



LRAM

Long-Range Acoustic Messaging

LONG RANGE ROBUST COMMUNICATION WITH DIVED SUBMARINES, UUVS AND SPECIAL FORCES

OVERVIEW

LRAM utilizes a proven scalable modem software architecture designed to provide robust, reliable and power-efficient through-water communications to extended ranges. The common LRAM modem architecture can be applied to submarine, UUV, and diver communications as well as remote activation of underwater devices.

Although the LRAM modem is scaled in both frequency and power to provide these individual applications, it incorporates a multimode receiver capable of receiving in all modes. Thus LRAM can provide integrated underwater communications to submarines, UUVs and divers covering both broad ocean areas and the shallows up to the shoreline.

In its original configuration LRAM provides on-demand connectivity to submarines and UUVs operating in direct and associated support to high-value units, greatly increasing the value of these underwater platforms as fleet assets.

In shallow water LRAM provides robust connectivity to dived units including SF and UUVs.

FEATURES

- Provides a highly robust communications capability to dived units, in both the open ocean and the shallows up to the shoreline
- Built-in data security, anti-spoofing, national and coalition access features
- Proven ability to operate in the presence of high-power in-band sonar transmissions
- Buoy-on-station time of 3 days with at least 180 minutes of acoustic transmit
- Up to 6 months duration with a persistent USV such as a Wave Glider
- Performance validated by Royal Navy during TAURUS 09, GE Navy during dedicated Baltic Trial 2011, and US Navy during ICEX 2011

OPTIONS

Can be upgraded for 2-way duplex communications

CONCEPT OF OPERATIONS

Submarine Rescue

LRAM will become a key resource to the disabled or downed submarine during an engineering casualty. During an engineering casualty a submarine can eject an SSE launched buoy to be used to communicate with command. Air and sea assets can deploy LRAM to search for and communicate with a casualty submarine.

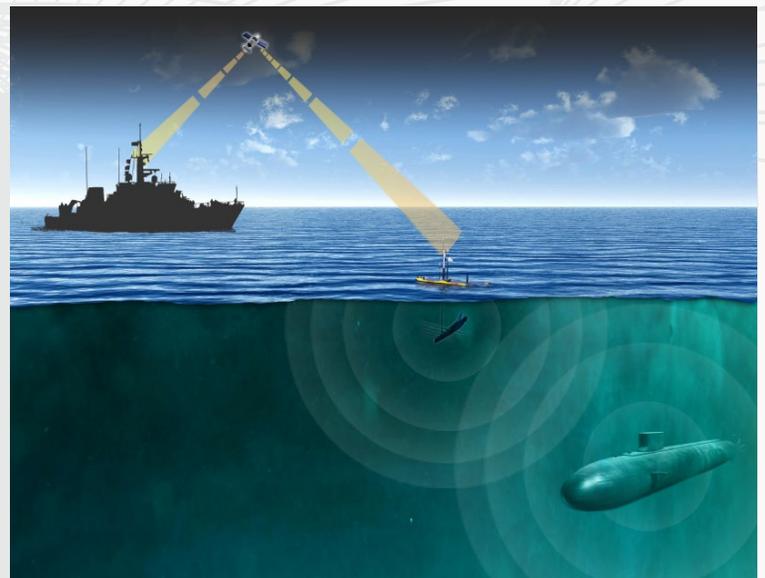
Broad Ocean

LRAM provides on-demand command and control to submarines and UUVs operating in direct and associated support, increasing the value of underwater platforms as fleet assets.

Littoral Waters

The LRAM modem can be scaled to support UUV, SDV and diver communications in the difficult littoral environment up to the surf zone.

In both broad ocean and littoral waters, LRAM provides a robust tactical messaging capability such as targeting assignment change, mission hold/gating, mission/unit status, RV assignment and target cueing.



OVERVIEW

Command Station

- Implemented on standard COTS hardware
- Utilizes IRIDIUM for reach forward connectivity
- Can be fitted with standard VHF-UHF RF link (for use by on-station MPA)
- User interface enables message formatting/select and status monitoring and control of the buoy via IRIDIUM
- Implements message assurance and encryption functions
- Allows the use of Coalition and National keys
- Can be fitted and operated from surface, shore and air units

Receiver Station

- Implemented on standard COTS hardware
- Walk-on system fit available
- Interfaced to sonar via either existing sonar patch panels or dedicated interface
- Decodes and formats received messages for display
- Implements Message Assurance checking and decryption functions
- Allows the use of Coalition and National keys
- Capable of rapid fit to all NATO-operated submarines without modification
- Minimal operator training required

Surface Link

OPTION A: Submarine Launched Expendable Buoy via SSE or TDU (SLEB)

- Common store capable of submarine, surface or air launch
- Incorporates a SLOT buoy facility
- Incorporates acoustic signal generation algorithms
- Optional acoustic source can also be used for monostatic or multistatic ASW
- Fitted with IRIDIUM satcomm antenna (for control and activation of the buoy)
- Integral GPS enables buoy position to be interrogated by SUBOPAETH or tactical unit receiver station
- Buoy-on-station life of 3 days with 180 hours of transmit at maximum power available

OPTION B: Persistent Unmanned Surface Vehicle (USV)

- Incorporates acoustic signal generation algorithms
- Acoustic source can also be used for monostatic or multistatic ASW
- Fitted with IRIDIUM satcomm antenna (for control and activation of the buoy)
- Integral GPS enables buoy position to be interrogated by SUBOPAETH or tactical unit
- Can be upgraded to include GeoSpectrum's M518 DIFAR with on-board processing for multi-purpose ASW passive detection
- Duration is persistent, though platform dependent (up to 6 months)

NOTE: Both the SLEB (Option A) and USV (Option B) variants do not include sensitive components or algorithms such as message assurance or encryption. LRAM implements these functions on a distributed modem architecture where the modem function is split between the SLEB/USV and the Command Station or Receiver Station. No sensitive functions are implemented on the SLEB/USV. All sensitive processing is done on the Command Station and Receive Station which are located at secure locations.

SPECIFICATIONS

Range in Deep Water (>1500 m)	150 nmi
Range in Shallow Water (<200 m)	30 nmi
Range Under Ice	80 nmi
Doppler Tolerance	+/- 33 kt of Doppler
Max Doppler Tracking Rate (instantaneous)	66 kt/s
Equivalent Data Rate	ca. 15 bits/s

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