

Software Defined Radio Tactical (SDR-Tac)

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In News: Ministry of Defence (MoD) and Defence Public Sector Undertaking (DPSU) Bharat Electronics Limited (BEL) have signed a contract for procurement of Software Defined Radio Tactical (SDR-Tac) worth over Rs 1,000 crore in New Delhi on February 08, 2021.

Who SDR-Tac ?

- The SDR-Tac, jointly designed and developed by Defence Electronics Applications Laboratory (DEAL) of Defence Research & Development Organisation (DRDO) through a consortium of domestic agencies and industry, comprising Weapons and Electronics Systems Engineering Establishment (WESEE), BEL, Centre for Artificial Intelligence & Robotics (CAIR) and Indian Navy will bring strategic depth to the Armed Forces.
- The delivery will take place within three years.
- The DRDO and BEL are planning to provide the latest SDR with security grading to the Armed Forces.

About SDR-Tac

- The SDR-Tac is a four Channel Multi-mode, Multi Band, 19'' Rack mountable, ship borne Software Defined Radio system.
- It is intended to serve ship-to-ship, ship-to-shore and ship-to-air voice and data communication for network centric operations.
- It supports simultaneous operation of all the four channels covering V/UHF and L Band.
- This SDR system houses multiple types of waveforms for narrow band and wide band applications.
- The MANET waveforms are available in UHF and L-Band to

support ad hoc networking features for net centric operations.

- User evaluation trials covering exhaustive harbour phase and sea phase trials were completed successfully during May to June 2018 at Visakhapatnam for all waveforms including V/UHF and L-Band MANET waveforms under different network configurations.

SDR-Tac Importance to Armed forces

- The Armed forces are in need of transition from the single purpose radio of the past to more flexible Software Defined Radios (SDRs) to serve most of their wireless communication needs.
- These SDRs will be backward compatible with existing Indian radios. Different Service groups require different form factor radios for specific platforms and waveforms/applications.
- The SDRs allow use of common waveform/application implementation methods for different form factors.
- They also allow implementation of futuristic waveforms on the same hardware using software programmability, thus ensuring longer life and savings on cost.

SDRs and Radio Fundamentals

- A key factor in SDRs is that software programmability allows easy changes of the radio's fundamental characteristics such as modulation types, operating frequencies, bandwidths, multiple access schemes, source and channel coding/decoding methods, spreading/despreading techniques and encryption/decryption algorithms.
- Traditional hardware-centric radios require hardware changes to modify these fundamental characteristics.
- Multiple types of radio equipment can be replaced with multi-mode, multi band, multi-role SDR's of suitable form factors.

mobile ad-hoc network (MANET)

- For troops on-the-move who require flexibility in their operations and tactical communications, Bittium provides tactical Mobile Ad Hoc Network solutions.
- With the elements of the Software Defined Radio based Bittium Tactical Wireless IP Network(TAC WIN) system it is possible to create MANET as an optimal solution for troops in a relatively small area requiring mobility. With the Bittium TAC WIN Waveform, the Bittium TAC WIN MANET is interoperable with other Bittium TAC WIN networks and also with combat vehicles and dismounted soldiers using Bittium Tough SDR Vehicular and Handheld radios on the lower echelons.
- When using ESSOR High Data Rate Waveform with the Bittium Tough SDR tactical radios, broadband data transfer, cooperation and direct communications also between different national troops in coalition operations is possible.

TrellisWare's TSM waveform

- Is the most suitable mobile ad-hoc network (MANET) to support uninterrupted real-time communications.
- The TSM waveform is designed to thrive in real tactical dynamic environments full of radio frequency (RF) volatility, high mobility of operators, and signal interference.
- The TSM waveform has proven deployment in urban, subterranean, cave and tunnel, and in-building settings with harsh RF propagation.
- This is because TrellisWare's core technology, called Barrage Relay networking is designed with a robust physical layer that incorporates receive-side collaborative combining techniques to handle extreme RF multipath fading and enable simultaneous relaying of all transmissions, including: voice, data, video, and position location information (PLI).

- Barrage Relay eliminates routing and minimizes network overhead, enabling much more reliable performance versus traditional MANET solutions.