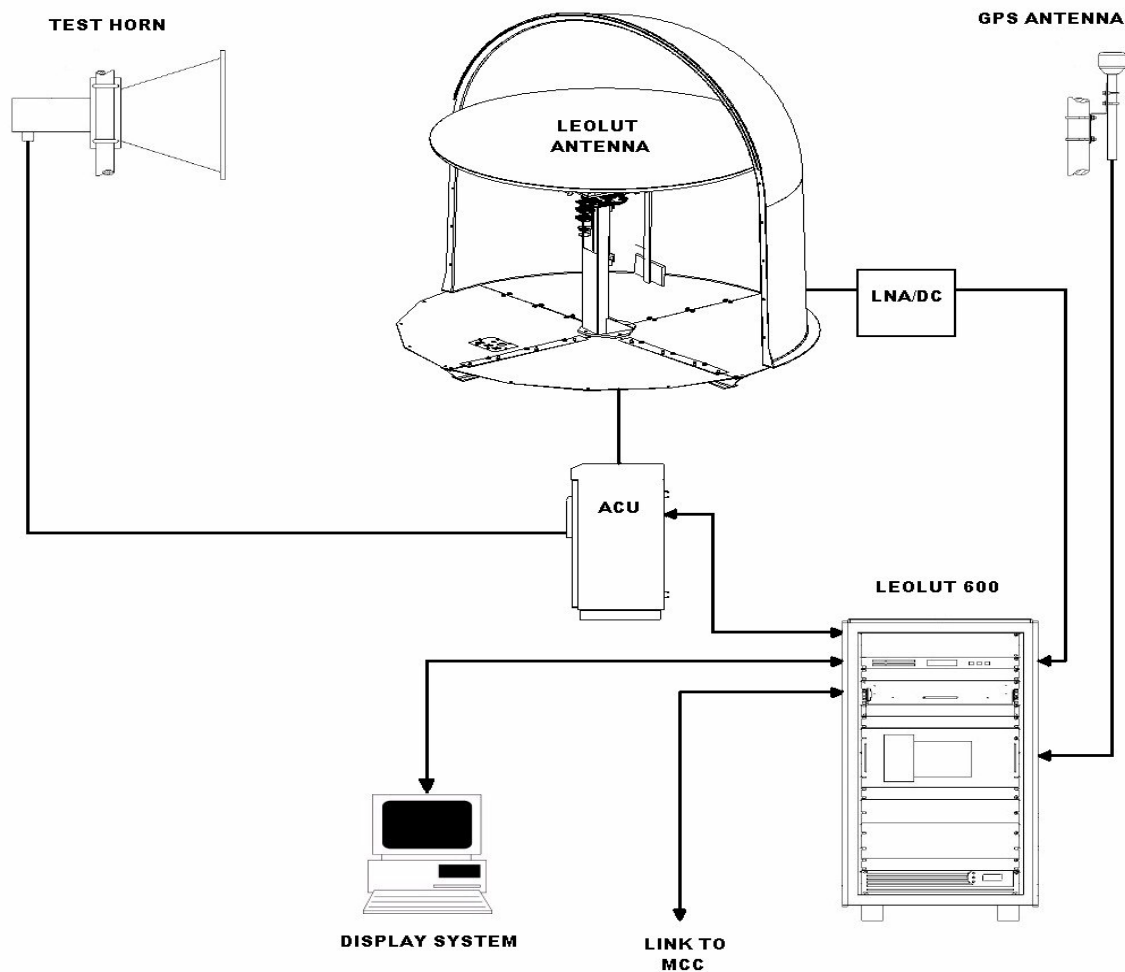




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LEOLUT HARDWARE





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FUNCTIONS OF A LEOLUT

- Track satellites – Pass Scheduling
- Process data received from the satellites
- Calculate location information from data received
- Maintain satellite orbit data information
- Maintain accurate time keeping using GPS
- Provide solution data to MCC
- Communications with MCC & via User Interface
- LUT status monitoring



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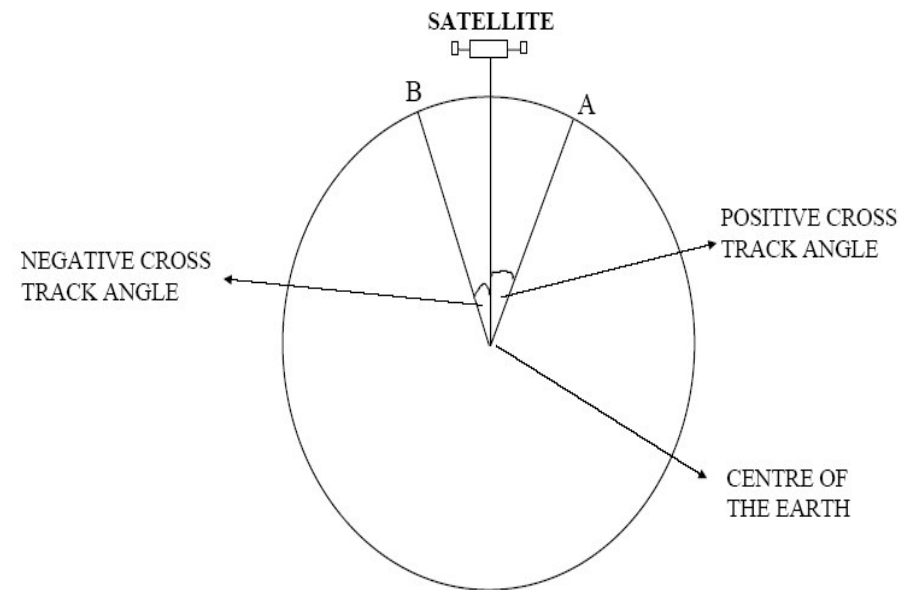
COSPAS-SARSAT JARGON

➤ Cross Track Angle (CTA)

- Determined by the magnitude of frequency change
- The smaller the CTA the closer the beacon to the satellite and vice versa

➤ Time of Closest Approach (TCA)

- Beacon to Satellite





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COSPAS-SARSAT JARGON

➤ Frequency Bias

- The frequency offset from the nominal transmitted frequency

➤ Frequency Drift

- Rate of frequency change for the beacon carrier frequency (Hz/Min)

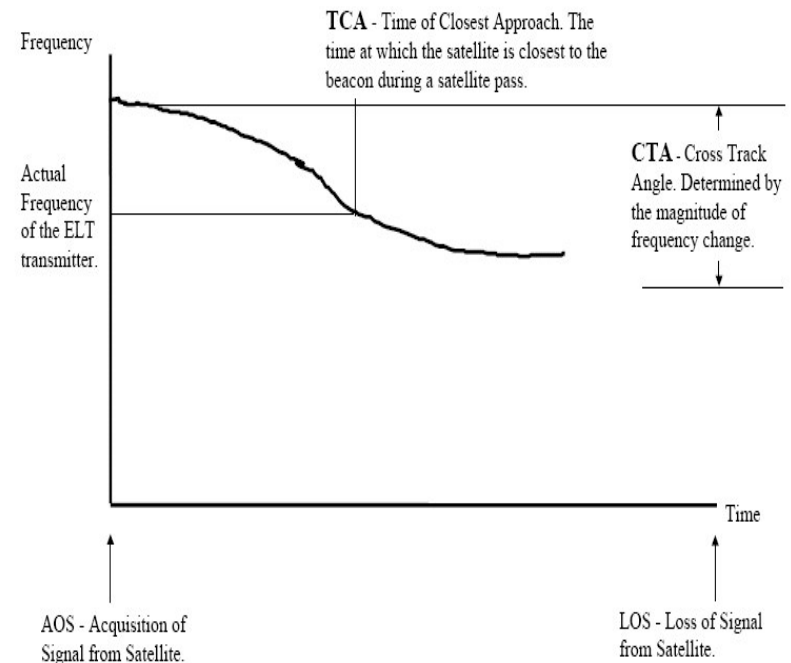


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DOPPLER PRINCIPLE

- Satellite motion creates Doppler shift
- Measured by the LUT and TCA and CTA established
- With known satellite orbit data, TCA and CTA the LUT can calculate location.

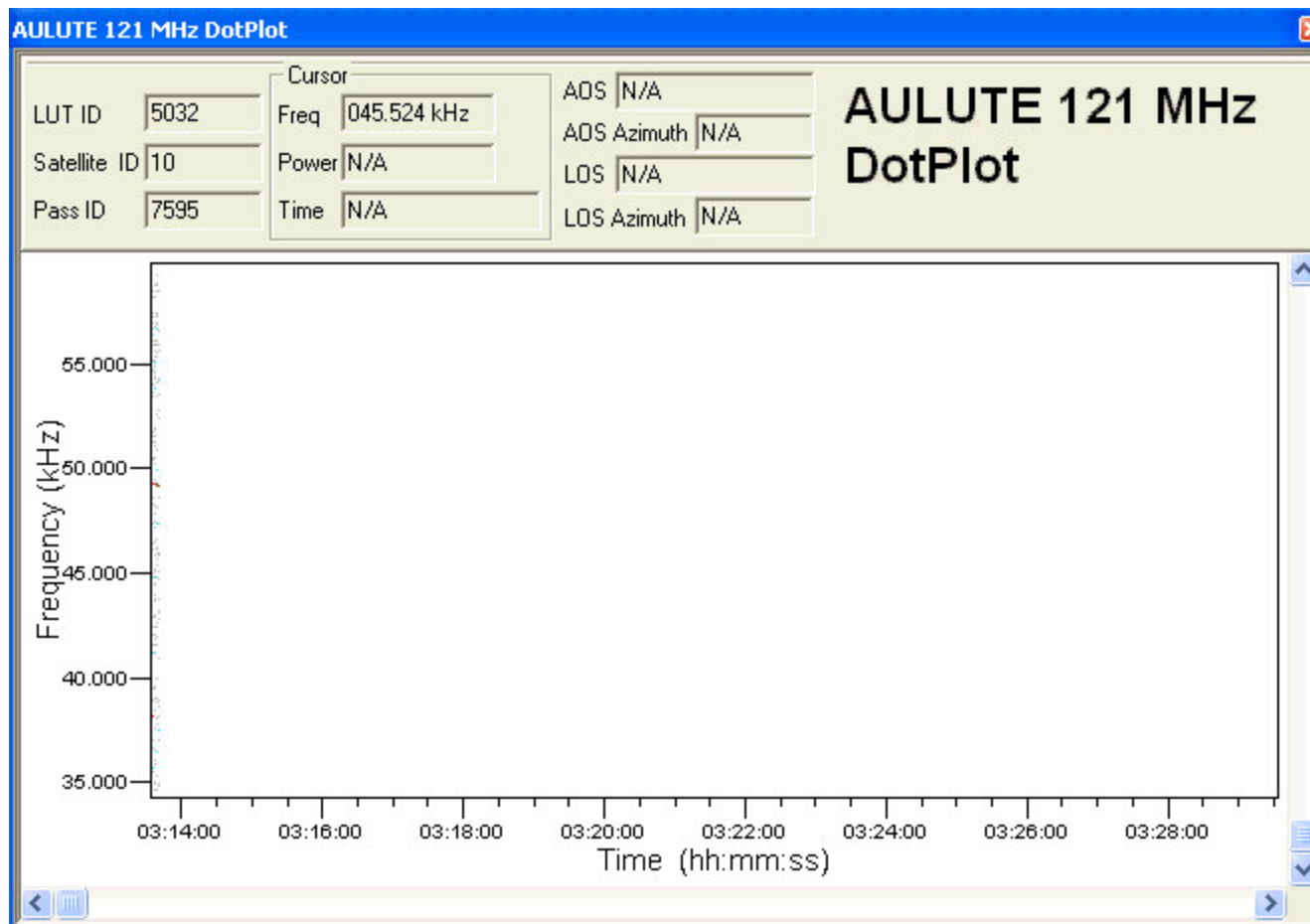




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DOPPLER PRINCIPLE



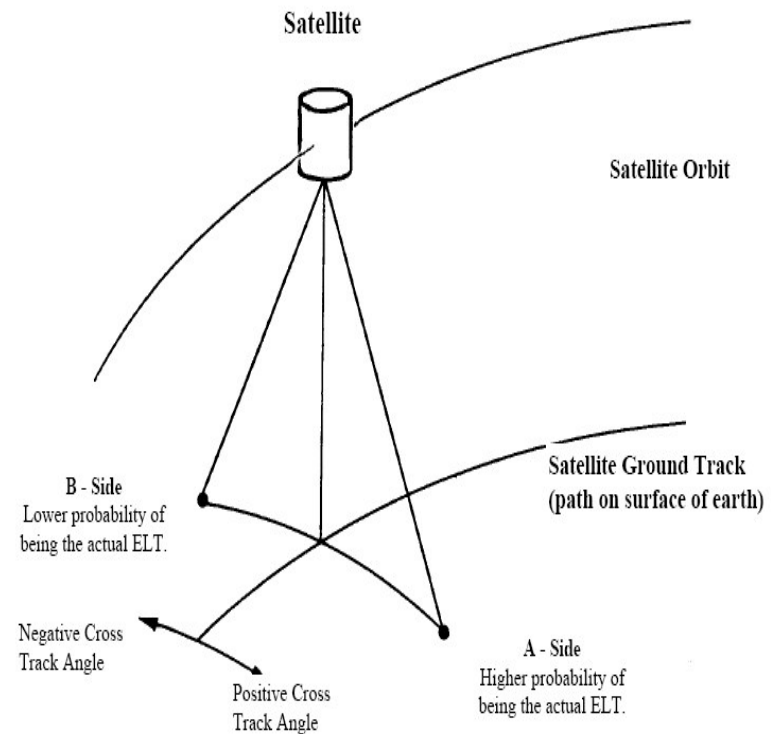


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SATELLITE BEACON GEOMETRY

- CTA is solved for negative and positive values
- Thus two locations, A & B
- Frequency Drift can be used to estimate the “correct” position





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FUNCTIONS OF A GEOLUT

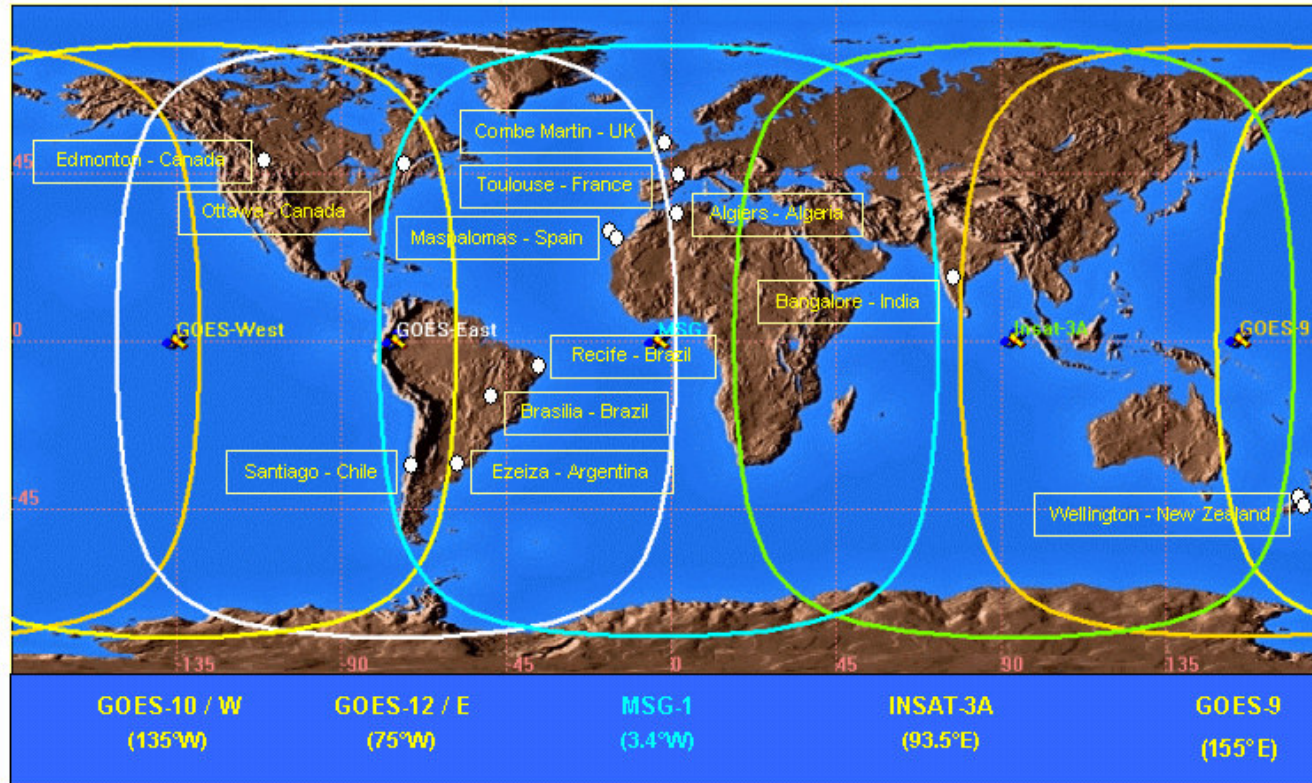
- Acquire and receive the downlink signal from a geostationary satellite
- Maintain time and frequency references
- Process and recover 406 MHz beacon messages
- Forward detections to the associated MCC
- Not designed to provide location information with exception of encoded location data



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GEOLUTs & GEOSATs





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LEOLUTs

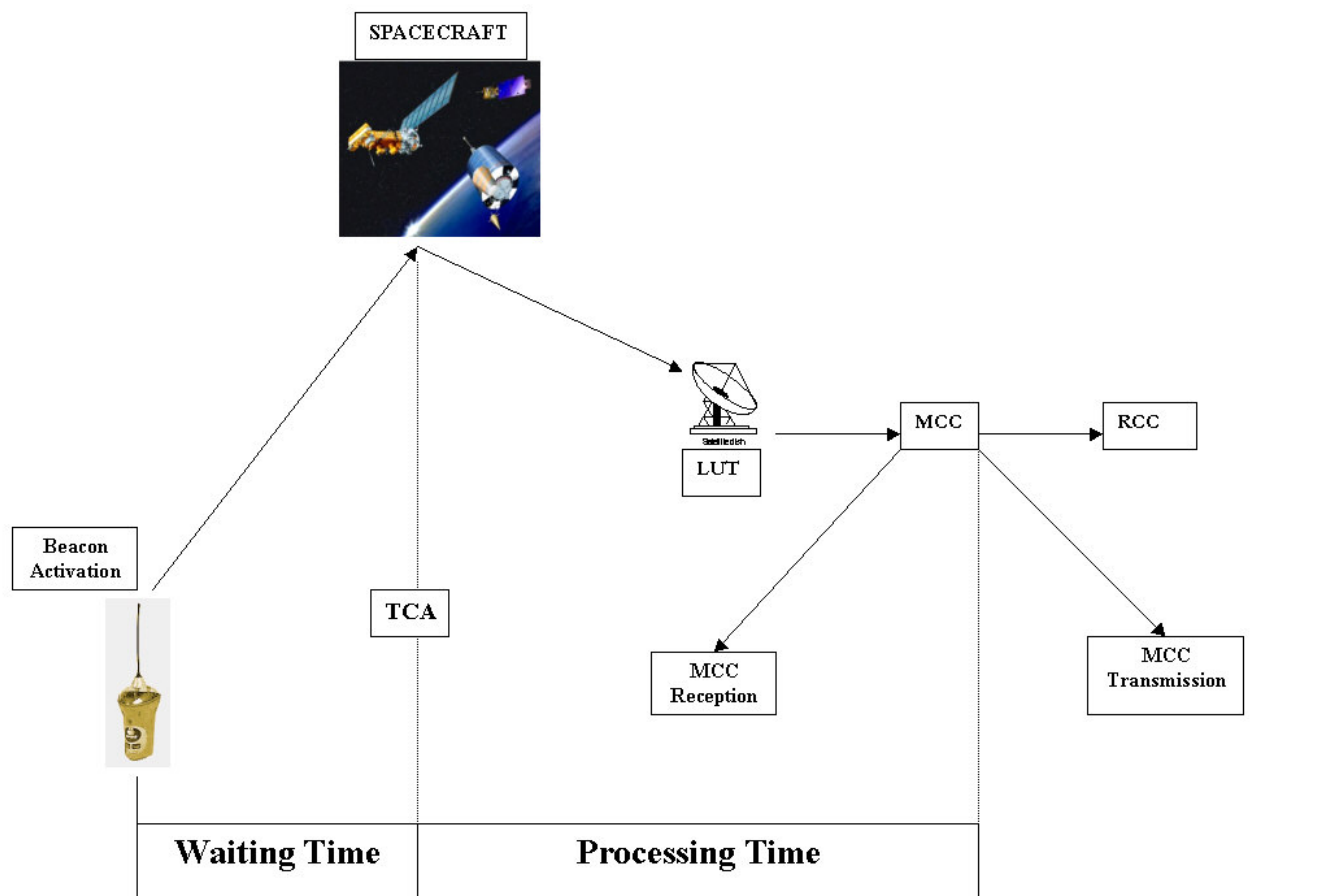




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SYSTEM WAIT TIME



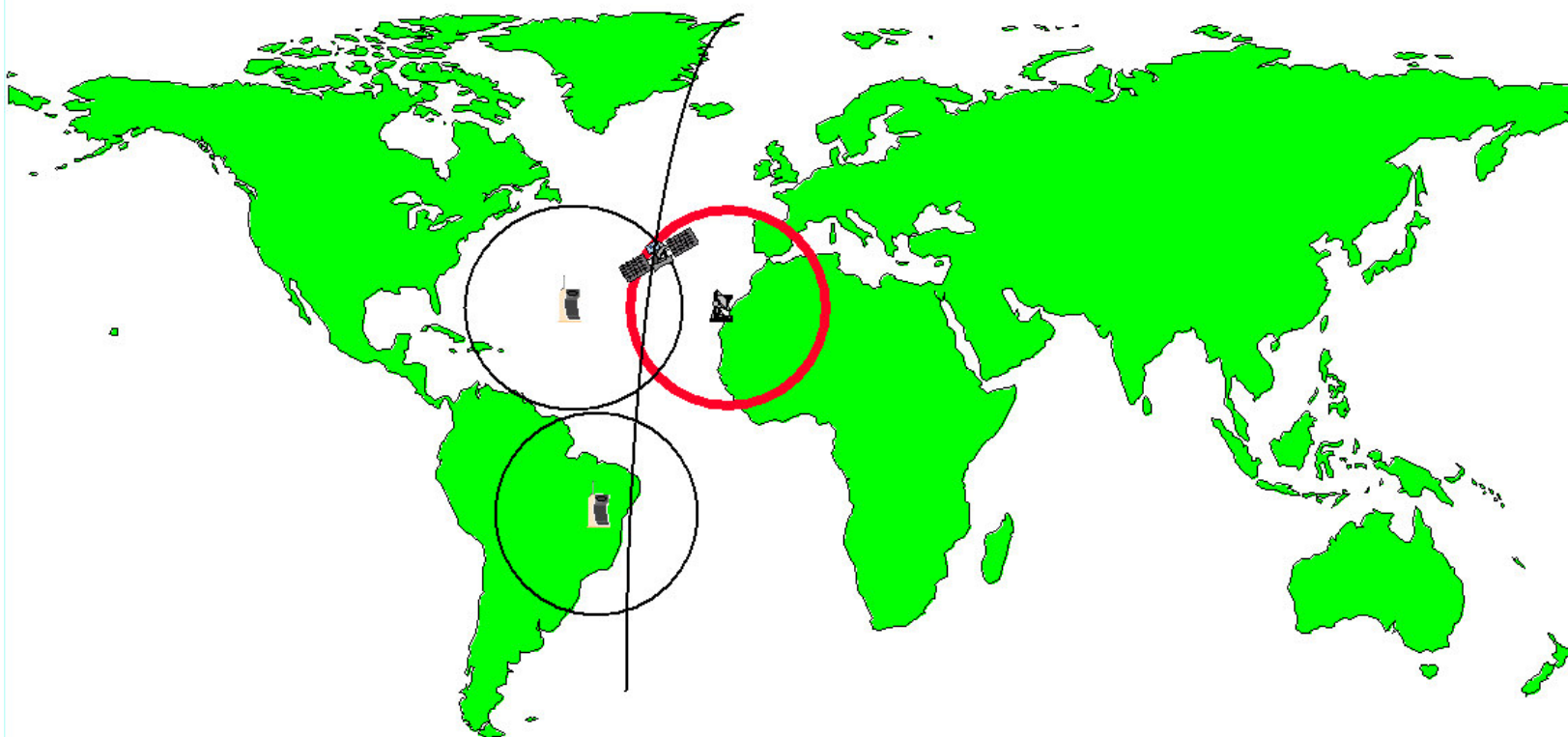


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121.5 MHz LOCAL MODE (SARR)

- - LUT TO SATELLITE VISIBILITY
- - BEACON TO SATELLITE VISIBILITY



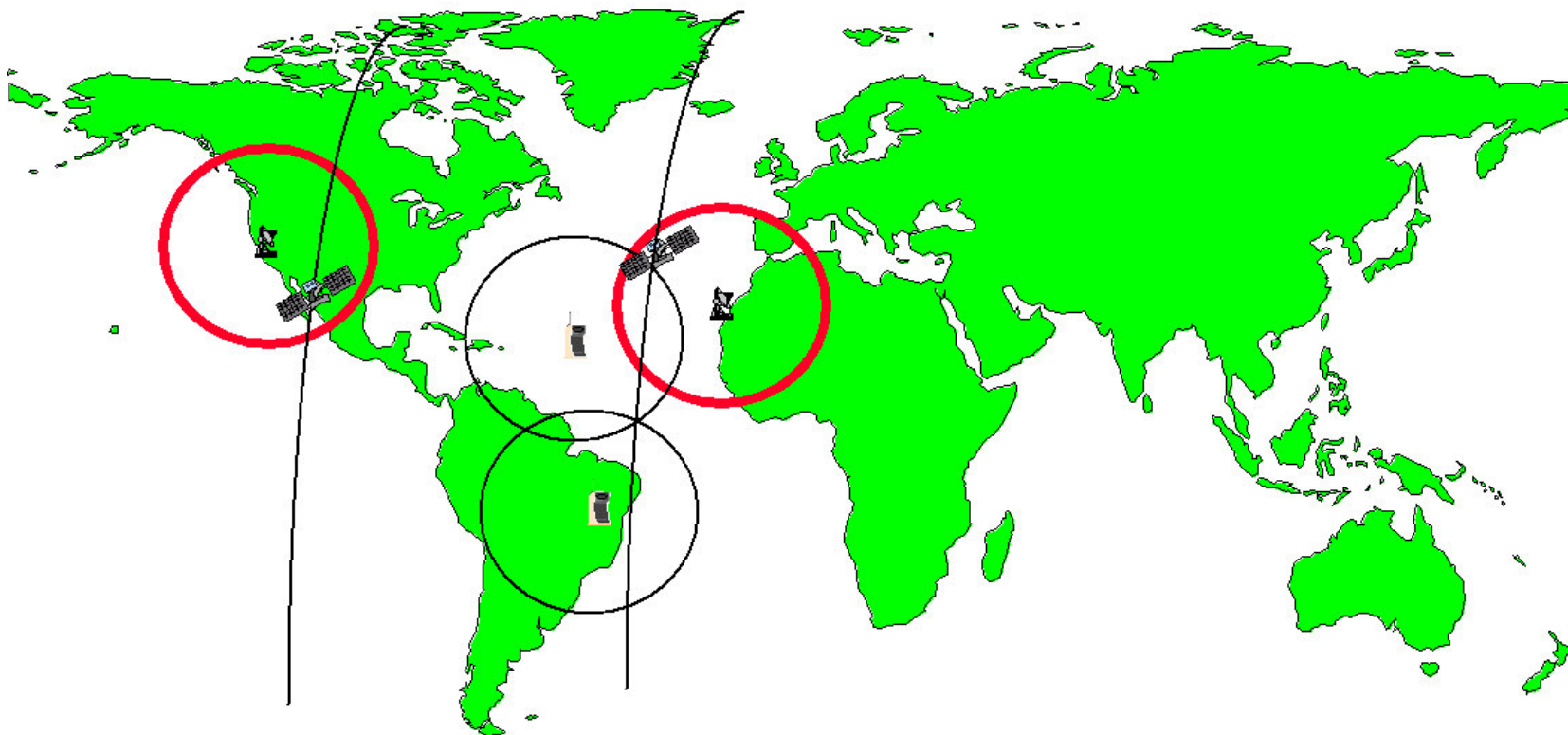


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406 MHz LOCAL/GLOBAL MODES (SARP)

- - LUT TO SATELLITE VISIBILITY
- - BEACON TO SATELLITE VISIBILITY



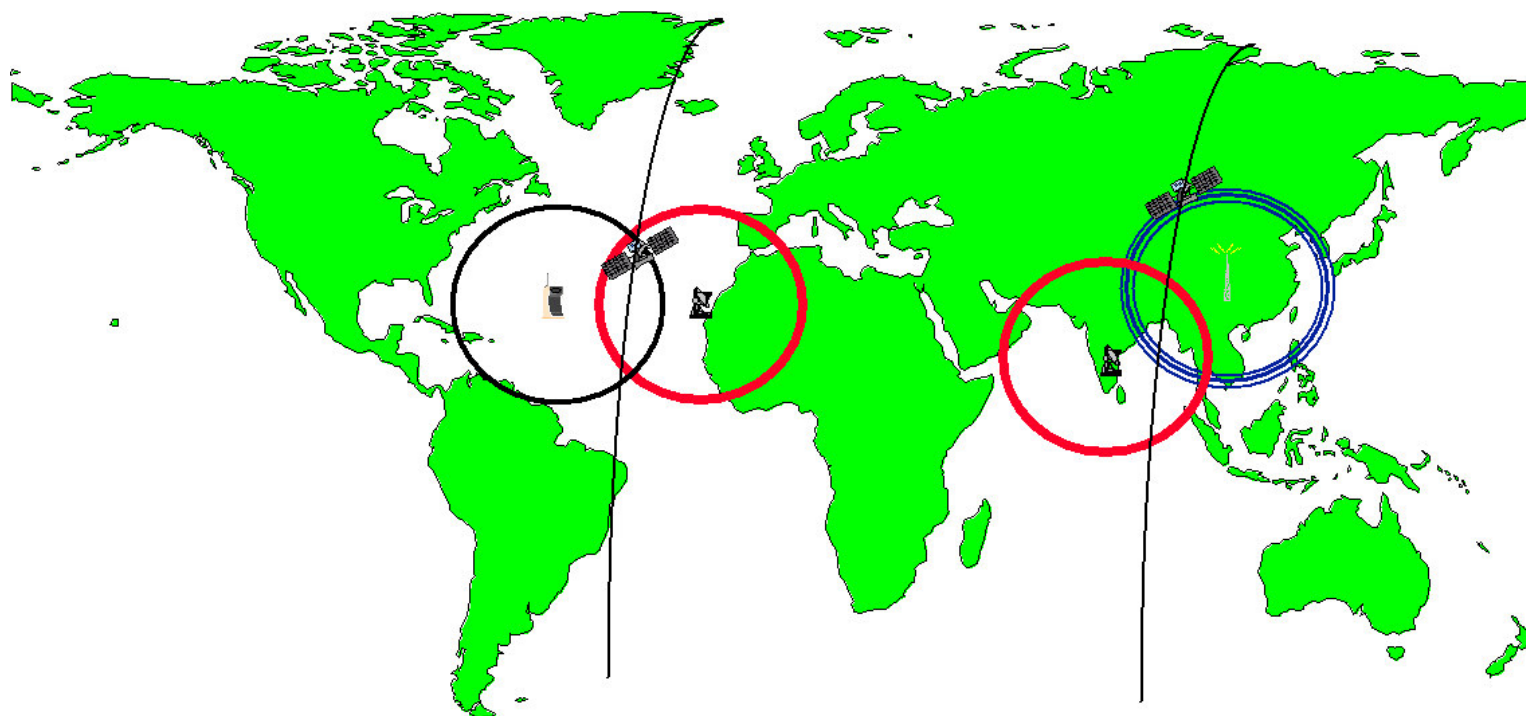


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406 MHz REPEATER MODE (SARR)

- - LUT TO SATELLITE VISIBILITY
- - BEACON TO SATELLITE VISIBILITY
- ◎ - INTERFERING SIGNAL TO SATELLITE VISIBILITY





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QUESTIONS?

Albany LUT



Bundaberg LUT

