

## Expression of Interest

### TOT of Compact Hull Mounted Sonar – ABHAY

#### **1.Introduction**

Naval Physical and Oceanographic Laboratory (NPOL), Kochi, a Research and Development Laboratory under DRDO, MoD, invites Expression of Interest (EOI) from Indian manufacturers having sufficient experience, expertise and willingness to undertake the production, certification and installation of a compact Hull-Mounted Sonar (ABHAY) designed for smaller warships of the Indian Navy, as Lead System Integrator. The sonar system is to be developed, integrated, tested and installed onboard Naval platforms. Further, life cycle maintenance support is to be provided.

In this connection, EOI is invited from reputed Indian firms having infrastructure, trained manpower, adequate resources and sufficient experience in the area of Defence System integration, Data acquisition systems, Electro-Acoustic Transducer Arrays, Power Amplifiers, Embedded Systems etc., with project management competency and experience. Firms fulfilling the essential requirements, as outlined in Section 2 below may submit the EOI.

#### **2.Essential Requirements for participating in EOI**

The firm submitting their EOI must fulfil the following requirements:-

- (a) The firm should have adequate technical competence, infrastructural requirements, qualified and experienced manpower for assembly, integration, cabling and testing of Electro-Acoustic Transducer arrays, PCBs and cabinets for ship borne applications along with expertise for installation, degutting/regutting of Ship's hull.
- (b) The firm should have prior experience and proven track record in specific areas such as development, supply, integration and installation of underwater sensor based systems for ship borne applications. They also should have expertise and experience in fabrication of consoles, racks, development of interconnect cable looms for ship borne systems.
- (c) The firm should have adequate product development support capability in terms of qualified human resources, infrastructure, test equipment and test and evaluation tools to carry out the integration task.
- (d) The firm shall have internationally recognized quality management systems and practices, such as ISO 9001:2008, AS 9100 or equivalent. Necessary documents supporting the same shall be attached during submission of EOI.
- (e) The firm shall have an established state-of-the-art, in-house accredited test facility for system integration, qualification testing, and quality assurance, environment testing,

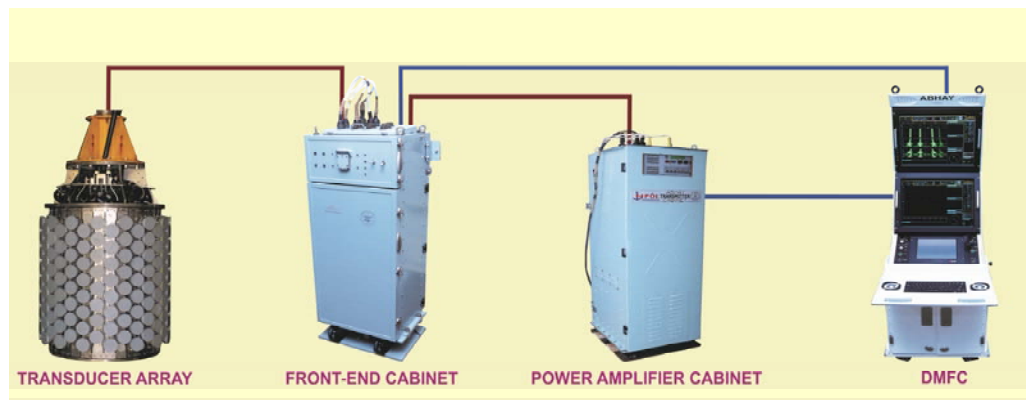
vibration tests, calibration and EMI/EMC etc. In case the firm, itself is not having proven record in a particular technology/ test facility, it will be the firm's responsibility to identify approved vendors / test centres in the country and carry out fabrication and tests as per the procedures/standards and as per the requirements of NPOL. Necessary documents indicating the above shall be attached during submission of EOI.

Note: Compliance to each of the above said requirements shall be substantiated with documentary proofs. In spite of the documentary evidences, if found necessary, a Committee constituted by Director, NPOL, may visit the firm and ascertain their competence.

### 3. System Description.

ABHAY is an advanced Active cum Passive integrated sonar system designed and developed for the smaller platforms such as coastal surveillance/ patrol vessels. It is primarily a compact active sonar system with enhanced passive capabilities. It employs advanced adaptive signal and information processing techniques for detection, tracking & classification of targets. The hardware architecture is based on the latest technology that enables smooth up-gradation of the system capabilities. The system architecture is designed to have feature like scalability, ease-of-maintenance & high reliability.

The Abhay sonar system consists of a transducer array, data acquisition system, power amplifier and the dual multi-function console. The brief details of each of the sub systems are given below. The configuration of the sonar system is given below.



(a) Transducer Array. Electro-acoustic transducers are used to generate and receive acoustic signals. Transducers are arranged in vertical staves and 32 such staves are arranged in a cylindrical form. Acoustic height and diameter of array is approximately 800 mm. The PA needs to procure the transducer and associated structures as per above mentioned specifications from a NPOL nominated OEM/Agency.

(b)Front End subsystem. The Front-end Subsystem acquires the analog data from the transducer array which is further amplified to the required voltage level post conditioning. The amplified signals are thereafter digitized and sent out over Ethernet. The Frontend system is housed in a single cabinet which is internally partitioned into three levels which consists of TX/Rx switch PCBs and DAC hardware. The PA needs to procure the Front end subsystem as per above mentioned specifications and the required PCBs and modules from NPOL nominated OEMs/Agencies.

(c)Transmitter Subsystem. The ABHAY transmitter sub system consists of one stand-alone cabinet for housing Power Amplifier (PA) modules, Transmit Signal Generator (TSG), HT Power supply units (HTPSU), LT Power Supply units (LTPSU). The cabinet should be EMI/EMC compliant and should support all interconnect wiring and should have necessary cooling arrangements as per specification. A resistive load box consisting of 32 sets of resistive elements, enclosed in a suitable enclosure, with appropriate cooling arrangements is used to test the Power Amplifier cabinet. The PA has to procure the transmitter subsystem as per above specification and required boards from NPOL nominated OEMs/Agencies.

(d)Dual Multi-Function Console (DMFC). DMFC houses mainly signal processing and display processing subsystem along with provision for data recording. The operator detects the target on the display aided by the audio. The data, after post processing, is sent to the Display and Information processing subsystem for further processing and presentation on the display. The PA has to procure this DMFC and required boards from NPOL nominated OEMs.

(e)Ring Laser Gyro (RLG). The RLG developed by RCI, Hyderabad and manufactured by BEL, Chennai is an integral part of ABHAY and is utilised for obtaining the beam stabilisation data for the Sonar. The installation of ABHAY also includes procurement of the gyro (i.e. RLG) from BEL, Chennai, installation and subsequently, integration with the sonar system.

#### **4. Responsibilities of System Developer**

- (a) Procurement, testing and supply of all consoles including PCBs/modules and wired back planes, with front panel connectors and their respective connectors and sonar transducers from NPOL nominated OEM/Agency. (Type, Quantity and part number and Test Procedure will be provided by NPOL). All subsystems shall meet EMI/EMC specifications applicable as per JSS standards for ship borne systems.
- (b) Fabrication of all necessary jigs and fixtures necessary for manufacture, assembly and testing of all consoles.
- (c) Thermal/structural simulation of cabinets to ascertain the cooling/ruggedisation requirements of the system

- (d) Testing and clearing of cabinets in standalone mode and simulation mode both at factory premises and onboard with the backplane ensuring the power supply and the individual connectivity between PCBs and the front panel connectors and cables as per Test Procedure and wire list in presence of NPOL and Naval Reps.
- (e) Installation, Interconnection and Integration including laying of power cables and system interconnecting cables between the consoles, junction box and transducer array and Installation of Application software and firmware (as provided by NPOL) in respective boards as per procedure provided by NPOL onboard Naval platforms. The installation may also include fitment of a Ring Laser Gyro (RLG) and transducer fixture which will be carried out while the ships are in Dry Dock. Installation of transducer array and subsystems may necessitate hotwork and degutting of Shipside.
- (f) Preparation of all Documents (Technical Documents, Operating Instructions, Interconnection diagrams, User manuals, Installation and maintenance manuals) required by NPOL/ Qualification Test / Functional Tests for the Cabinets.
- (g) Testing, trouble shooting and replacement of respective boards during warranty and beyond warranty period on mutually agreed terms. The lead system integrator has to enter into back to back AMCs with respective OEMs accordingly.
- (h) Each cabinet to be subjected to the Qualification & Certification Procedures as per Navy approved Qualification Test Schedule (QTS). Overall responsibility of total system qualification will be the responsibility of the lead system integrator.
- (j) Technical Support during STW, HATs and SATs onboard all platforms.

## 5. TOT TERMS

- (a) TOT will be given on non-exclusive basis only. The number of licenses on non-exclusive basis will be restricted. However, additional licence if required will be given by DRDO on need basis. The intellectual property rights shall always remain with DRDO.
- (b) The amount and payment stages of TOT fee will be as prescribed by DRDO.
- (c) Royalty fee @ 2% of the annual sales to Indian Govt. Estt, Armed Forces and @ 6% of the annual sales to Export Market (based on invoice value declared to Customs authorities).
- (d) Technical assessment of the industries submitting EOI will be carried out by a Technical Assessment Committee (TAC) for verification of the technical and financial capability/capacity of the industry.
- (e) Eligible parties will have to sign Confidentiality & Non-Disclosure Agreement (CNDA) with DRDO for technical discussion including specifications, following which they shall be considered for giving Transfer of Technology (TOT) on non-exclusive basis.

- (f) TOT to industry will be given based on their manufacturing capability, assurance on quality and capacity of production apart from other terms and conditions.
- (g) The licencing agreement for transfer of technology (LATOT) which is to be signed will be as per the template approved by Department of Legal affairs. Ministry of Law and Justice.
- (h) DRDO shall have the march-in rights to use the IP for its own use in the interest of the Govt. of India without any restrictions, irrespective of the nature of licence granted.
- (i) The firm expressing interest should be technically sound to Procure/manufacture, supply, install, Integrate and maintain the system with requisite quality standards. Domain knowledge in installation, integration and maintenance of sensor systems onboard naval ships is considered to be essential for satisfactory completion of system commissioning and sea trials.

## **6. Submission of EOI**

Interested industries may write along with their company profile, financial & technical capabilities etc. as per the following format to Director, NPOL, Kochi and copy to Director DIITM on the following addresses within 45 days of this advertisement.

### **Director, NPOL**

DRDO, Min. of Defence,  
Thrikkakara P.O.  
Kochi-682021  
Contact No - 0484 2424878  
FAX : 0484-2424858  
Email: director@npol.drdo.in

### **Director, DIITM**

Room No 446 DRDO Bhawan  
DRDO HQrs Ministry of Defence  
RajajiMarg New Delhi – 110011  
Contact No - (011) 23016216 / 23007446  
FAX No. 011-23793008

The following documents are to be submitted along with EOI:

- a) Memorandum and Articles of Association (Should be incorporated as per Indian Companies Act, 1956)
- b) Certificates of registration as a manufacturing unit, if any.
- c) Balance Sheet for the preceding three years.
- d) Income Tax returns for the preceding three year period
- e) Details of shareholding/ownership pattern especially foreign partners/ shareholders, foreign employees, directors, etc. The company must adhere to the prevailing Govt. of India policies and regulations on Foreign Direct Investment (FDI)/DIPP norms as applicable.

- f) Annual budget for R&D during last three years.
- g) Numbers and details of IPR or patents etc. held by the company.
- h) Number of technically / professionally qualified personnel.
- i) Record of past performance (e.g. Supply orders executed against Ministry of Defence orders, public sectors and paramilitary forces, if any).
- j) Availability of adequate infrastructure (List of machines and their production capacities) and technical expertise.
- k) List of Testing and Support equipment.
- l) ISO/ ISI certification or any other certification
- m) Relevant clearances from the authorities/ ministries (if any)
- n) Capacity and capability to undertake large scale integration work of similar nature and to accept attendant financial and commercial risks.
- o) Capacity/capability to market the product through marketing network, sales and service network, reliability to maintain confidentiality.