GOVT. OF INDIA
MINISTRY OF SHIPPING,
DIRECTORATE GENERAL OF LIGHTHOUSES & LIGHTSHIPS
A-13, SECTOR –24, NOIDA (U.P.), 201 301

INVITATION OF BUDGETARY QUOTES

The Director General of Lighthouses and Lightships invites budgetary quotes for supply, installation, integration, testing and commissioning of National Coastal Vessel Traffic Service (NCVTS), on turnkey basis. The quotes are to be submitted as per the Performa for Bill of Quantity (BoQ). The last date of submission of the quotes is 20 Dec 2016. The detailed documents for budgetary quotes may be downloaded from departmental website www.dgll.nic.in.
LETTER OF SUBMISSION OF BUDGETARY QUOTES

(To be typed in Firm’s Letterhead)

From:

M/s ______________________
____________________
____________________

To
The Director General
Directorate General of Lighthouses & Lightships,
A-13, Deep Bhavan, Sector-24,
Noida – 201301. India.
Tel: 91-120-24112508 / Fax: 91-120- 2411345
INDIA, Email: noida-dgll@nic.in

Sub: Submission of Budgetary quotes for “Supply, Installation, Integration,
Testing and commissioning Of National Coastal Vessel Traffic Service –
NCVTS” on Turn Key basis.

Sir,

Having examined the details given in detailed document for the above project, I/we hereby submit our quotes and the relevant information as per enclosures.

1. I/We hereby certify that all the information supplied in the enclosed form and accompanying statements are true and correct.
2. I/We have furnished all information and details necessary for quotes and have no further pertinent information to supply.
3. I/We also authorize DGLL or his authorized representatives to approach individuals, employers and firms to verify our competence and general reputation.

Signature(s) of Applicant(s)

Enclosures:
Seal of applicant
Date of submission
### Appendix – 1

#### Name of firms /Applicants

(Organizational Structure)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Name &amp; Address of the applicant with Telephone No. / Fax No. /email address</td>
</tr>
</tbody>
</table>
| 2. | a) Year of Establishment  
|    | b) Date & Year of commencement |
| 3. | Legal status of the applicant (attach copies of original document defining the legal status)  
|    | a) A proprietary firm  
|    | b) A firm in partnership  
|    | c) A limited company or Corporation / Joint venture /Consortia  
|    | d) State owned  
| 4. | Any other information considered necessary but not included above |

**Authorized Signatory**
**Appendix – 2**

**Experience for supply and installation of Vessel Traffic System**

<table>
<thead>
<tr>
<th>Name and location of the Port where VTS equipment was supplied, installed/operated or maintained.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief Description of the works carried out</td>
<td></td>
</tr>
<tr>
<td>Total Value of the work</td>
<td></td>
</tr>
<tr>
<td>Annual Turnover of the firm in last three years (in US $)/(in Indian Rupees)</td>
<td></td>
</tr>
</tbody>
</table>

**Signature**

Note: Please enclose separate sheet for each Project
SECTION - 1

1. **INTRODUCTION**

1.1. **Directorate General of Lighthouses and Lightships (DGLL)**

In accordance with the Lighthouse Act 1927, The Directorate General of Lighthouses and Lightships (DGLL) is the principal authority of the Government of India in the field of Aids to Marine Navigation. The services provided by the DGLL enables mariners to know the position with respect to a fixed point on the land with the help of Visual Aids to Navigation such as lighthouses (193), Lightships (01), Lighthouse tender vessels (04), Deep Sea Channel Marking Buoys (21) and Radio Aids to Navigation like Differential Global Positioning System (DGPS-23), Radar Beacons (Racons-64), Network of Automatic Identification System (AIS) consisting of 87 base stations. DGLL has also established and maintaining Vessel Traffic Service for the Gulf of Kutch, Gujarat. For the purpose of effective superintendence of Lighthouse and other Aids to Marine navigation, the Indian coast is divided into regional Directorates known as Lighthouse Districts with their headquarters at Jamnagar, Mumbai, Goa, Cochin, Chennai, Visakhapatnam, Kolkata, Port Blair and VTS Directorate at Gandhidham (Gujarat).

1.2. **Vessel Traffic Services**

Vessel Traffic Services is a service implemented by a competent authority, designed to improve the safety and efficiency of navigation, safety of life at sea and the protection of the marine environment. VTS is governed by SOLAS Chapter V Regulation 12 together with the Guidelines for Vessel Traffic Services [IMO Resolution A.857(20)] adopted by the International Maritime Organization on 27 November 1997. The VTS traffic image is compiled and collected by means of advanced sensors such as radar, AIS, direction finding and VHF or other co-operative systems and services. A modern VTS integrates all of the information into a single operator working environment for ease of use and in order to allow for effective traffic organization and communication. All sensors are connected in single network.

1.3. **Service Provided by VTS**

A VTS shall provide following service to vessels in pre-defined area;

(a) **Information Service** (INS)

   A service to ensure that essential information becomes available in time for on-board decision-making.

(b) **Traffic Organization Service** (TOS)

   A service to prevent the development of dangerous maritime traffic situations and to provide for the safe and efficient movement of vessel traffic within the VTS Area.

(c) **Navigational Assistance Service** (NAS)

   A service to assist onboard navigational decision-making and to monitor its effects.
1.4. **Components of VTS**

Following are the various components of the VTS as per the IMO resolution A857 (20) and IALA Guidelines V 128:

(a) Radar  
(b) Automatic Identification System (AIS)  
(c) Environmental Monitoring (Hy-Me Sensors)  
(d) Electro-Optical equipment  
(e) Radio Communications  
(f) Data Processing  
(g) Human / Machine Interface (HMI)  
(h) Decision Support  
(i) External Information Exchange

1.5. **Details of existing VTS in India**

All major ports in India have their own vessel traffic service which is part of the VTS (Vessel Traffic System) of the port. Most of the VTS stations are installed with single Radar except VTS in Mumbai and Kolkata where with three and four Radars have been installed respectively to cover the larger area of operation.

(a) **Mumbai High**

Mumbai high is an offshore oilfield 176 kilometers (109 mi) off the coast of Mumbai, India, in about 75m of water. The oil operations are run by India's Oil and Natural Gas Corporation (ONGC). To cater the vessel traffic in the area, there are 16 Radars installed in 2006 and the same is managed privately. These Radars are not providing coverage in coastal area.

(b) **VTS Gulf of Kutch**

The Gulf of Kutch in Gujarat was established by DGLL and is operational since February 2012. The VTS GoK provides services to Kandla Port Trust and another 10 minor ports including GAPL in Mundra. There are 9 radar stations and 03 repeater stations providing VTS coverage to about 16000 sq. kilometers area in GoK. Three radar stations are established in Saurashtra region (Okha, Chudeshwar and Balachadi) and six Radar stations in Kutch region (Koteshwar, Jakhau, Chachhi, Mundra, Navinal and Kandla).

(c) **VTS Gulf of Khambhat**

Gulf of Khambhat also known as Gulf of Cambay is another inlet of the Arabian Sea along the west coast in the state of Gujarat. It is about 130 kilometers (80 nm). The Gujarat Marine Board (GMB) has awarded the right for development and establishment of Vessel Traffic & Port Management System of Gulf of Khambhat, to M/s Aatash Norcontrol Limited (ANCL) on BOOT basis for a period of 30 years. This VTS is providing services to 20 minor ports grouped in ports of Magdalla, Bharuch, Bhavnagar, Alang and Jaffrabad. There are eight radar stations (Jafrrabad, Mahuva, Sartanpur, Ghogha, Dahej, Hazira, Magdalla and Dumas) and two repeater stations (Alang and Bhavnagar). VTS fee is applicable to all vessels plying to Gulf of Khambhat.
(d) The VTS services available in India are as follows:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Location</th>
<th>No. of Radars</th>
<th>Equipment</th>
<th>Year of Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Gulf Of Kuchchh, Gujarat</td>
<td>09</td>
<td>Terma</td>
<td>2012</td>
</tr>
<tr>
<td>02</td>
<td>Gulf of Khambat, Gujarat</td>
<td>08</td>
<td>Selesmar</td>
<td>2010</td>
</tr>
<tr>
<td>03</td>
<td>Mumbai High (ONGC), Maharashtra</td>
<td>16</td>
<td>Raytheon</td>
<td>2006</td>
</tr>
<tr>
<td>04</td>
<td>JNPT, Mumbai, Maharashtra</td>
<td>03</td>
<td>STN Atlas</td>
<td>2011</td>
</tr>
<tr>
<td>05</td>
<td>Murmugaon, Goa</td>
<td>01</td>
<td>GEM</td>
<td>2001</td>
</tr>
<tr>
<td>06</td>
<td>New Managalore, Karnataka</td>
<td>01</td>
<td>STN</td>
<td>2016</td>
</tr>
<tr>
<td>07</td>
<td>Cochin, Kerala</td>
<td>02</td>
<td>Raytheon</td>
<td>2009</td>
</tr>
<tr>
<td>08</td>
<td>Tutucorin, TN</td>
<td>01</td>
<td>Vissim</td>
<td>2014</td>
</tr>
<tr>
<td>09</td>
<td>Chennai, TN</td>
<td>01</td>
<td>Selesmar</td>
<td>2012</td>
</tr>
<tr>
<td>10</td>
<td>Visakhapatnam, AP</td>
<td>01</td>
<td>Transas</td>
<td>2016</td>
</tr>
<tr>
<td>11</td>
<td>Paradeep, Odisha</td>
<td>02</td>
<td>Raytheon</td>
<td>2012</td>
</tr>
<tr>
<td>12</td>
<td>Kolkata-Haldia, WB</td>
<td>04</td>
<td>GEM</td>
<td>1996</td>
</tr>
<tr>
<td>13</td>
<td>Ennore, Chennai</td>
<td>01</td>
<td>Kongsberg</td>
<td>2015</td>
</tr>
</tbody>
</table>

1.6. **National Coastal VTS**

1.6.1. Considering the growing marine traffic in our nation, the need of establishing VTS services along complete coastal water in India is realized at various levels. National coastal VTS shall provide seamless VTS coverage along Indian Coast. NCVTS shall enhance the safety of navigation and security in Indian water, shall aid in efficiently management of the projected growth of Marine trade in Indian Ports and help in protection of marine environment. NCVTS shall provide integrated VTS picture through State VTS Control Centers, located in each coastal state/UT. The State VTS control center would integrate feed from various equipment installed at VTS sites, under its coverage area (data from Radar, AIS, CCTV and VHF radio communication etc.). The data from existing infrastructure (existing VTS at major ports, AIS equipment of NAIS network, raw data feed from Static Sensors of Indian Coast Guard, VTS-GOK and VTS-GoKh) is to be integrated in the NCVTS. The State Control Centers at East coast and west coast will be connected to a Coastal Monitoring Centers at both East and West coast. Both of the Coastal Monitoring Centers will be integrated with a National Monitoring Centre at Mumbai with mirror image at Vizag.

1.6.2. The “National Coastal Vessel Traffic System (VTS)” shall have AIS (Automatic Identification System), Radar System and Communication links enabling operators to manage vessel traffic, monitor the environment and support Port & Harbour resources along Indian coast.

1.7. **Scope of Work - system design concept**

1.7.1. In the NCVTS, the equipment shall be, to the maximum extent possible, Commercial-Off-The-Self (COTS) equipment, of the latest version of the same or better standards available at the time of contract execution/delivery. Any outdated equipment of OEM should be replaced with latest version/model. Any additional
cost involved in replacement of outdated equipment at the time of supply shall be borne by the contractor. All non-COTS items must be clearly documented in the proposal, stating the extent of any development required, the extent of any custom fabrication, the expected reliability of such non-COTS items and other similar non-COTS considerations.

1.7.2. The project includes the following items of work:
“Supply, installation, testing and commissioning of the National Coastal VTS”. The system shall generally comprise of the following equipment/sub-systems.

- a) Radar equipment (existing and new)
- b) Tracking System
- c) VTS Computer Systems
- d) AIS System (existing)
- e) VHF Systems
- f) CCTV systems
- g) Voice recording and replay system
- h) Communication Link (Microwave Link/LL/VSAT), as applicable
- i) Meteorological sensors
- j) Electrical Power System (including UPS and Generators)
- k) LAN/WAN System Hardware (Existing NAIS network to be used for data transfer).

1.7.3. The supplier shall bear complete responsibility of procurement / development integration of all the above equipment/sub-systems. He shall be totally responsible for installation, commissioning and testing of the complete system including the hardware software and interfacing of all the equipment.

1.8. **Qualitative Requirement**
The establishment of NCVTS shall be fully able to meet the requirements of a VTS authority for the next decade and beyond and conform to latest relevant standards of ITU, IEC, the latest guidelines, recommendations, performance standards on VTS issued by IALA and IMO including followings:

- a) Operational and Technical Performance of VTS System-
  - i) IALA Recommendation No. V-128
  - ii) IALA VTS manual
  - iii) IMO Guideline for VTS {IMO Resolution A.857(20)}

- b) Provision to meet operational requirements
  - i) IALA Guideline No. 1110
  - ii) IALA Guideline No. 1111
  - iii) IALA Guideline No. 1070

- c) Shore-side portrayal ensuring harmonization with e-Navigation related information,
  - i) IALA Guideline No. 1105.

- d) IALA Recommendation No. V-145 on the Inter-VTS Exchange Format(IVEF) Service

- e) IEC 9834-8

- f) IEC60950-1, 2nd edition
g) IEC 61000-6-2
h) IEC 61000-6-3
i) IEC 529
j) IEC 60945
k) Radiation Safety (Radio and Radar)
   i) For non-ionising radiation, the European standard for human exposure to RF electromagnetic fields is the International Commission on Non-Ionizing Radiation Protection (ICNIRP)
   ii) Electromagnetic Compatibility
   iii) All other latest recommendations and standards issued by IEC/ITU/IMO/IALA.

1.9. Integration
The NCVTS will be a complex system having number of different hardware and software modules, integration of existing systems viz. communication network of NAIS, raw data from radars of CSN network, VTS at major ports, AIS feed from NAIS network etc. Necessary Provisions to be made in the NCVTS system to interface with ERP/MIS system in the ports in the future.

1.10. System Up-gradation
The NCVTS shall be designed with a view for future growth. Up to integration of new VTS sites/sensors and work stations. The entire system shall be upgraded for IT products, and software, as midlife upgrade after 5 yrs.

1.11. Maintenance
The system shall be designed for maximum ease of servicing. Built in test facility shall be provided and replacement of any faulty component shall take minimum time. The tenderer has to provide details of the maintenance setup to provide warranty and annual maintenance for 9 years after warranty. There should be adequate trained manpower available for maintenance of the system on 24 x 365 hours. All such details are to be provided in their proposal. System availability ≥ 99.98% is to be ensured by keeping sufficient spares and redundancy.

1.12. Provision to Extend NCVTS feed to Indian Navy, Indian Coast Guard, State Maritime Authorities, Port Authorities, State Maritime Police, Border Security Force, Customs etc.
A provision shall be made in the NCVTS system to extend feed to Indian Navy, Indian Coast Guard, State Maritime Authorities, Port Authorities, State Maritime Police, Border Security Force, Customs etc.
SECTION II

2.1. NCVTS – SYSTEM ARCHITECTURE
2.1.1. The National Coastal VTS (NCVTS) will provide seamless VTS coverage across the complete coast of India to facilitate higher level of safety of navigation in contiguous waters by integrating existing VTSs of the major ports, Radars of Coastal Surveillance Network (CSN), VTSs in Gujarat (GoK and GoKH) and proposed new radar stations. The architecture of the proposed NCVTS is depicted below:

2.1.2. Radar Stations
The radar stations will consist of following equipment:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>VTS Equipment</td>
<td>X-band VTS Radar with dual Transceiver</td>
</tr>
<tr>
<td>(b)</td>
<td>Radar Processor unit</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Radio Communication (VHF) sets</td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>AIS unit</td>
<td>DGLL is maintaining</td>
</tr>
</tbody>
</table>
2.1.3. **Data Aggregation Center (DAC)**

2.1.4. Data Aggregation Center (DAC) will be established at the respective Deepbhavans of the regional directorates of the DGLL. It will be provided with monitoring consoles and data processors. Data from DAC will be further disseminated through leased lines/VSAT to the State Monitor Centers (SMC), Port Monitor Centers (PMC) stablished within the respective state and the Coastal Monitor Center (CMC). The list of equipment to be established at the Data Aggregation Center (DAC) is listed below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Qty.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>DBMS Server with software (with redundancy)</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Processing Server with software (with redundancy)</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Console for VTS operators/supervisors</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Radio Communication (VHF) sets</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>(e)</td>
<td>Data networking devices wiring protection devices</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(f)</td>
<td>Air conditioners/Furniture, electricity, back-up power (UPS &amp; Gen-Set), net connectivity, back office support, ancillary equipment etc.</td>
<td>-</td>
<td>As per requirements</td>
</tr>
</tbody>
</table>

2.1.5. **State Monitor Centers (SMC)**
State Monitor Centers (SMC) will be provided with monitoring consoles and data processors. The list of equipment to be established at the State Monitor Centers (SMC) is listed below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Qty.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>DBMS Server with software (with redundancy)</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Processing Server with software (with redundancy)</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Console for VTS operators/supervisors</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Radio Communication (VHF) sets</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>(e)</td>
<td>Data networking devices wiring protection devices</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(f)</td>
<td>Air conditioners/Furniture, electricity, back-up power (UPS &amp; Gen-Set), net connectivity, back office support, ancillary equipment etc.</td>
<td>-</td>
<td>As per requirements</td>
</tr>
</tbody>
</table>

2.1.6. **Coastal Monitoring Centre (CMC)**

Two Coastal Monitoring centers one each at West Coast and East Coast shall be established and integrated with DAC. These centers shall be equipped with redundant Data servers and all devices required for monitoring and integration with DACs and NMC.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Qty.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>DBMS Server with software (with redundancy)</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Processing Server with software (with redundancy)</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Console for monitoring</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Two Leased line connectivity for redundancy with each DAC with networking devices.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(e)</td>
<td>Air conditioners/Furniture, electricity, back-up power (UPS &amp; Gen-Set), net connectivity, back office support, ancillary equipment etc.</td>
<td>-</td>
<td>As per requirements</td>
</tr>
</tbody>
</table>

2.1.7. **National Monitoring Center (NMC)**

A National Monitoring Centre for NCVTS shall be established at Mumbai with a mirror image at Visakhapatnam. The data will be shared to external stakeholders like Indian navy, Indian Coast Guard, BSF, Marine Police, IPA, etc. from National Monitoring Centre.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Description</th>
<th>Qty.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>DBMS Server with software and redundancy</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Processing Server with software and redundancy</td>
<td>01</td>
<td></td>
</tr>
</tbody>
</table>
2.1.8. **Port Monitoring Center (PMC)**
Port monitoring Centre under NCVTS shall be established at 30 State owned Non Major ports.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Description</th>
<th>Qty.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b)</td>
<td>Processing Server with software and redundancy</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Console for monitoring</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>(e)</td>
<td>Data networking devices with redundancy</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(f)</td>
<td>Air conditioners/Furniture, electricity, back-up power (UPS &amp; Gen-Set), net connectivity, back office support, ancillary equipment etc.</td>
<td>-</td>
<td>As per requirements</td>
</tr>
</tbody>
</table>

2.2. **COMPONENTS AND SPECIFICATIONS**

2.2.1. **RADAR**
The VTS Radar proposed to be installed at all stations should be X-band navigational radar, fully compliant with IALA guidelines and recommendations (V-128, V1111). The radar proposed for NCVTS is a solid state based, Dual Transceiver, with following specifications:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sub unit</th>
<th>Type/Features</th>
<th>Specification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Antenna</td>
<td>Slotted wave guide</td>
<td>21 feet</td>
<td>Gain not less than 25 dB</td>
</tr>
<tr>
<td>(ii)</td>
<td>Antenna</td>
<td>RPM</td>
<td>10-20</td>
<td></td>
</tr>
<tr>
<td>(iii)</td>
<td>Antenna</td>
<td>Polarization</td>
<td>Horizontal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beam width - H</td>
<td>Less than 1 degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beam width - V</td>
<td>Less than 25 degree</td>
</tr>
<tr>
<td>(iv)</td>
<td>Transceiver</td>
<td>Peak Power</td>
<td>Up to 200 Watt</td>
<td></td>
</tr>
<tr>
<td>(v)</td>
<td>Transceiver</td>
<td>Pulse Compression</td>
<td>Ratio better than 500:1</td>
<td>Gain approx 20 dB</td>
</tr>
<tr>
<td>(vi)</td>
<td>Transceiver</td>
<td>Location- Upmast</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>(vii)</td>
<td>Transceiver</td>
<td>Frequency Diversity</td>
<td>Enabled with min of 6 sub bands</td>
<td></td>
</tr>
<tr>
<td>(viii)</td>
<td>Transceiver</td>
<td>Sector Blanking</td>
<td>Enabled</td>
<td></td>
</tr>
<tr>
<td>(ix)</td>
<td>Complete system</td>
<td>MTBF</td>
<td>Not less than 50000 hrs</td>
<td></td>
</tr>
</tbody>
</table>
Note: The bidder may suggest the make and model of the VTS radar meeting the above specifications or better version available, if any, in the global market.

2.2.2. **RADAR TRACKER/PROCESSOR UNIT**
Should be able to export data under IVEF (Inter VTS Exchange Format). Data tracking capacity not less than 500 tracks and output video data should be in ASTERIX format. The software provided should be compatible with integration of existing VTS Radars. It shall be possible to record all track information, together with the link to ship data, for 24 hours continuously. At least the following information shall be recorded:
(a) Synthetic Video
(b) Radar Plot
(c) Radar Tracking Data
(d) Status of Equipment
(e) AIS Data
(f) Meteorological and Hydrological Data
(g) Administrative Data
(h) The value of the label related to the track and of all other parameters governing the display is, as received from the VTS computer (database server).

2.2.3. **Capability level of the Radar proposed for the NCVTS - ‘X’ band ‘Advanced’**

- **Radar detection performance**

The radar detection performance shall be sufficient to meet the VTS operational requirement in the individual VTS areas. This includes detection and tracking of all types of surface objects in all weather conditions typical for the individual site.

*Radar Targets to be detected*

<table>
<thead>
<tr>
<th>IALA Target Type</th>
<th>Typically Representing</th>
<th>Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aids to Navigation without radar reflector. Small open boats, fiberglass, wood or rubber with outboard motor and, at least, <strong>4 meters long</strong>. Small speedboats, small fishing vessels, small sailing boats and the like.</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>In-shore fishing vessels, sailing boats, speedboats and the like.</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Aids to Navigation with radar reflector.</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>Small metal ships, fishing vessels, patrol vessels and the like.</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Coasters and the like.</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Large coasters, bulk carriers, cargo ships and the like.</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Container carriers, tankers etc.</td>
<td>X</td>
</tr>
</tbody>
</table>
- **Target detection range**

The achievable target detection range is highly dependent on several factors including antenna height, target characteristics, weather and atmospheric propagation conditions. In the design of radar systems it is furthermore very important not only to focus on maximum detection range but also on radar quality at all ranges, the ability to handle clutter, the ability to suppress interferences and the ability to simultaneous handling of defined (small and large) targets in the VTS area covered by radar.

### Typical Range Performance Predictions for X-band Radar in NCVTS

<table>
<thead>
<tr>
<th>Antenna Elevation</th>
<th>IALA Target Type</th>
<th>Clear</th>
<th>Rain 10 mm/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 m ASL</td>
<td>1</td>
<td>0.02-5 NM SS 0-4</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.02-7 NM SS 0-5</td>
<td>0.02-6 NM SS 0-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.02-9 NM SS 0-6</td>
<td>0.02-7 NM SS 0-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.02-12 NM SS 0-7</td>
<td>0.02-10 NM SS 0-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.02-14 NM SS 0-8</td>
<td>0.02-13 NM SS 0-8</td>
</tr>
<tr>
<td>20 m ASL</td>
<td>1</td>
<td>0.05-10 NM SS 0-4</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05-12 NM SS 0-5</td>
<td>0.05-9 NM SS 0-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05-14 NM SS 0-6</td>
<td>0.05-12 NM SS 0-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05-17 NM SS 0-7</td>
<td>0.05-15 NM SS 0-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05-20 NM SS 0-8</td>
<td>0.05-18 NM SS 0-8</td>
</tr>
</tbody>
</table>

### Typical Range Separation

<table>
<thead>
<tr>
<th>Typical Range Separation of Small Point Targets [m]</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Range Separation</td>
<td>6 dB points</td>
</tr>
<tr>
<td>Less than 5 NM instrumented range</td>
<td>15</td>
</tr>
<tr>
<td>5-20 NM instrumented range</td>
<td>50</td>
</tr>
<tr>
<td>More than 20 NM instrumented range</td>
<td>80</td>
</tr>
</tbody>
</table>
**Typical Azimuth Separation**

<table>
<thead>
<tr>
<th>Typical Azimuth Separation of Small Point Targets</th>
<th>Advanced 6 dB points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azimuth separation in angle (in °)</td>
<td>0.5</td>
</tr>
<tr>
<td>Or distance, whichever is the greater [m]</td>
<td>15</td>
</tr>
</tbody>
</table>

2.2.4. **Electrical infrastructure**
(a) In order to ensure continues power supply, each stations are to be installed with 02 no. DG sets of reputed make. Two independent UPS as power backup are also to be provided for Radar antenna operation (15 KVA) and other VTS equipment (6 KVA). (PCs/Networking/Firewall)
(b) Fire detection system and firefighting equipment
(c) Air conditioners/Furniture, electricity, back-up power (UPS & Gen-Set), net connectivity, back office support, ancillary equipment etc.
(d) Lightning arrester and earthing.

2.2.5. **Data Networking**
(a) Existing NAIS network is to be used for data transfer. Necessary hardware, software interface is to be provided.
(b) Microwave link/VSAT/Leased Line (as per suitability) for Data transfer among Radar Stations and between Radar Stations & PMS.
(c) Leased line (LL) connectivity for data transfer between PMS & respective State Control Centre.
(d) Leased Line network for transfer of data for monitor terminals for security agencies (IN, ICG, BSF & State Marine Police) and for DG (Shipping), Mumbai.

2.2.6. **Software for NCVTS**
For smooth data integration, operation and maintenance of NCVTS system, the software should have following characteristics:
(a) Modular SW-Concept based on small, task specific Software Modules
(b) Software modules with standardized open interfaces and Customer specific system architectures with capability for several, hierarchical levels.
(c) Easily expandible system architectures with potential for system growth
(d) Easy integration of external subsystems into components, support for almost every radar model on the market, AIS base stations according to ITU standards, camera systems etc.
(e) Smooth integration of existing VTS systems as well as capability to be integrated into other, higher level systems
(f) Advanced HMI
(g) Creation of Comprehensive picture traffic situation over ECDIS
(h) Simulation and training
(i) Traffic risk assessment and early warning and alarms
2.2.7. **VHF System with voice recording and play back facility**

At every Radar station one main and one standby VHF system is to be installed with below specifications:

(a) Power:
   - Normal: 25 Watts;
   - Reduced: 1 Watt;

(b) Frequency range: 150.8 to 163.3 MHz (Entire Marine frequencies)

(c) Operation: Semi-duplex;

(d) DSC: Built-in class D DSC;

(e) Receiver:
   - Sensitivity: -119 dBm or 0.25µV p.d.
   - Distortion: below 5%;
   - S/N ratio: better than 40 dB;
   - Spurious emission: below 2nW;
   - Inter modulation attenuation: More than 68 dB;

(f) Transmitter:
   - Adjacent channel power: below -70dBc;
   - Spurious radiation: below 0.25µW;
   - Distortion: below 5%;
   - S/N ratio: better than 40 dB;

(g) Channels: All ITU Channels;

(h) Interface for remote control, recording and replay;

**Note:** 02 telephone lines patching feature should be available at Data aggregation Centers for VHF systems.

2.2.8. **Meteorological System**

At 30 State owned non major ports meteorological sensors shall be established. The meteorological sensor should have the following specifications:

(a) Wind Speed
   - Range: 0 to 60 m/s
   - response time 250ms
   - accuracy
   - 0 to 35 m/s: ±0.3 m/s or ±3%, whichever is greater
   - 35 m/s to 60 m/s: ±5%

(b) Wind Direction
   - Azimuth: 0 to 360°
   - Response time: 250ms
   - Accuracy: ±3°
   - Output resolution and unit 1°

(c) Air temperature
   - Range: -52 to +60 °C (-60 ... +140 °F)
   - Accuracy for sensor at +20 °C ±0.3 °C (±0.5 °F)
   - Output resolutions and units 0.1 °C, 0.1 °F

(d) Barometric pressure
• Range: 600 to 1100 hPa
• Accuracy: ±0.5 hPa at 0 to +30 °C (+32 to +86 °F)
• ±1 hPa at -52 to +60 °C (-60 to +140 °F)

(e) Output resolutions and units
• 0.1 hPa, 10 Pa, 0.0001 bar,
• 0.1 mmHg, 0.01 inHg

(f) Relative humidity
• Range 0 to 100 %RH
• Accuracy ±3 %RH within 0 to 90 %RH
• ±5 %RH within 90 to 100 %RH
• Output resolution and unit 0.1 %RH

(g) Display:
An LED display screen of approximate size 18 inches x 6 inches shall be mounted on the wall to display the different meteorological parameters in sequence. The system shall be able to record, storing and taking printouts of the meteorological data of the previous records for minimum one year shall be provided.

2.2.9. RADAR DATA PROCESSING SYSTEM
This is the first part of the tracking system wherein tracker generate tracks for all the objects observed by the radar. A high performance radar processor installed at the radar station shall extract the targets. The processor shall have the feature for automatic clutter control, noise reduction, radar interference, etc. The processor shall be capable of tracking at least 2000 targets (1000 moving and 1000 stationary targets; buoys, etc.). It shall be capable of detecting targets moving at 50 knots and turning at the rate of 0 to 5 degrees per second. The tracks from the two radars shall be fused/integrated so that only one track is shown on the operator display, also together with the corresponding AIS track if there should be one. The integration shall be automatic and a single track displayed per vessel regardless of the number of sources of information for that track. The track symbol shall indicate whether it is a Radar-only track, an AIS-only track, or a Radar+AIS track.

2.2.10. DISPLAY PROCESSOR
(a) This unit shall be located at ‘NCVTS’ centres and one of the main functions of the system is to present the VTS Traffic Image consisting of synthetic radar video, fused/integrated Tracks, Electronic Navigation Chart data along with other related information from the sensors.
(b) The fused/integrated traffic overview output from the multi-tracker shall be one of the inputs to the display processor. The other input shall be from the ‘VTS’ computer system regarding the administrative data of the vessel.
(c) One of the main functions of the display processor shall be of maintaining a continuous link between the VTS database and the targets extracted by the tracking system. The data specific to a target shall be displayed on the terminal whenever the same is selected/clicked by the operator.
(d) Initially, the operator identifies the tracked target with the relevant vessel data. The system from that point maintains the link. In the event when no initial data is available, the same can be manually entered from the console.
(e) The display processor displays the synthetic radar picture along with fused/integrated Tracks on the Electronic Navigation Charts. The operating console shall have the facility to turn ON or OFF the radar image on the screen.

(f) The data along with video shall be stored on-line continuously for a period of at least 7 days in accordance with IALA VTS Recommendations.

(g) The system shall have the facility for updating the Electronic Navigation Charts. There should be tools to add user layers on the chart (The updating/corrections to the charts can be made in the hydrographic PC).

2.2.11. ENC CHARTS

(a) The electronic navigation charts (ENC) are the base elements for forming graphic presentation of navigational area of interest where the targets are displayed as movable objects on fixed background. Additional information for objects of navigational importance such as navigational buoys, lighthouses shall be displayed on the chart.

(b) The electronic charts shall comply with database standards of latest ‘International Hydrographic Organization’ (IMO) and IMO regulations. ENC’s (Electronic Navigational Charts) generated by the Indian Hydrographic office are now available in S-63 format and same shall be used as the electronic chart for Indian coast covering all the ports.

(c) The VTS chart covers the entire area of interest along Indian coast and may be combination of one or more of electronic charts. Following information shall be available on the VTS chart:
   (i) Auto/Manual/No tracking zone
   (ii) Radar sites
   (iii) Routes, etc.
   (iv) Light Houses, Buoys, etc.
   (v) Harbour limits
   (vi) Reporting points
   (vii) Anchorages and Berths
   (viii) Wrecks
   (ix) Dangerous Zones
   (x) Shore Lines
   (xi) Alignment Line
   (xii) Approach channel
   (xiii) Turning Circle
   (xiv) User defined Layers

(d) The modified charts with user layers shall be started at a separate file without overwriting on the original chart.

(e) WGS – 84 co-ordinate systems shall be used for presenting the targets and other physical objects. It shall be possible for the ‘VTS’ system to use ENC charts to provide grounding predictions.
(f) It shall be possible to edit and change the S52 schemes and create customized schemes.
(g) It shall be possible to group ECDIS chart object into custom defined overlay groups.

2.2.12. **MODE OF OPERATION**
The system as minimum shall have following modes of operations:
(a) Traffic Mode - The system will be normally operated in this module.
(b) Maintenance Mode – This mode is intended mainly for preventive maintenance and for trouble shooting of hardware and software modules offline diagnostics shall be available in this module.

2.2.13. **ZONES**
The complete area of coverage shall be divided into two basic zones.
(a) Tracking Zone
(b) Blank Zone (No tracking)
- It shall be possible to define auto acquisition zone in each tracking zone. The system shall have the facility for making and monitoring the following zones as minimum:
   (a) Anchorage Zones
   (b) Restricted Zones
   (c) Reporting Zones
- The system shall have the feature of generating alarms automatically whenever the target crosses the zones limits.

2.2.14. **TARGETS**
The targets are broadly classified in to three types:
(a) **Tracked Targets**
Accuracy of information is dependent on the radar processor, radar antenna, transceiver, tracker’ fusion/integration processor and position fixing transponder. The processor shall not use any form of “radar map” or “radar matrix”. The processor must measure the Quality of Service (QoS) from all available tracking sources and use the QoS dynamically to calculate the vessel’s position, course over ground and speed over ground. The system must be able to handle at least 5,000 tracked targets.

(b) **Simulated Targets**
The position, direction, etc. of the target depend upon the system from the target future set by the operator. The difference between the two types of targets is that the actual route of the target depends on the actual movement of the vessel, whereas the movement of the simulated target from to point on an assigned route follows exactly path and speed limits set. The system must be able to handle at least 100 simulated targets.

(c) **Fixed targets**
These are Navigation Aids (NavAids) such as buoys etc, in area of coverage. The system must be able to handle at least 5000 NavAids.
- After Glow - The system shall have the feature for adjusting the afterglow of the tracked targets & the radar image. The intensity of the glow and time duration shall be adjustable from the operator’s console.

- Radar image and afterglow shall be displayed with no less than 16 color levels representing the radar video levels and ages of afterglow

2.2.15. TRACKS

- Each target once tracked by the System shall be assigned a unique track number and symbol. The system shall be broadly classify the tracks into following groups.

  (a) Initial tracks
  These tracks are those, which are identified by the system and shall be tabled with a specific type of symbol and colour code for easy identification.

  (b) Confirmed Tracks
  The initial tracks once confirmed by the operator become confirmed tracks. They shall be tabled with specific type of symbol and colour code.

  (c) Parked track
  Tracks may be “parked” once they are along-side. Parked tracks maintain their continuous link to the future MIS Database so that once they are “un-parked” the administrative data remains.

  (d) Lost track
  Tracks may be lost completely when the vessel leaves the port area or temporarily when the target is not symbol for such target and enter a Direct Reckoning (DR) mode for a specified time. The DR mode shall take into account the track’s assigned route including changes in the vessel’s vector (course and speed). If the radar video is not re-acquired, the Track will fade out.

- It shall be possible to define zones where lost tracks are retained and zones where lost tracks are automatically dropped/suppressed.

2.2.16. IDENTIFIER, HISTORY AND LABELS

  (a) Identifier
  Each target once tracked by the system either manually or by auto is labeled with unique identifier.

  (b) History
  It shall be possible to display the past positions of the target (to be displayed as a trail behind the target). The supplier shall specify clearly the number of past positions the system can display.

  (c) Labels
  It shall be possible to customize the labels to show various information related to the target. Further it should be possible to align the label with respect to the target in any one of 12 sectors. It shall be possible to hide label for de-cluttering purposes. Target Tooltip label shall be visible on hovering. The following shall be available as part of label to be selected by the operator:
    · Call sign
2.2.17. **CCTV SYSTEM**

- The system shall be designed, supplied and installed so that it shall deliver high performance **high resolution day and night clear images** of vessels in the radar shadow area and critical areas of the port within the port limits of PMC.
- The CCTV sub system shall be capable of remote monitoring and identify vessels, which are illegally sailing or parking at the restricted areas of the port basin, navigational water channel and outer anchorage area.
- The CCTV system shall include one number of **high resolution day and night camera** for clear view of the vessels during day and night.
- The camera shall be monitored and controlled at port and the feed, on demand if required, is to be provided at respective DAC/SMC.
- The camera shall have full zoom, pan and tilt control from its port control centre. The housing, pan/tilt head and received unit shall be weather proof and able to operate in outdoor environment conditions. It shall also able to perform automatic panning, tilting and zooming (preset sequence) and also view area around the camera.
- CCTV supports visual identification of vessels. The camera shall be installed at control tower, which shall deliver a clear colour picture during day time and black & white during night. It shall be possible to control the pan, tilt, zoom and turn on/off the camera from the VTS control room.

- It shall be possible from the operator’s console to automatically view a target on the CCTV. The CCTV should also support automatic follow up mode wherein the CCTV follows the selected track.

- An image stabilizer system shall also be provided to provide a stable image to the operators.

- An LED wall mounted display unit (monitor) of minimum 36 inches shall be installed for CCTV surveillance in the PMC.

2.2.18. **DISPLAY SYSTEM**

**Console**

- This is one of the principle elements of interface between the operator and the system. Most of the commands required for the system operation are entered through the console.

- The design of the console and the processing software shall be of the state-of-art-technology combining the features of presentation and control. The system shall be designed to enable the operator to perform most of the operations without taking his eyes off the screen.

- Maximum use of icons should be made to make operation as user-friendly as possible. Suppliers shall describe the icons they have available.

- A system with two operating consoles and one maintenance console is proposed. Each console shall have two 24” monitors for the VTS Traffic Image and one 24” monitor for the VTS Database. Such configuration would be advantageous when operator intends to zoom a particular area of interest on one monitor while on the other monitor have the overall view of VTS coverage area. All vessels and crafts in the port shall be depicted clearly on the 24” full screen monitor along with the chart with a provision to zoom a particular area.

- Frequently used functions shall be made available in toolbars and shortcut menu (right click).

- The console shall be equipped with telephone facility for normal shore to center communication and VHF system for center to ship communication.

- It shall be possible to perform the following operations from the console;
  - Scaling and shifting of the centre
  - Zooming any part of the area
  - Select a predefined view (Bookmark)
  - Highlighting any vessel of interest
  - Switching Labels on/off for all or individual targets
  - Manual acquisition of targets
  - Transfer of targets from lost targets to simulated targets and vice versa
  - Selection of danger zones
  - Vessels information
  - Designation a route to target
  - Control of Range and bearing line
- Radar control functions like switching, PRF/Polarization, pulse width etc.
- Rx/Tx selection for particular radar
- Off centering
- Track History
- Alarm zone ON/OFF
- Replay
- Symbols and Label selection
- Edit default settings
- Edit charts
- Information on meteorological system

- The synthetic radar image integrated with Electronic Navigation Chart (ENC) shall be displayed on a high-resolution 24” Colour monitors.
- The process of linking a vessel data stored in the VTS Database system with relevant object on the ‘VTS’ chart is termed as identification. Once identified the system from that point onwards keeps track of the object till the track is lost or manually deleted.
- It shall have a feature for selecting particular Radar for viewing its radar video. The system shall have the facility of transferring the information of tracked targets to simulated targets in case the tracked target is lost when the system is able to recapture the lost target; it shall be possible to transfer the information from the simulated target to tracked target.
- The system shall give the following information for each target:
  (a) Identifier
  (b) Speed over ground
  (c) Course over ground and Heading
  (d) Call sign
  (e) Flag
  (f) Range and bearing with respect to any operator selected reference point such as the VTS centre or any of the radars.
- The system on request shall display in a separate window the meteorological information.

2.2.19. **Alarm System**
- The system shall have automatic detection and Track alarm facility for all the critical parameters followed in the VTS as per IALA guidelines.
  - An audio-visual indicating system for the alarm shall be provided at operator console.
  - The alarm messages marked with date, time and identification of vessel shall be stored automatically for a period of not less than 30-days.

2.2.20. **Data Display Format**
The system have different data presentation forms for various parameters viz. time, distance (meters, km, NM), Speed (km/hr, knot, m/sec), date, co-ordinates, etc.
2.2.21. **Cursor**
The system shall support a future of automatically displaying the following information on positioning the cursor anywhere on the chart.

(a) Latitude
(b) Longitude
(c) Common Tactical Grid (CTG)
(d) Range
(e) Bearing

2.2.22. **Measurements**
The system shall possible to measure the distance and bearing between any two targets on the electronic chart.

2.2.23. **Data Security**
No essential data shall be lost as a result of equipment failure or result of software malfunctioning. The system shall have sufficient protection against unauthorized logins. The supplier will have to furnish the details on different levels of security.

2.2.24. **Chart Windows**
- It should be possible to split Chart Window into minimum 16 Split Windows. Each Chart Window should be able to display the whole area or just a segment, depending on the range and centre selected for the Chart Window.
- It should be possible to define and save a set of Views. Each View should have its own scale and area. Each of the defined Views can be accessed from any Chart Window.

2.2.25. **Target Center**
It should be possible to set Chart Window centre to a target, so when the target moves it would always stay in the centre of the window.

2.2.26. **Workspaces**
Each operator should be able to define and save a Workspace. A Workspace is one or more Chart Windows and system parameters configured to reflect the Operator’s personal preferences. This way, the desired chart windows, locations, ranges, overlays, etc. are available each time the operator logs onto the system.

2.2.27. **Responsibility Areas**
Each console should be able to be configured to cover a responsibility area. A Responsibility Area is a unique geographical area in which a single VTS operator is responsible for total traffic surveillance. The assignment of responsibility areas ensures that one operator is given exclusive responsibility for each target.

2.2.28. **Tracked Target Assignments**
Some Track Alarms are initiated by the target assignment(s) given by the VTS operator having the target inside his responsibility area. The system should provide the following assignments:

(a) Anchor Watch
(b) Anchor Area
(c) Authorize
(d) Collision Watch
(e) Domain Watch
(f) Grounding Watch
(g) Navigation Channel
(h) Reporting Area
(i) Speed Watch
(j) Type & Size
(k) Turning Circle

2.2.29. **AIS MESSAGING**

The console should enable the VTS operator to send AIS messages to specific vessels using their MMSI number and also broadcast to all ships.

2.2.30. **NCVTS COMPUTER SYSTEM**

The NCVTS computer system is a VTS data processing system is the core of whole operation, where traffic data helpful for safe navigation and other VTS function are processed, stored and displayed with the help of hardware and customized software. The VTS system design shall include redundancy and graceful degradation. The supplier will have to furnish details of graceful degradation features. The minimum preferred system configuration shall be as given below.

(a) 128 bit architecture
(b) 8 GB RAM
(c) CACHE MEMORY as per system requirement
(d) Disk storage
(e) Multimedia disc storage
(f) Interface units
(g) DAT drives
(h) Console
(i) High-speed back tape drive systems
(j) Operating systems UNIX/LINUX

The server shall be provided with sufficient storage (on a multimedia), for storing video, audio and data information. The ship data shall be stored initially in central storage device and subsequently shall be transferred to DAT drives.

(Make: - HP / Dell / IBM).

2.2.31. **WAN/LAN**

- The Wide Area Network/local area network (LAN) as the name implies is the communication network that covers a relatively small area of coverage. The existing NAIS network is to be used for data transfer. Necessary interface, hardware and software is to be provided. The LAN shall be based on TCP/IP, shall have linux based operating system

- A high speed LAN shall be used for connecting the server with graphic substations and the PCs. The loading on the LAN shall not be more than 50%. All the product selected (hardware, software) shall have interfaces compatible with port LAN system.
2.2.32. **VTS Database**

- The VTS Database should be an application that provides the functions necessary for the efficient management of a port marine and traffic operations. The user interface should be designed to be clear and straightforward to use, so that information can be entered and retrieved without difficulty. Computing expertise should not be needed. The VTS Database should enable the storing and manual input of marine data including vessel name, flag, call sign, MMSI number and IMO number. Any of these data fields can be used to search and retrieve data for reporting.

- The VTS Database package should include:
  (a) Server running MS SQL Server 2008 or better and
  (b) Client Software.

- The VTS Database shall enable VTS Operators to plan, activate and complete voyages including the following functional areas:
  (a) Application Security
  (b) User Administration
  (c) Base Data Management
  (d) Vessel Administration
  (e) Voyage Management
  (f) Incident Management
  (g) Waste Management
  (h) Historic Data Overview
  (i) Report Generation
  (j) Online Help.

- The supplier will have to furnish details of these functional areas.

### 1.2.34. OTHER SYSTEMS

(a) **Emergency Power System**

- In view of the importance of the system, it is essential that continuous availability of power to the VTS center be maintained.

- It is proposed to install an emergency D.G. set (totally enclosed type) of adequate capacity (40 KVA, 3 phase, 50 Hz preferred) at the main control station. However the contractor shall assess exact capacity of the DG set required based on the requirement of load at signal station.

- Generator and its starting panel shall be maintained in separate room available at the base of the center.

- Starting of the generator shall be by dedicated batteries installed near the D.G. set. D.G. set shall be provided with Dynamo for automatic charging of the batteries.

- In the event of breakdown of main power supply, it shall be possible to start the emergency D.G. set within 45 sec. starting and closing of the circuit breaker in the emergency switchboard shall be automatic.

- The normal power supply to the switchboard shall be routed through a circuit breaker of an adequate capacity and shall be provided with auto trip facility. In the event of main power failure, the breaker instantaneously trip and shall remain in that position till it is manually reset. The restoration of the system from emergency mode to normal mode shall be by manual means.
- The contractor shall maintain a log book of the running hours and other parameters of the DG set.

(b) **Uninterrupted Power Supply Unit (UPS Unit)**
- The UPS (Uninterrupted Power System) is ON LINE mode shall be installed in the control room.
- The system shall be designed to meet the following loads for minimum period of 30 minutes in the event of breakdown of main power supply through a separate connection:
  a. Servers/computers and all its peripheral devices including graphic stations, consoles and PCs, monitors, display units etc.
  b. Radar equipment and all associated system including recording.
  c. VHF, Voice recording system and other communication systems
  d. CCTV system
  e. Communication Links (Microwave Link).
  f. Meteorological system.
  g. LAN System
  h. Satellite communication system
  i. Printers
  j. Lighting (minimum)
  k. SERVERS

(c) **AC and Ventilation**
- Split type room Air conditioners shall be installed in the NCVTS sites.
- In addition to the above ventilation fans shall be provided at the following places.
  - UPS battery room – supply & exhaust
  - Emergency Generator room – supply & exhaust

(d) **Lightning Protection**
All the masts, light structures shall be protected against lightning as per relevant rules. The over voltage shall be safety conducted to the ground. An earth pit as per state electricity rules shall be provided near the structure for conclusion of over voltage to the ground.

2.2.33. **TRAINING**
The contractor shall organize two weeks technical training to 24 engineers of the Directorate on the total system at manufacturing / factory place, prior to installation of NCVTS. The cost towards airfare, and training shall be at contractors account. The contractor shall arrange a stay for the trainees during the training.

2.2.34. **RECORDING AND PLAY BACK SYSTEM**
- The recording of track information shall be automatic and on line for a period of at least 30-days and after which it shall be transferred to a off-line media. It shall be possible to check the recorded information authenticity; recording data
tampered with can be identified automatically. Each recording shall be stamped with date & time.
- The System shall support the following; Recording of positions of all tracked targets for a specified time
  (a) Recording of radar images
  (b) Recording of AIS Messages
  (c) Recording of Hydro / Meteorological data
  (d) Recording of alarms
  (e) Selection of a particular tape/volume for playback
  (f) Assigning/modifying volume identification
  (g) Delete/erase recorded volume (through password)
  (h) Standard features of a record/playback system viz fast-forward,
  (i) rewind, pause, volume control, start, stop, slow
  (j) motion, etc.
  (k) Synchronized playback of target track recording (video) along
  (l) with VHF recording (audio) shall be possible.
  (m) Selection of particular VHF channel for recording.
  (n) When the current volume is full, the system automatically assigns the next empty volume for the recording.
- A high end PC with multimedia software running on Windows shall be used for linking the VHF information to the VTS computer through the LAN.
- The system shall provide the feature of synchronizing the VHF communication replay with track replay. The replay feature shall be offered at all the consoles. When only audio replay is required the same shall be possible from MIS PC.
- The system shall have the feature for recording and playback of telephone conversation to the VTS center (minimum two lines). This is optional and if desired the necessary input from the telephone system shall be routed through suitable signal interface systems.

2.2.38 PRE BID MEETING
A pre bid meeting with the prospective bidders will be held at 1130 Hrs on 06/12/2016 at Deep Bhavan Noida. The queries if any, may be submitted through email at noida-dgll@nic.in latest by 02/12/2016.
## BILL OF MATERIAL

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>EQUIPMENT</th>
<th>QTY.</th>
<th>Unit Price in Rs. inclusive of all taxes and duties</th>
<th>Amount in Rs.</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>A 1</td>
<td>SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF DUAL TRANSCEIVER X BAND SOLID STATE, 50-200 W RADAR, COMPLIANT OF IALA VTS STANDARD WITH 21 FEET SWG HORIZONTAL POLARIZED ANTENNA WITH PROVISION FOR CIRCULAR POLARIZATION.</td>
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<tr>
<td>2</td>
<td>RADAR DATA PROCESSOR UNITS</td>
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<td>3</td>
<td>RADAR DISPLAY UNITS</td>
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<td>B 1</td>
<td>ENC CHARTS FOR INDIAN COAST TO BE INSTALLED AT ALL NODES OF NCVTS</td>
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<td>C 2</td>
<td>INTEGRATION OF EXISTING VTS SYSTEMS AT 12 MAJOR PORTS, GULF OF KUTCH, GULF OF KHMABHAT AND INTEGRATION OF RAW RADAR DATA FROM RADAR OF CSN NETWORK</td>
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<td>D</td>
<td>VTS DATA FEED TO IN, ICG, BSF, SMB, SMAS, DGS, PORT AUTHORITIES, CUSTOMS ETC.</td>
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<td>E</td>
<td><strong>VHF SYSTEM</strong> (with 02 telephone lines patching feature at 09 Data Aggregation Centers)</td>
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<td>1 VHF SYSTEM WITH VOIP</td>
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<td>2 VHF SERVER WITH RECORD AND REPLAY PROVISION</td>
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<td><strong>CAMERA SYSTEM</strong></td>
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<td></td>
<td>1 HIGH RESOLUTION THERMAL OPTICAL CAMERA SENSOR</td>
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<td>1 METEO SENSOR WITH UNIVERSAL SERIAL INTERFACE (WIND SPEED &amp; DIRECTION, HUMIDITY, PRECIPITATION, TEMPERATURE AND BAROMETRIC PRESSURE)</td>
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<td><strong>VTS SOFTWARE, NETWORKING AND HARDWARE WITH (WITH LINUX BASE OPERATING SYSTEM)</strong></td>
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<td>3 DBMS SERVER AT 09 DAC, 02CMC and 02 at NMC</td>
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<td>4 NETWORK SERVER</td>
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<td>5 NETWORK SERVER</td>
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<td>6 RECORD AND REPLAY SYSTEM TO BE INSTALLED AT ALL PROCESSOR</td>
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<td><strong>CONNECTIVITY</strong></td>
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<td>1 VSAT SYSTEM PAMA PER SITE</td>
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<td>2 INDORE UNIT (IDU MODEM ONBOARD TCP OPTIMIZATION AND QOS (QUALITY OF SERVICE) CAPABILITIES, ROUTER AND DNS AND CMPATIBLE WITH Ku and C BAND</td>
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<td>2 OUTDOOR UNIT (VSAT SATELLITE DISH, LNB AND BUC</td>
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<td></td>
<td>3 4 MBPS LEASED LINE FROM RADAR STATIONS TO DAC WITH NETWORKING DEVICES</td>
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</table>
Parties interested in the Project are required to submit their budgetary quotes in writing to Directorate General of Lighthouses & Lightships, A-13, Deep Bhavan, Sector-24, Noida – 201301. India. Tel:91-120-24112508 / Fax: 91-120- 2411345 Email: noida-dgll@nic.in

- **Note**: Any other additional item required to make the system complete, may be indicated on a separate sheet with details (technical and cost)

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<td><strong>4</strong></td>
<td><strong>8 MBPS LEASED LINE FROM DAC TO COASTAL MONITORING CENTRE WITH NETWORKING DEVICES</strong></td>
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<td><strong>DISPLAY</strong></td>
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<td><strong>1</strong></td>
<td><strong>LED DISPLAY 24” TERMINAL / OPERATOR’S CONSOLE</strong></td>
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<td><strong>TECHNICAL TRAINING FOR 02 WEEKS FOR 24 ENGINEERS</strong></td>
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<td><strong>INSTALLATION, COMMISSIONING AND DOCUMENTATION</strong></td>
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<td>- Radar and associated components</td>
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<td>- VHF Equipment</td>
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