

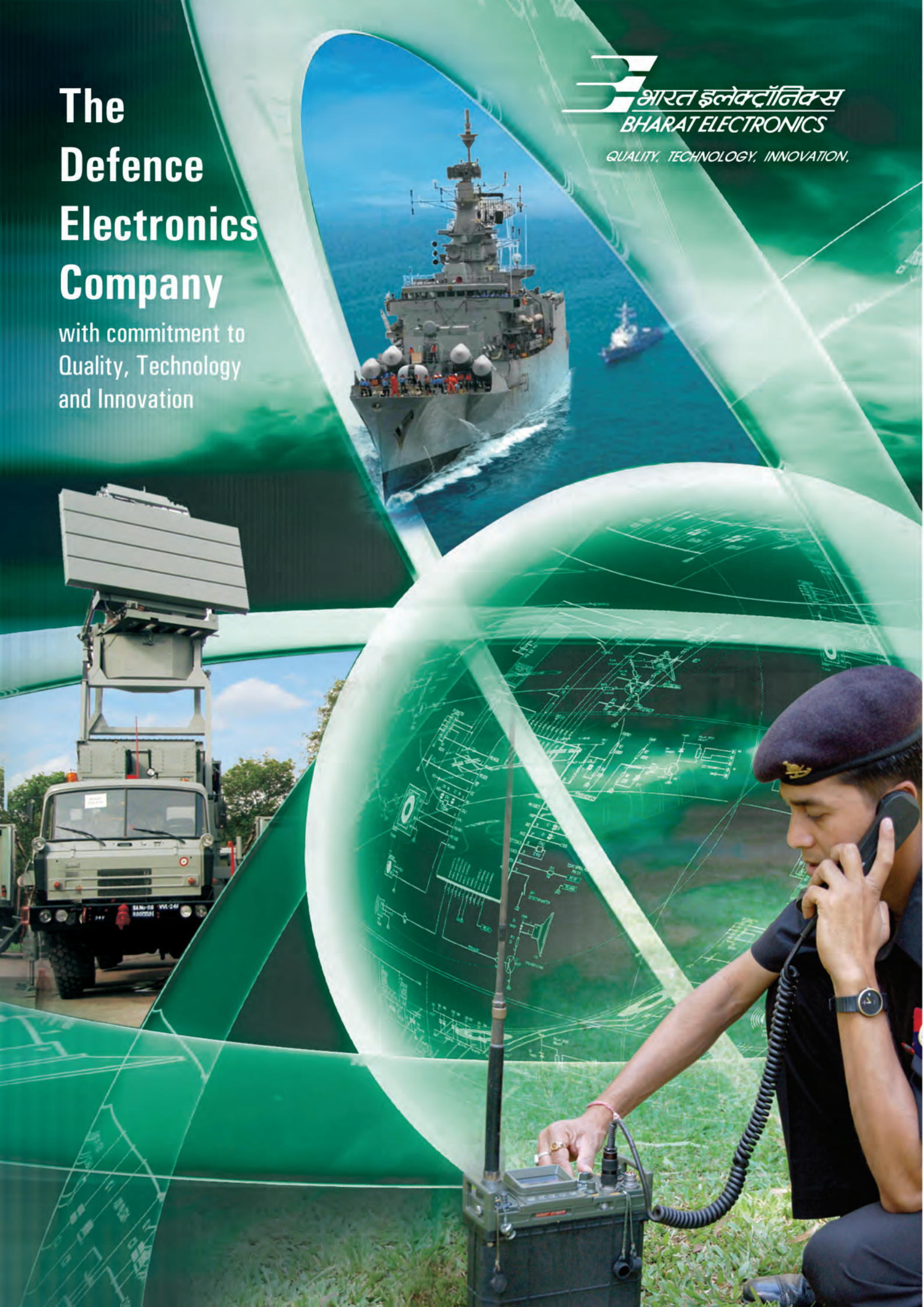
# The Defence Electronics Company

with commitment to  
Quality, Technology  
and Innovation



भारत इलेक्ट्रॉनिक्स  
BHARAT ELECTRONICS

QUALITY, TECHNOLOGY, INNOVATION.





# Bharat Electronics Limited

Domain knowledge, the capability to design and manufacture products that suit the exacting standards of the Indian Defence Forces and long-term customer support make up the core competence of Bharat Electronics Limited (BEL), a name that's synonymous with defence electronics in India.

Guided by a vision to make the country self-reliant in strategic electronics, BEL was established in Bangalore in 1954 by the Government of India under the Ministry of Defence (MoD). Starting with the manufacture of a few communication products, BEL now designs and manufactures a host of products in the areas of Military Communication, Radars, Naval Systems, Weapon Systems, C4I Systems, Electronic Warfare, Avionics, Tank Electronics, Electro Optics, Shelters, Telecom & Broadcast, Professional Electronic Components and Solar Photovoltaic Systems.

A Navratna Public Sector Undertaking BEL is India's foremost defence electronics company. While defence continues to contribute to nearly 80 to 85% of the Company's revenue, BEL has expanded its horizons beyond defence electronics and touched a chord with the common man through civilian products like the Electronic Voting Machines, Tablet PC and solar-powered traffic signalling systems and solar power systems.

BEL has extensive design and manufacturing infrastructure and a highly skilled workforce spread over its 9 Units located across the country. The Company maintains its technological leadership with strong in-house R&D at all its Units, backed by two Central Research Laboratories, and in association with DRDO & other leading defence labs.

BEL exports its products and services to various countries. BEL has seven AS9100 certified Strategic Business Units, which can cater to the offset requirements of defence and aerospace majors. The Company offers electronic manufacturing facilities on 'Build to Print' and 'Build to Spec' basis.

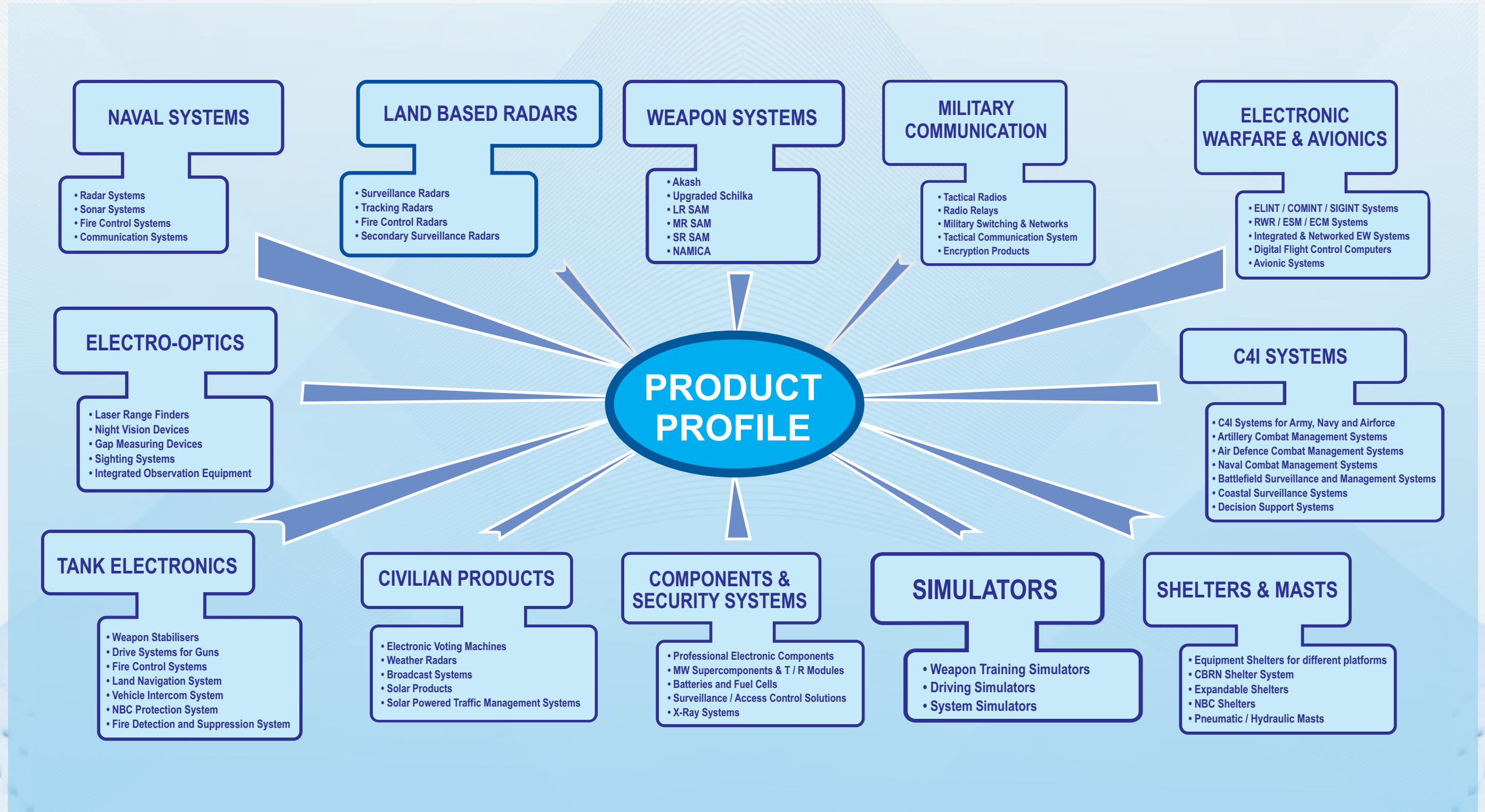
... BEL offers wide range of  
products, systems and solutions  
to its valued customers ...







## PRODUCT PROFILE





## MILITARY COMMUNICATION

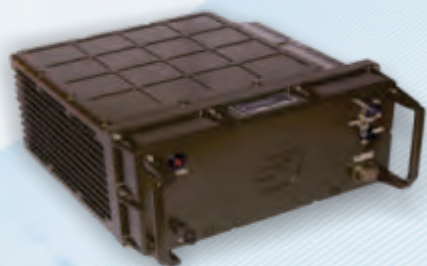
- Tactical Radios
- Radio Relays
- Military Switching & Networks
- Tactical Communication System
- Encryption Products

### Software Defined Radio



### Frequency Hopping Radio Relay (FHRR)

#### Outdoor Unit (ODU)



#### Indoor Unit (IDU)



### Next Generation Bulk Encryption Unit



### VHF (Frequency hopping) Radio, Stars V Mk II



### HF Transceiver



### Handheld Radio VPS Mk III





# We cover the entire spectrum



VLF/HF Receiver



HF Transceiver (20W)



VHF Transceiver



VHF Base Station/Repeater



UHF Radio Relay (LB & HB)

10KHz

100KHz

1MHz

30MHz

100MHz

136MHz

400MHz

512MHz

1GHz

2GHz

6GHz



VLF Receiver



HF Transceiver (100W)



VHF Transceiver



V/UHF Transceiver



UHF Base Station/Repeater



FHRR



HCRR





## LAND BASED RADARS

- Surveillance Radars
- Tracking Radars
- Fire Control Radars
- Secondary Surveillance Radars

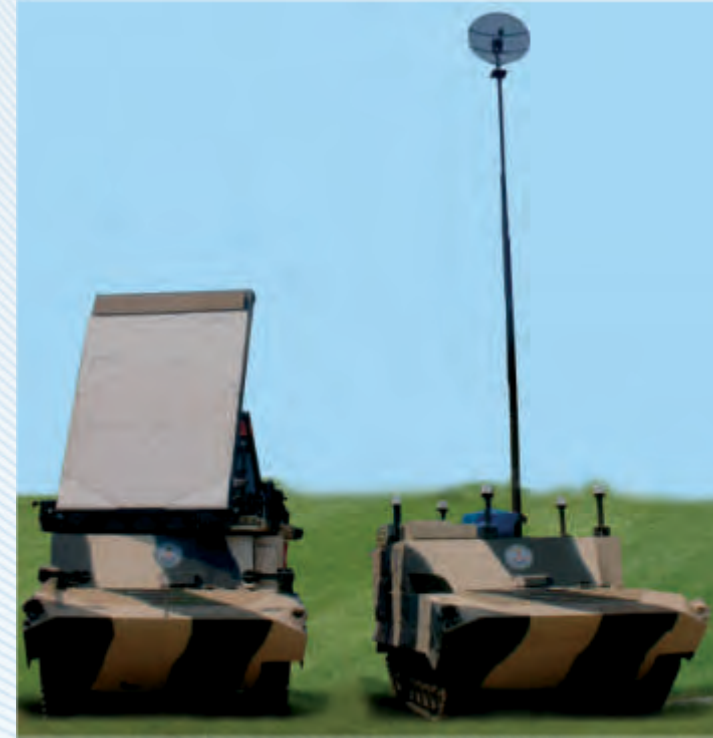
3D Tactical Control Radar



Weapon Locating Radar



Battery Level Radar



Central Acquisition Radar - ROHINI

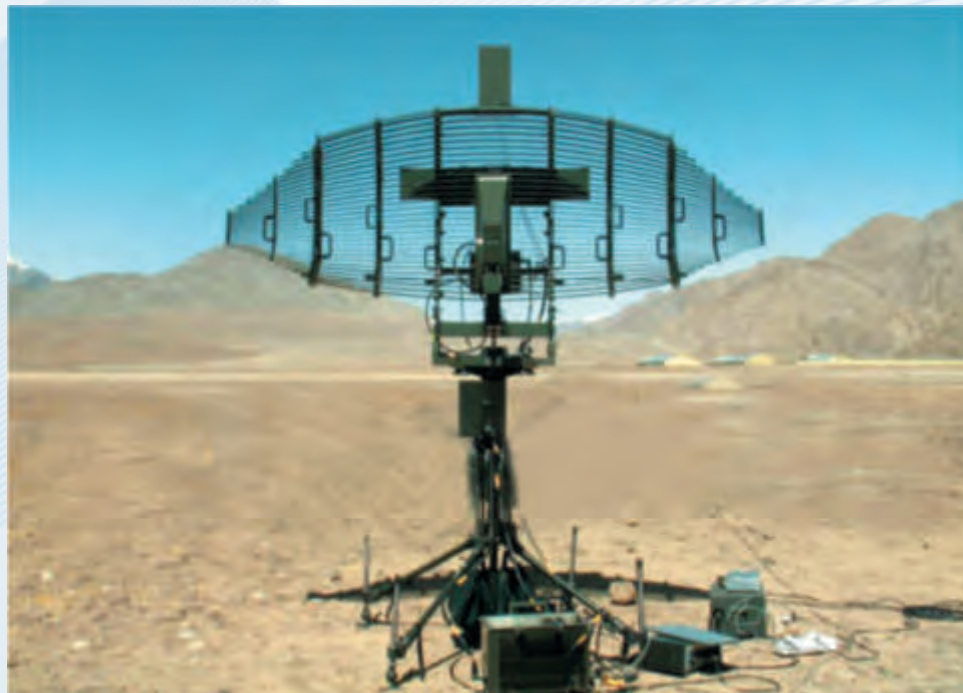




3D Low Level Light Weight Radar - ASLESHA



Low Level Light Weight Radar - BHARANI



## NAVAL SYSTEMS

- Radar Systems
- Sonar Systems
- Fire Control Systems
- Communication Systems

3D Surveillance Radar - REVATHI



HUMSA-NG





## Downmast Navigation Radar (DNR)



## Advanced Naval Gun Fire Control System (Lynx-U1)

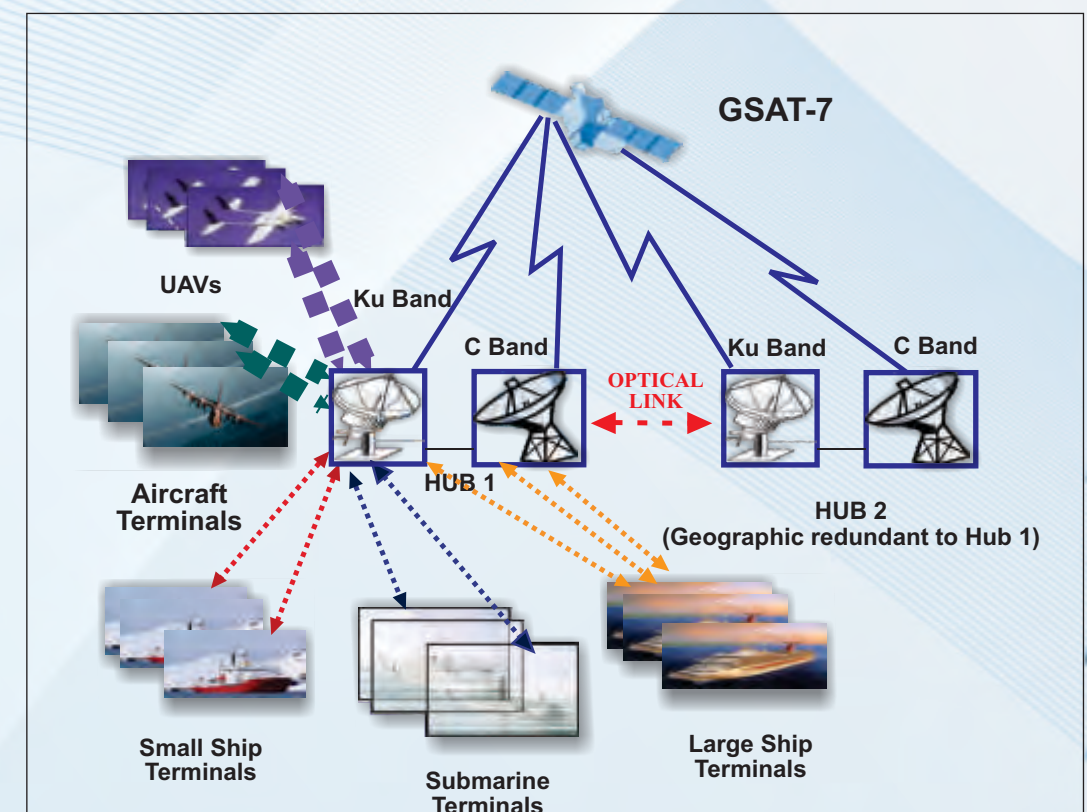


## NAVAL COMMUNICATION SYSTEMS

### Data Link - II System



### Integrated Communication Network System

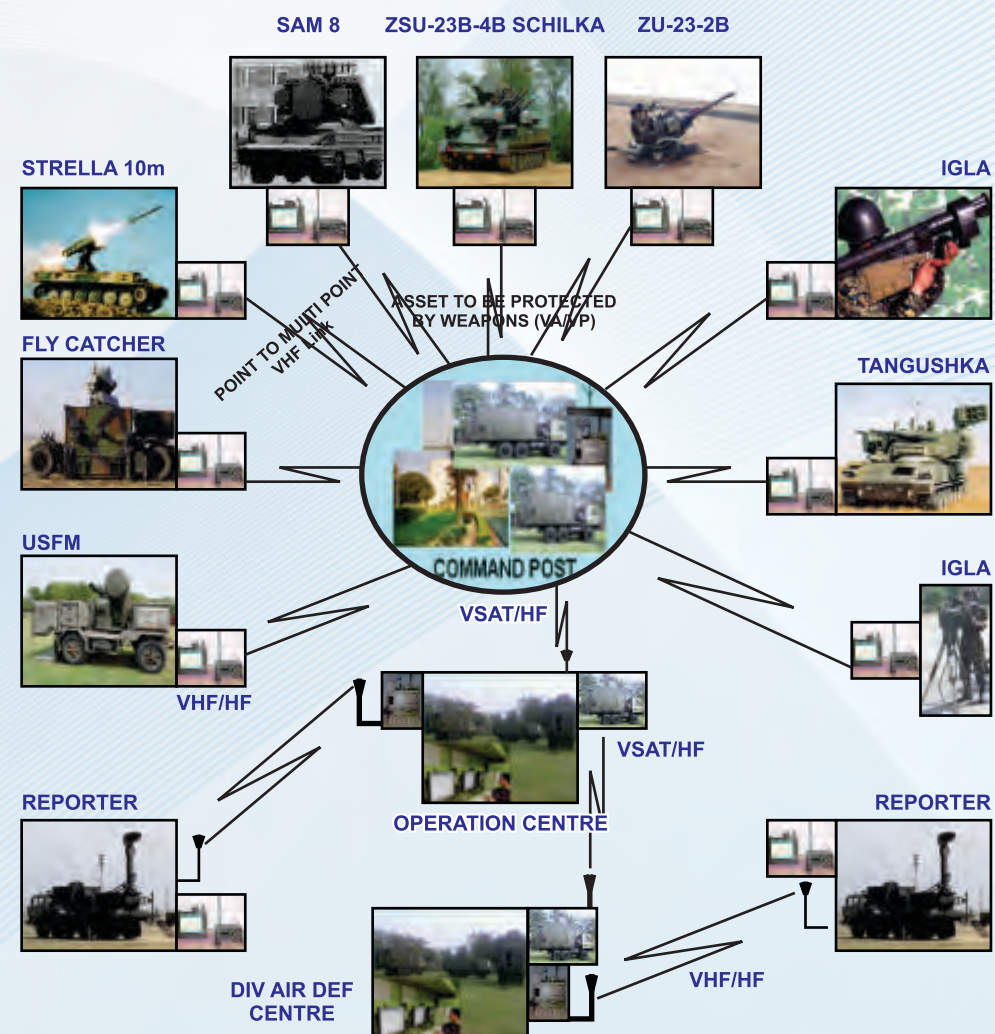




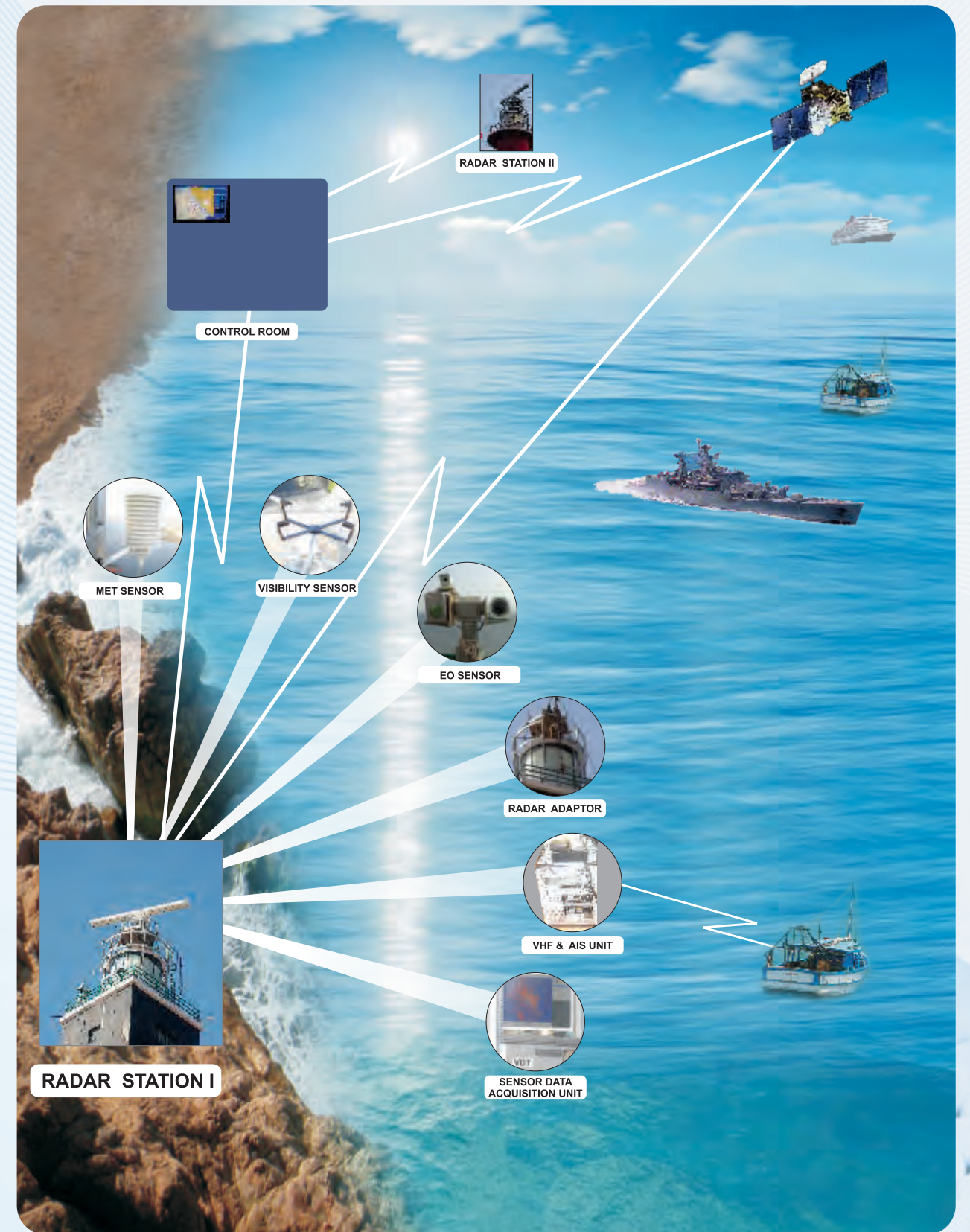
## C4I SYSTEMS

- C4I Systems for Army, Navy and Airforce
- Artillery Combat Management Systems
- Air Defence Combat Management Systems
- Naval Combat Management Systems
- Battlefield Surveillance and Management Systems
- Coastal Surveillance System
- Decision Support Systems

### Air Defence Control & Reporting System

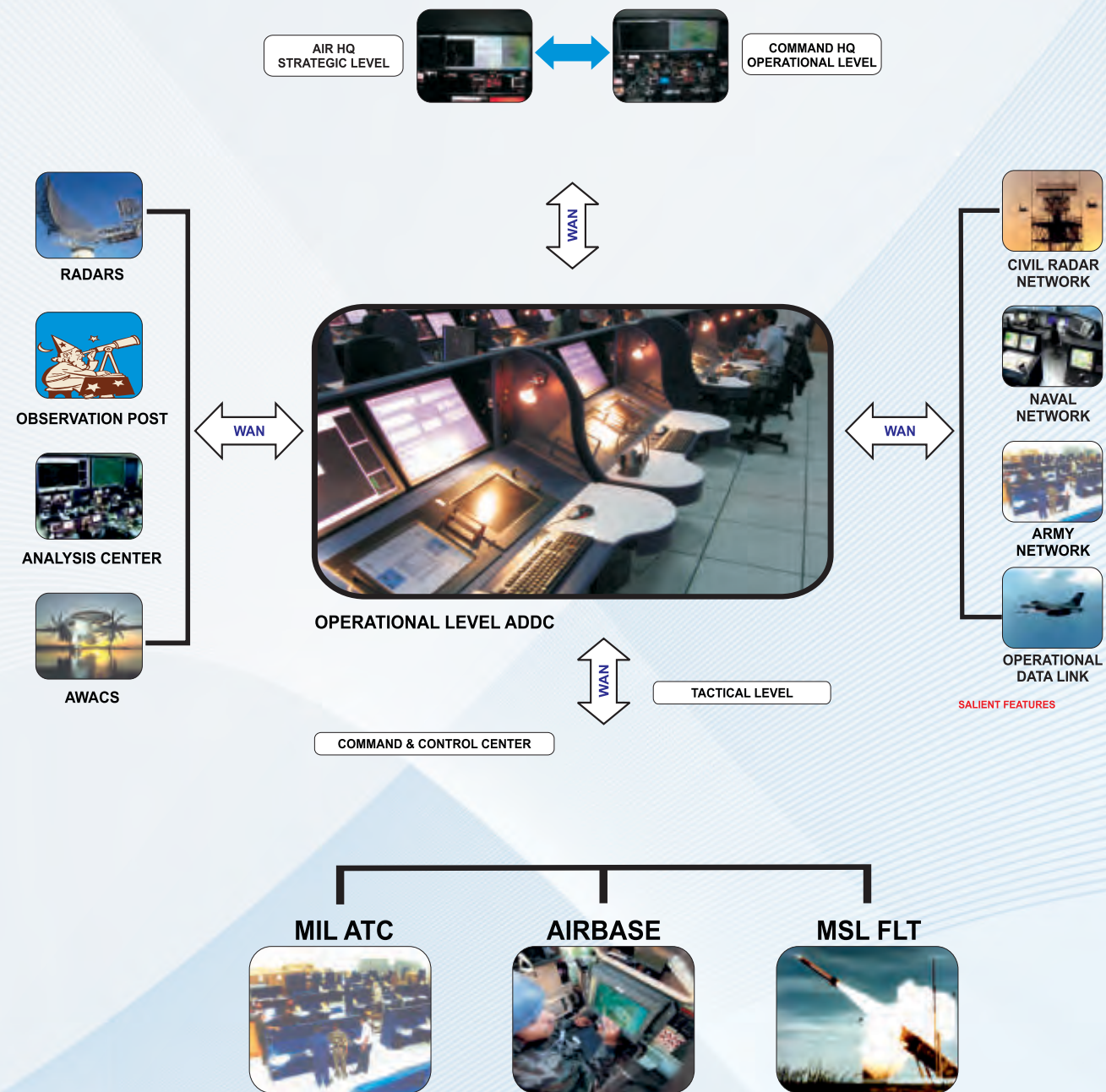


### Coastal Surveillance System





## Integrated Air Command & Control System



## WEAPON SYSTEMS

- Akash
- LR SAM
- SR SAM
- Upgraded Schilka
- MR SAM
- NAMICA

### Akash Air Defence Weapon System



### Upgraded L70 gun



### Upgraded SCHILKA





## ELECTRONIC WARFARE & AVIONICS

- ELINT/COMINT/SIGINT Systems
- RWR/ESM/ECM Systems
- Integrated & Networked EW Systems
- Digital Flight Control Computers
- Avionic Systems

### Radar Warning Receivers



### Avionics Products for LCA



## ELECTRO OPTICS

- Laser Range Finders
- Night Vision Devices
- Gap Measuring Devices
- Sighting Systems
- Integrated Observation Equipment

### Night Vision Products





## Integrated Observation Equipment



## Gap Measuring Device- GMD Mk III



## Laser Products



Laser Range Finder - Air Defense



Laser Designator -cum-Range Finder



Integrated SurveillanceSight



Laser Range Finder with Sight



Lightweight Laser Target Designator



Eye Safe Laser Range Finder

## TANK ELECTRONICS

- Weapon Stabilisers
- Drive Systems for Guns
- Fire Control Systems
- Land Navigation System
- Vehicle Intercom System
- NBC Protection System
- Fire Detection and Suppression System

## Instant Fire Detection and Suppression System





## T-90 Stabiliser



Control Unit -K1



Gyro unit



Angle limiter



Amplidyne



Electric motor



Elevation hydraulic system

## Gunner's Main Sight for MBT-ARJUN



GUNNER'S  
PRIMARY SIGHT



GUNNER'S SIGHT  
ELECTRONICS UNIT



GUNNER'S  
CONTROL DISPLAY



COMMANDER'S  
CONTROL DISPLAY



## Advanced Land Navigation System (ALNS) for Armoured Fighting Vehicles



Inertial  
Measurement Unit



Control and  
Display Unit(CDU)



Driver's Display  
Unit (DDU)



GPS Receiver  
(Position Indicator)

## Commander's Panoramic Sight for MBT-ARJUN

Panoramic  
Sight Head



Sight  
Electronic Unit



Sight Control  
Unit

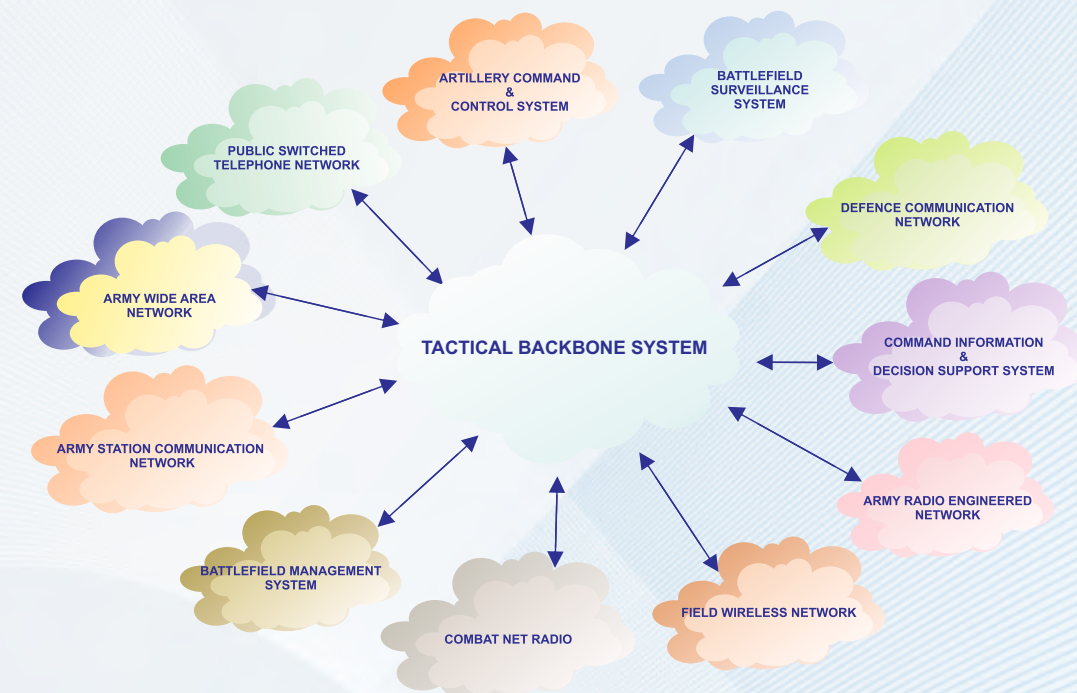
## Combat Net Radio





## TACTICAL COMMUNICATION SYSTEM

### Backbone Network of TAC C3I System

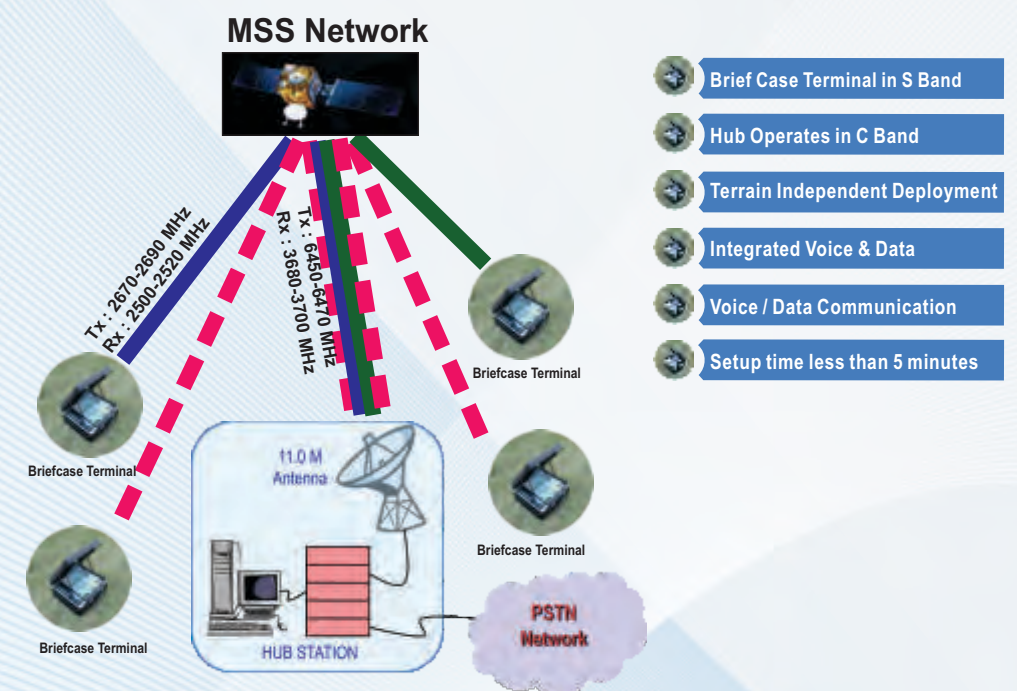


### Concept of Deployment

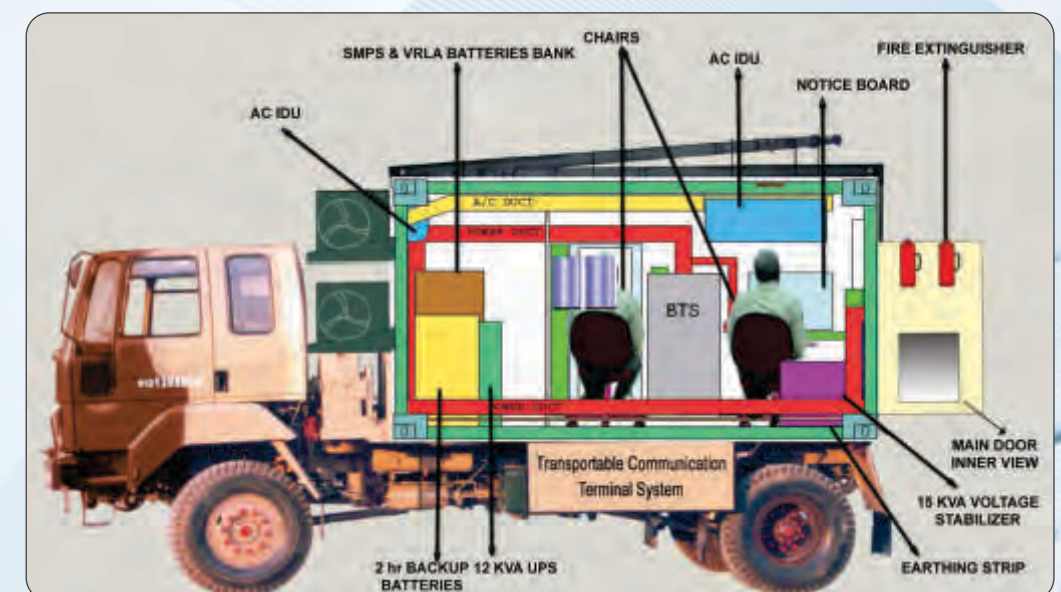


## DEFENCE MOBILE COMMUNICATION SYSTEMS

### Mobile Satellite Services



### Mobile Cellular Communication Network



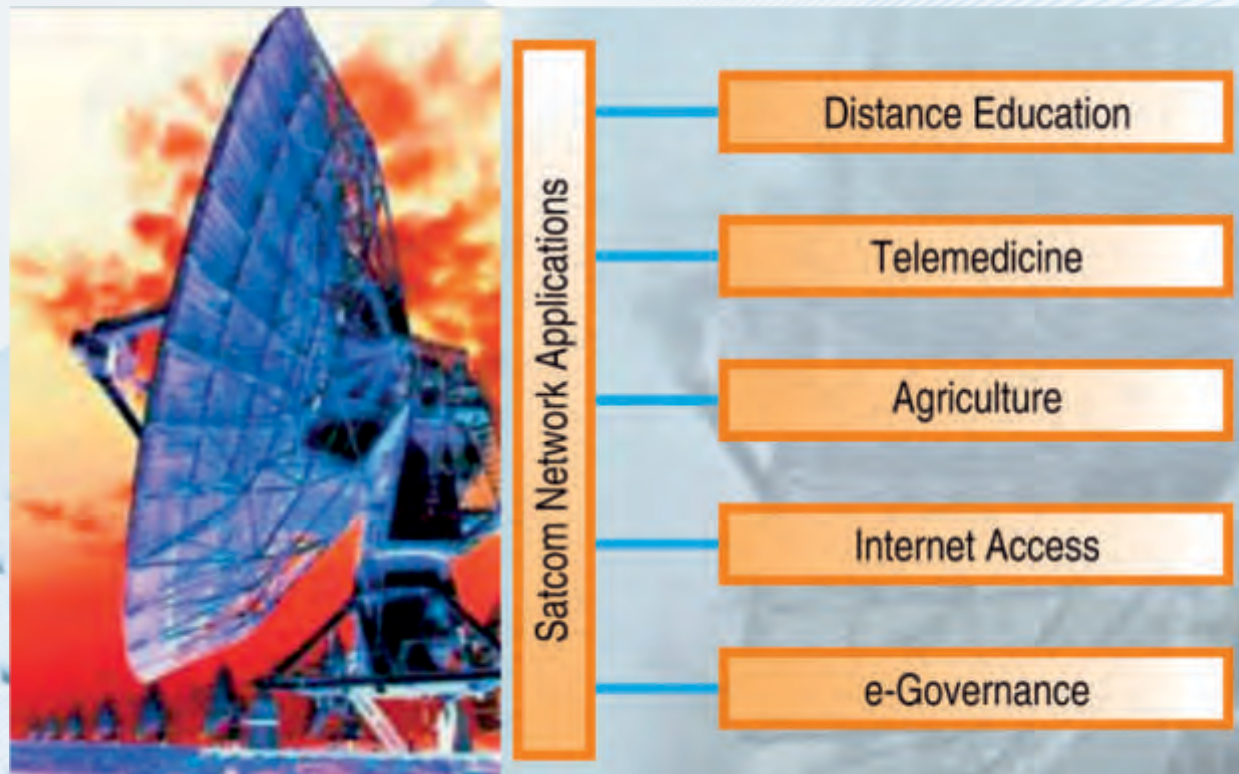


## TELECOM & BROADCAST SYSTEMS

### Digital Mobile Radio Relay (DMRR)



### Satcom



### Mobile Communication Terminals





## SHELTERS & MASTS

- Equipment Shelters for different platforms
- CBRN Shelter System
- Expandable Shelters
- NBC Shelters
- Pneumatic/Hydraulic Masts

CBRN Surveillance System



MIL grade ISO 20 ft Shelter



Mobile RecceLite Control System Shelter



BFSR-MR with Hydraulic Mast



2-3 Expandable Shelter

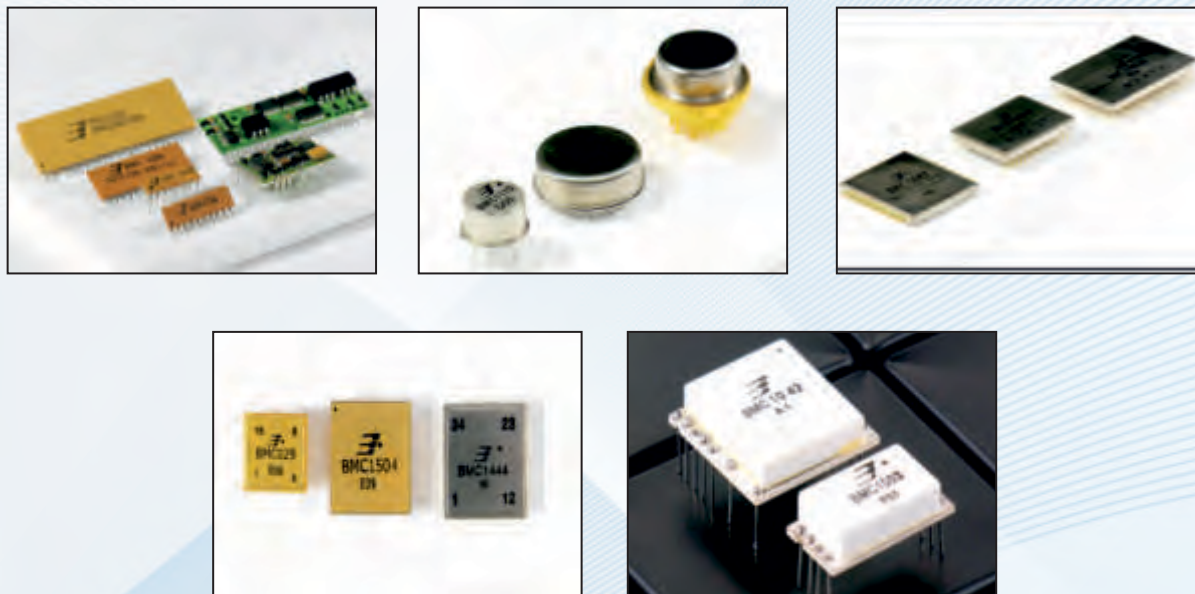




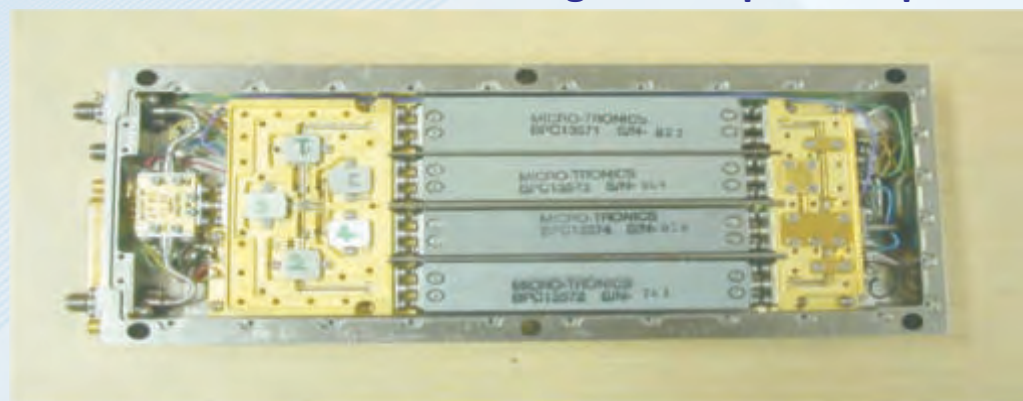
## COMPONENTS & SECURITY SYSTEMS

- Professional Electronic Components
- MW Supercomponents & T / R Modules
- Batteries and Fuel Cells
- Surveillance / Access Control Solutions
- X-Ray Systems

### Hybrid Microcircuits



### Integrated Super Component



### MW TUBES



Coupled cavity TWT



Mini TWT



Klystron



Magnetron

### BE 80501 Embedded Flash Micro controller



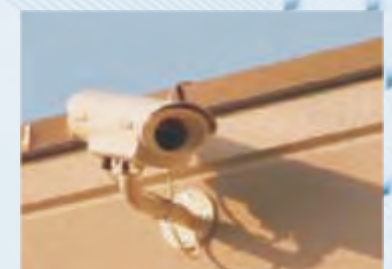
### Vacuum Interruptors



### Perimeter Intrusion Detection System (PIDS)



### Closed Circuit Television (CCTV) Surveillance System

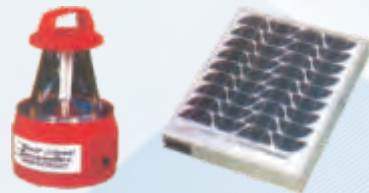




## CIVILIAN PRODUCTS

- Electronic Voting Machines
- Weather Radars
- Broadcast Systems
- Solar Products
- Solar Powered Traffic Management Systems

Solar Pumping & Lighting Systems



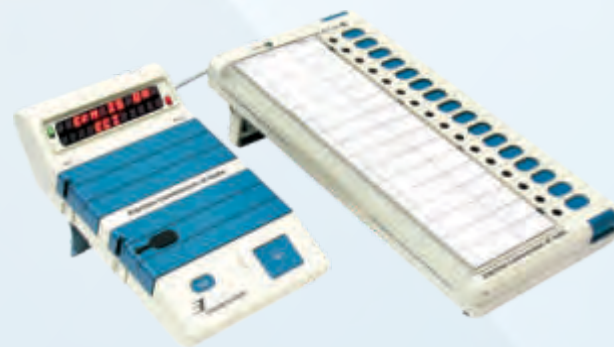
Solar Traffic Signal



Doppler Weather Radar



Electronic Voting Machine



## MANUFACTURING FACILITIES

Super Components Assembly



X-RAY Inspection Machine



CNC Vertical Machine



Wave Soldering Machine





## Electronic Assembly Line



## Pick & Place Machine



## Automatic Test Facility



## QA FACILITIES

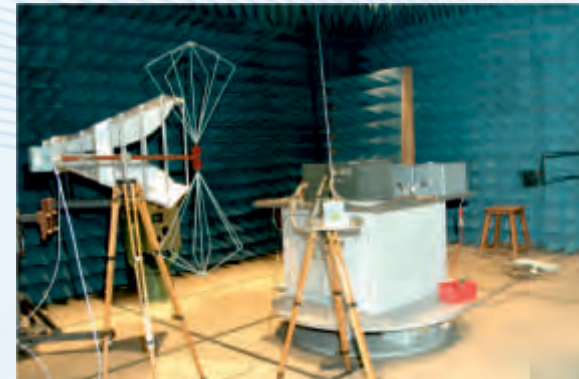
### Walk-in Chamber



### Climatic Test Chamber



### EMI / EMC facility



### Thermal Cycling





## Random Vibration



## Antenna Test Facility



## Mechanical Shock



- Environmental Tests: JSS-55555 / MIL STD-810F
- NABL Accredited Calibration and Measurements
- Meteorology and Material Analysis
- EMI / EMC Tests: MIL STD-461E
- Reliability Prediction

## EXPORTS

BEL exports components, products and systems to several countries across the globe. BEL exports products like HF & VHF Communication equipment, Battle Field Surveillance Radar-Short Range, Opto-electronic products like Eye Safe Laser Range Finders, Night Vision Devices and solar products & components to countries in Africa, Latin America, Southeast Asia, SAARC, Middle East and CIS.

BEL is closely working with various global aerospace and defence companies to secure business under the mandatory Offset Clause in the RFPs for Indian defence procurement. These companies have visited BEL's facilities and based on their feedback, necessary action has been taken to upgrade infrastructure and processes. Seven of BEL's Strategic Business Units (SBUs) / Units have got AS 9100 certification to address the aerospace business. Further, efforts are being made to establish long-term supply chain relationships with global players.

Apart from the export of products and services, contract manufacturing business from USA and Europe is also being addressed on 'Build to Print' and 'Build to Spec' basis. BEL also offers turnkey system solutions like Coastal Surveillance Radar Systems.



## RESEARCH & DEVELOPMENT



Research & Development (R&D) is BEL's forte and focussed attention is given to core technology areas like Radars, Communications, C4I Systems, Electronic Warfare and Electro Optics. BEL spends over 7% of its turnover on R&D. Over 1,600 engineers are engaged in R&D.

BEL has a three-tier R&D set-up comprising of Development and Engineering (D&E) Divisions at all its 9 Units, which develop products and associated technologies in their respective business segment; a Central D&E Division and two Central Research Laboratories (CRLs) at Bangalore and Delhi for carrying out futuristic, cutting-edge research.

BEL also interacts with other development agencies like DRDO, ISRO, CSIR, C-DOT, C-DAC, leading academic institutions like IITs, IISc and NITs and select multinational companies for joint development of technology.

The Company has an R&D Plan in place based on customers' perspectives and the technology road map. A Knowledge Management Portal has been created to document all the R&D projects.

BEL's constant quest to maintain technological leadership has ensured that over 80% of the turnover is from products developed indigenously.

## QUALITY

BEL is committed to consistently deliver enhanced value to customers through continual improvement of products and processes. Right from inception, BEL has understood the quality and reliability requirements of its customers and has been striving to enhance their satisfaction level.

BEL has adopted the Total Quality Management (TQM) philosophy in 1990 under the acronym 'TORQUE' which stands for Total Organisational Quality Enhancement.

All Units / SBUs of the company have been certified for ISO 9001 Quality Management System and ISO 14001 Environment Management System. Seven Units / SBUs are also certified for AS 9100 Aerospace Standards. The Central Software Development group of the company has CMMi Level 5 certification.

BEL also accomplishes continual improvement of products and processes through deployment of Six Sigma methodology; key processes' stabilization and capability improvement through Statistical Process Control techniques; reduction of cycle time in all transaction areas; improvement in quality of design through DFSS projects; employee motivation and empowerment through self-certification, QCC and Suggestion Schemes; introduction of lean manufacturing concepts to achieve on-time delivery; and customer satisfaction surveys to measure and improve the satisfaction level of customers.

The Company has adopted CII-EXIM Bank Business Excellence Model to improve its overall strategic and operational excellence.

The Bharat Electronics Quality Institute was set up in 1999 to impart education to the company's officers, customers and suppliers on various facets of quality management.

The Corporate Standards Department established over four decades ago has evolved more than 4,000 standards on drafting, materials, systems & procedures, manufacturing processes, quality & workmanship, etc. These standards have provided effective support in design, manufacturing, vendor development and process standardisation.



# MANUFACTURING NETWORK



A 'CUSTOMER' IS THE MOST IMPORTANT VISITOR ON OUR PREMISES.  
HE IS NOT DEPENDENT ON US. WE ARE DEPENDENT ON HIM.  
HE IS NOT AN INTERRUPTION ON OUR WORK. HE IS THE PURPOSE OF IT.  
HE IS NOT AN OUTSIDER ON OUR BUSINESS. HE IS A PART OF IT.  
WE ARE NOT DOING HIM A FAVOR BY SERVING HIM.  
HE IS DOING US A FAVOR BY GIVING US AN OPPORTUNITY TO DO SO.

•MAHATMA GANDHI



For any Customer Queries / Complaints:

Call us at BSNL / MTNL  
Toll Free Number: 1800 425 0433



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**Bharat Electronics Limited**

( A Govt. of India Enterprise, Ministry of Defence)

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