Bharat Heavy Electricals Limited

(A Government of India undertaking)
ELECTRONICS SYSTEMS DIVISION
P. B. No 10010, Plot No. 98, Electronics City, Hosur Road,
Bangalore - 560 100

NOTICE INVITING EXPRESSION OF INTEREST FOR IPMS& IBS

EOI REFERENCE NUMBER
DE/ESD/EOI/IPMS-IBS

This document contains 21 pages

DISCLAIMER

The information contained in this Expression of Interest document (the "EOI") or subsequently provided to Applicant(s), whether verbally or in documentary or any other form, by or on behalf of BHEL or any of its employees or advisors, is provided to Applicant(s) on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided.

This EOI is not an agreement and is neither an offer nor invitation by BHEL to the prospective Applicants or any other person. The purpose of this EOI is to provide interested parties with information that may be useful to them in the formulation of their application for qualification pursuant to this EOI.

BHEL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Applicant upon the statements contained in this EOI.

The issue of this EOI does not imply that BHEL is bound to select and shortlist Applicants for next stage or to enter into any technology tie-up agreements with shortlisted Applicants for the Project.

The respondent shall bear all costs associated with the preparation, technical discussion/presentation and submission of EOI, the Purchaser/Consultant shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the EOI process.

Canvassing in any form by the respondent or by any other agency on their behalf may lead to disqualification of their EOI.

BHARAT HEAVY ELECTRICALS LIMITED

ELECTRONICS SYSTEMS DIVISION

INVITES EXPRESSION OF INTEREST FROM OEMs FOR

BUSINESS SHARING AGREEMENT

FOR IPMS /IBS FOR DEFENCE & COMMERCIAL SHIPS

CONTACT PERSON AND SCHEDULE OF EVENTS

Contact Person

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Schedule of Events

Last date for receipt of responses from prospective technology partners:	16:30 HRS IST, 30th November 2014
All corrigenda, addenda, amendments, clarifications, time extensions etc. related to this EoI will be hosted on	www.bhel.com and www.bheledn.com
Mode of Submission of Documents	In sealed cover to the contact person / mail to the e-mail ID so as to reach on or before the date mentioned above. The cover shall be super scribed with EOI Reference number and the words "Expression of Interest –IPMS & IBS". In case of response by e-mail, the words "Expression of Interest – IPMS & IBS" shall be in the Subject field of the e-mail & hard copy (printout) of the mail & all the attachment documents shall be sent to the contact person so as to reach on or before 7th December 2014

EXPRESSION OF INTEREST FOR BUSINESS SHARING AGREEMENT UNDER PHASED MANNER FOR MANUFACTURE, SUPPLY, TESTING, COMMISSIONING, MAINTAINING AND TRAINING FOR IPMS /IBS

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SECTION - 1

EXPRESSION OF INTEREST

1.1 ABOUT BHEL

Bharat Heavy Electricals Limited (BHEL) **(www.bhel.com)**, a Government of India Undertaking and a Maharatna Company, is an integrated power plant equipment manufacturer for both Indian and export markets. It is one of the largest engineering and manufacturing enterprises in India with annual revenue of over INR 400 Billion (US$ 6.6 Billion). About 63% of the equity in BHEL is owned by the Government of India.

Established in 1964, BHEL is India's largest engineering and manufacturing company of its kind engaged in the design, engineering, manufacture, construction, testing, commissioning and servicing of a wide range of products and services for the core sectors of the economy, viz. Power, Transmission, Industry, Transportation, Renewable Energy, Oil & Gas and Defence. With a widespread network of 17 manufacturing units, two repair units, four regional setups, eight service centers, eight overseas offices, 15 regional centers, seven joint ventures and infrastructure to execute more than 150 project sites across India & abroad, BHEL provides products, systems and services to customers efficiently and at competitive prices. The Power sector covers generation, transmission and distribution equipment for hydro, fossil, and gas fuels. BHEL has been in this business for nearly 50 years and has supplied equipment that accounts for 64 % of the total thermal generating capacity in India. The high level of quality & reliability of our products is due to adherence to international standards by acquiring and adapting to some of the best technologies from leading companies in the world including General Electric Company, Alstom SA, Siemens AG and Mitsubishi Heavy Industries Ltd., together with technologies developed in our own R&D centers.

The annual turnover of BHEL for the year 2013-14 was US $ 6.6 Billion with a profit before tax of US $ 822 Million. BHEL's highly skilled and committed manpower of about 47500 employees, the best of manufacturing facilities and practices together with the latest technologies, has helped BHEL to deliver a consistent track record of performance. With the current order book exceeding US $ 16 Billion, BHEL is poised for excellent future growth. More details about the entire range of BHEL's products and operations can be obtained by visiting our web site www.bhel.com.

1.2 ABOUT ELECTRONICS DIVISION & ELECTRONICS SYSTEMS DIVISION

Electronics Division (EDN) **(**www.bheledn.com**)** along with its Electronics Systems Division (ESD) situated in Bangalore is a leading supplier of new generation power plant, automation and control systems. EDN has also emerged as a leading player in the field of power transmission and distribution, industry, transportation and renewable energy sources. The state of the art equipment and systems manufactured meet the demanding requirement of both the national and international markets in terms of technical specifications and quality.

This Division has established references both in India and overseas by successful installation of power plant automation and photo voltaic systems. Besides providing unified solutions for various control systems application, EDN proudly holds the largest market share for power plant automation systems in India. Further, it has been accredited with Quality Management Systems (ISO 9001), Environmental Management Systems (ISO 14001), Occupational Health & Safety Management Systems (OHSAS 18001) and ISMS (ISO 27001) certifications.

Electronics System Division (ESD) which is a part of EDN, is located at Electronic City, Hosur Road, Bangalore and has an area of 12.4 acres. Presently the unit manufactures Defence Electronics Products, Control Equipment for power plants, Naval automation systems, Space batteries and Solar Space panels. Defence Electronics Group which operates from ESD has executed a number of projects relating to Simulators for Defence applications like Infantry Weapons Effects Simulation System (IWESS), Small Arms Training Simulator (SATS) and Tactical Training Simulators for T-72 Tanks etc.

Presently ESD is engaged in design and supply of IPMS (Integrated Platform Management System) for Naval Ships. Auxiliary Control System (ACS) for P15A Destroyer Class of Ships and IPMS for P71 Indigenous Aircraft Carrier are the present contracts which are under execution.

1.3 BHEL's EXPERIENCE IN IPMS & IBS

Since 2006, the Defence Electronics group at ESD started addressing IPMS requirements of Indian Navy as a qualified vendor of IPMS & IBS. In partnership with an OEM, BHEL had won the tenders for supply of Auxiliary Control System (ACS) for P15A-Destroyer class of ships and Integrated Platform management system (IPMS) for P71-Indeginous Aircraft Carrier. These two projects are currently under execution.

1.4 EXPRESSION OF INTEREST (EOI)

BHEL proposes to address the present and future IPMS & IBS requirements of Defence & Commercial Ships from its Electronics Systems Division (ESD) located in Electronics City, Bangalore. This EOI is published for seeking responses from Original Equipment Manufacturers (OEMs) who are willing to be associated with ESD to enable it to meet the above objective on Business Sharing basis through a business sharing agreement (BSA) and training of BHEL engineers for long term service support. The business association shall also be governed by Indian MOD's Defence Procurement Procedure 2013 and its offset policy and subsequent amendments issued from time to time.

1.5 A COLLABORATIVE APPROACH

BHEL intends to have a long term association with the prospective technology partner to enable it to promote and bid for IPMS and IBS tenders.

1.6 BUSINESS MODEL

BHEL proposes to have an association with the Respondent (i.e. prospective Business partner) who shall be responsible to the Customer jointly with BHEL for the design, procurement of components and sub-systems, overall system integration, testing (Functional & Type Tests), commissioning and also shall be responsible for the successful Acceptance (including field trials), guarantee and warranty obligations & long term support.

1.6.1 Business Sharing Agreement (BSA)

In the BSA model, the Respondent shall offer/ develop / customize IPMS/IBS in association with BHEL to meet Customer requirements. All the information related to design manufacture, inspection, testing, commissioning, trouble shooting, servicing/maintenance, quality assurance methods, training, etc., for the complete IPMS/IBS including hardware and software will be shared with BHEL. No separate charges/fees/cost shall be payable for sharing this information/association. BHEL and the prospective OEM shall mutually agree on a workshare for each business opportunity/tender/project based on each other's strengths in system design/ software/ hardware/ manufacturing/ testing/ installation/ commissioning/post-sales support etc.

1.7 TYPICAL REQUIREMENTS

Indicative Typical requirements of IPMS and IBS, is covered in Section – 2. However, the Respondent is requested to provide detailed specifications to

achieve the objective of BSA. Also respondents are requested to indicate if they are OEM for IPMS alone or IBS alone or for both IPMS and IBS.

1.8 METHODOLOGY OF BUSINESS ARRANGEMENT BETWEEN BHEL AND PROSPECTIVE BUSINESS PARTNER WHO IS AN OEM

IPMS/IBS systems comprise of 3 types of items:

A. Items in the manufacturing range of the prospective business partner (OEM) and manufactured at their works or at their sub-contractors' works, either at a single location or at multiple locations for which technology has to be provided for the entire product life cycle to BHEL to enable BHEL to provide long term product support.

B. Items other than (**A**) above to be procured by BHEL-ESD. The specifications for these items are to be given by the prospective technology partner.

C. Items bought-out by the prospective technology partner for integration: For these items, complete technical details to be provided by the partner including acceptance criteria and type tests specifications etc.

In all the above cases, any customization required has to be mutually worked out on case to case basis.

1.8.1 Typical Arrangement

The prospective business partner shall be the Technology leader and shall indicate in their response to this EOI the proposed arrangement for information sharing to BHEL-ESD along with the milestones and time frame.

This shall however be mutually discussed considering the long term support implications at the time of entering into a final agreement.

1.8.2 Information Sharing

In response to the EOI, the prospective technology partner shall clearly state his willingness to share the following with BHEL-ESD.

a. Provide marketing support and assist in the bidding process to receive maximum business

b. Engineering information and selection criteria of all bought-out components (Recommended third party vendors database).

c. Complete Technical documentation for manufacture of various PCBs and sub-assemblies including processes employed, testing methods flow chart & source

code of all software & firmware shall be provided through BHEL as required by the Customer. The software must have provision for fine-tuning and customization to suit the end user's requirements.

d. Details of special purpose equipment for design platform, engineering platform, Manufacturing, testing commissioning, servicing at both sub-assemblies and system level.

e. Training, deputation of OEM's experts and assistance in system design, manufacturing and testing of the equipment and software, know-how and know-why to enable BHEL to provide long term product support.

f. Support for commissioning, deputation of OEM's experts and training of BHEL-ESD engineers and Customer Engineers for operating, maintaining and troubleshooting the equipment at site.

g. Technology upgrades including addressing of obsolescence issues covering all the above for a mutually agreed period.

h. A commitment has to be given by the prospective BSA partner for long-term association with BHEL-ESD. The prospective BSA partner shall forward details regarding methodology and duration for which they can provide support.

i. All equipment approvals have to be routed through BHEL-ESD, including the Detailed Design Documents and Quality Documents.

j. Exclusive rights to be given to BHEL to modify hardware/ software beyond partnership period, on no charge basis.

k. If any equipment needs Type tests (Environmental, EMI/EMC and any end equipment specific tests), a copy of Type test certificates or type test procedures to be provided by the prospective business partner.

l. The prospective technology partner shall provide details of all the standards followed for the hardware & software used in their products.

m. Repair, trouble-shooting procedures, database of failures, MTBF and reports of site returned modules, User/Operator manual, maintenance and engineering Manuals to be provided so as to enable BHEL to provide product support to Customer.

1.9 RESPONSE TO THE "EXPRESSION OF INTEREST" – (EOI)

BHEL-ESD will analyze the responses received towards this EOI to shortlist prospective Business partners.

A separate Request for Quotation (RFQ) along with detailed Technical and Commercial Specifications will be issued to these shortlisted business partners for submitting Techno-Commercial and Price offers.

1.9.1 Qualifying Requirements

Only OEMs meeting the Qualifying Requirements (QR) as described in Section–3 may respond to this Expression of Interest and will be considered for further evaluation.

1.9.2 Checklist of Documents

The information required to be submitted along with the EOI by the interested OEMs are given in Section–5.

SECTION - 2

TYPICAL REQUIREMENTSFOR IPMS / IBS:

2.1 GENERAL REQUIREMENTS:

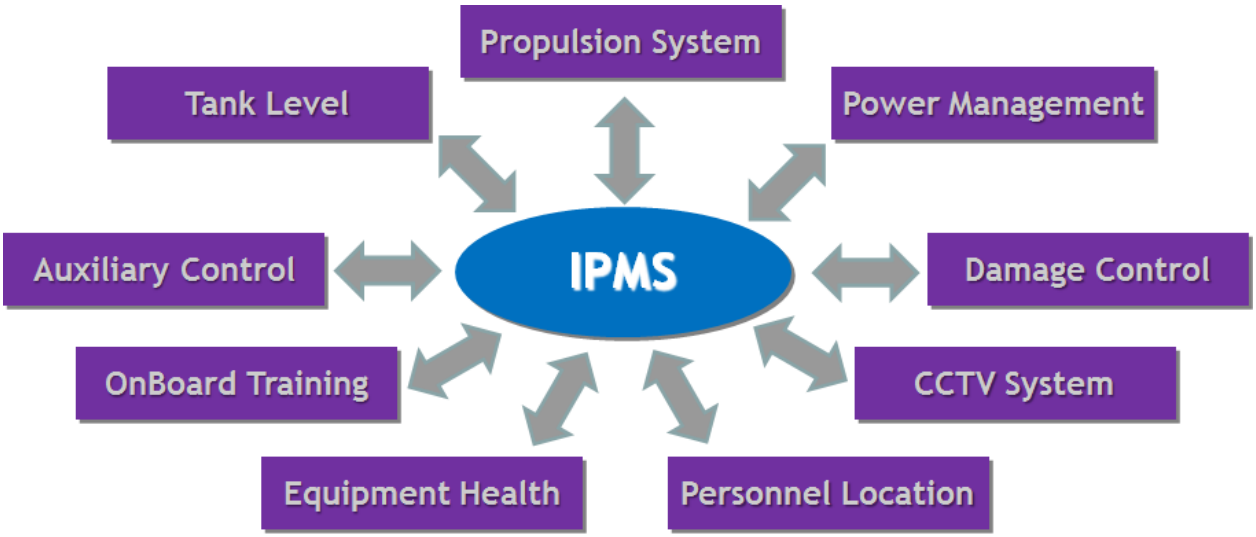
INTEGRATED PLATFORM MANAGEMENT SYSTEM (IPMS)

IPMS is a fully integrated Open-Architecture distributed Control System used on board ships and submarines for real time monitoring and control of various ship subsystems.

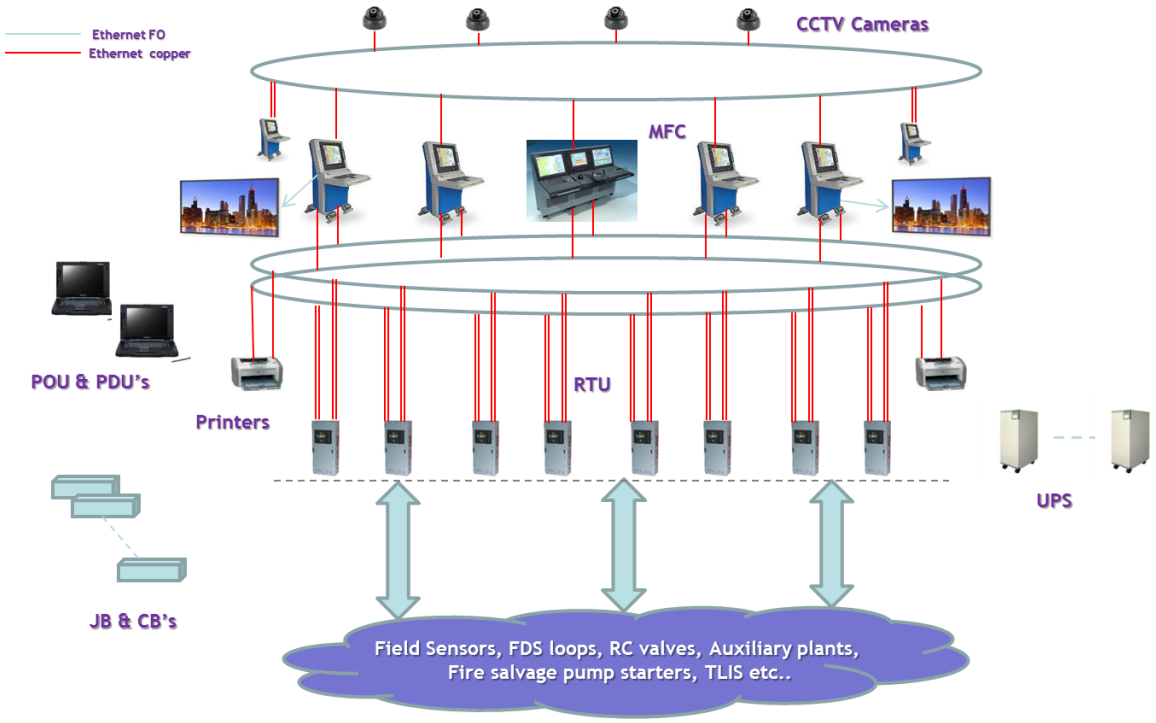
Main Design Features Of IPMS:

- It is a fully integrated, open-architecture, microprocessor based distributed control system.
- A single failure in the system will not degrade the control and monitoring function.
- Built-in system redundancy ensures that the vital monitoring and control functions remain operative when the system is exposed to adverse operational conditions.
- Gigabit Fiber optic (FO) network back-bone with Hot standby.
- Independent network for training and video streaming.
- The modular design of Hardware and software cater for maximum maintainability, operational flexibility, system growth and obsolescence.
- In the event of degradation of system through multiple failures, continuous operations of vital functions are maintained.
- The system is easily expandable and reconfigurable to accommodate changing operational upgrades. Ability to upgrade the system –in-service.
- The equipment comprising the IPMS has a small footprint that provides significant weight and space advantage.
- Hardware with necessary compliance to EMI/EMC and shock as per standards laid down by the prospective customers.
- Provision for Built-In-Test- Equipment (BITE).
- Capability to integrate 3rd party hardware and software.
- Compliance to MIL standards/ JSS55555 standards (hardware & software).
- Condition based maintenance for on-board equipment.

POSSIX compliant Real Time Operating System (RTOS) for RTUs



Block Diagram of IPMS



IPMS – Typical Architecture

The IPMS consists of the following sub-systems:

1) **Propulsion Control System:**

The main aim of the Propulsion Control System is to Control & Monitoring of Main Engines, Controllable Pitch Propeller and Reduction Gearbox with associated Auxiliary Equipment.

2) **AutomaticPower Management System:**

Fully automated control of Generator Engine System (comprising of Diesel Generators and Alternators), their synchronisation, continuous parallel operation, load management by automatically cutting in/cutting off of generators, monitor status of large electrical loads, carry out load shedding in case of failure of DAs, blackout management and, monitor the distribution system.

3) **Auxiliary Systems:**

For control and monitoring of AC Plants, Refrigeration Systems, Air Compressors, Steering Gear, Reverse Osmosis Plants, Oily water Separator, Centrifuges, and various other ship systems.

4) **Battle Damage Control System (BDCS) & Stability Management:**

For evaluation of ship stability with recommendations for counter-flooding; to aid decision making process during damage control operations. It also includes an integrated fire/smoke/flood detection system.

5) **Equipment Health Monitoring System (EHMS):**

The system shall be programmed to record all Operating Information, Alarms & Warnings. It can gather and display vibration data from propulsion machineries.

6) **Tank Level Indicator System (TLIS):**

TLI system indicates the fluid volume in various tanks & spaces, onboard ship. There are a number of tanks of varying capacities.

7) **On-Board Team Training System (OBTS):**

The OBTS allows any console or group of consoles to be placed in seamless training mode, and respond as if in normal operational mode, except that they are to interact with a simulator rather than with the ship's machinery. The IPMS can include an advanced OBTS capability whereby the operator consoles can

also operate in training mode. All of the operator consoles can be placed in training mode to facilitate full-mission team training on board the ship.

8) Uninterruptible Power Supply (UPS):

These are provided for continuous operations of all vital IPMS equipment, sensor excitation and actuator drive, in the event of loss of ship's power. They have back-up time of about 30 minutes.

9) CCTV System:

The CCTV System is on a separate FO Gigabit Network to monitor the machinery spaces, flight deck and hangar areas or other areas, which require monitoring and not normally manned.

10) Personnel Location Monitoring System (PLMS):

For identifying the location of ship crew to assist in proper management of damage scenarios. It consists of active type RFID tags with readers.

IBS (Integrated Bridge System):

IBS is a combination of systems which are interconnected in order to enable centralized access to sensor information or command/control from various workstations thereby enhancing navigational capability and safety of the ship. The system should be able to collect process and present the navigational and other relevant data to improve the efficiency of the ship's navigation and safety at sea.

The IBS will be integrated with the following ships systems:-

(a) Ring Laser Gyros

(b) Echo Sounder

(c) Anemo meter

(d) EM Log

(e) GPS

(f) Steering System with Autopilot

(g) Analog video of Navigation radar:

(h) Radar Data Distribution Unit (RDDU)

(i) Ship's Data Network (SDN)

(j) Automatic Identification System (AIS)

(k) Integrated Platform Management System (includingCCTV)

(l) Radio Receiver Beacon (RRB)

(m) Transmitting Magnetic compass.

The IBS shall be one integrated, distributed architecture system covering all systems mentioned above including specific features such as On-Board Training System (OBTS), Equipment Health Monitoring (EHM), Online Stability Calculation etc. It is essential that the hardware and software should be compliant to open architecture standards and will not include any proprietary design or Operating Systems. In particular, proprietary designs such as Programmable Logic Controllers (PLC's) shall not be used. The system should be based on following key principles:-

(a) Seamless integration

(b) Uniform presentation of information

(c) Uniform principles of operation

(d) User simplicity to avoid human error

(e) Multi Function Workstations

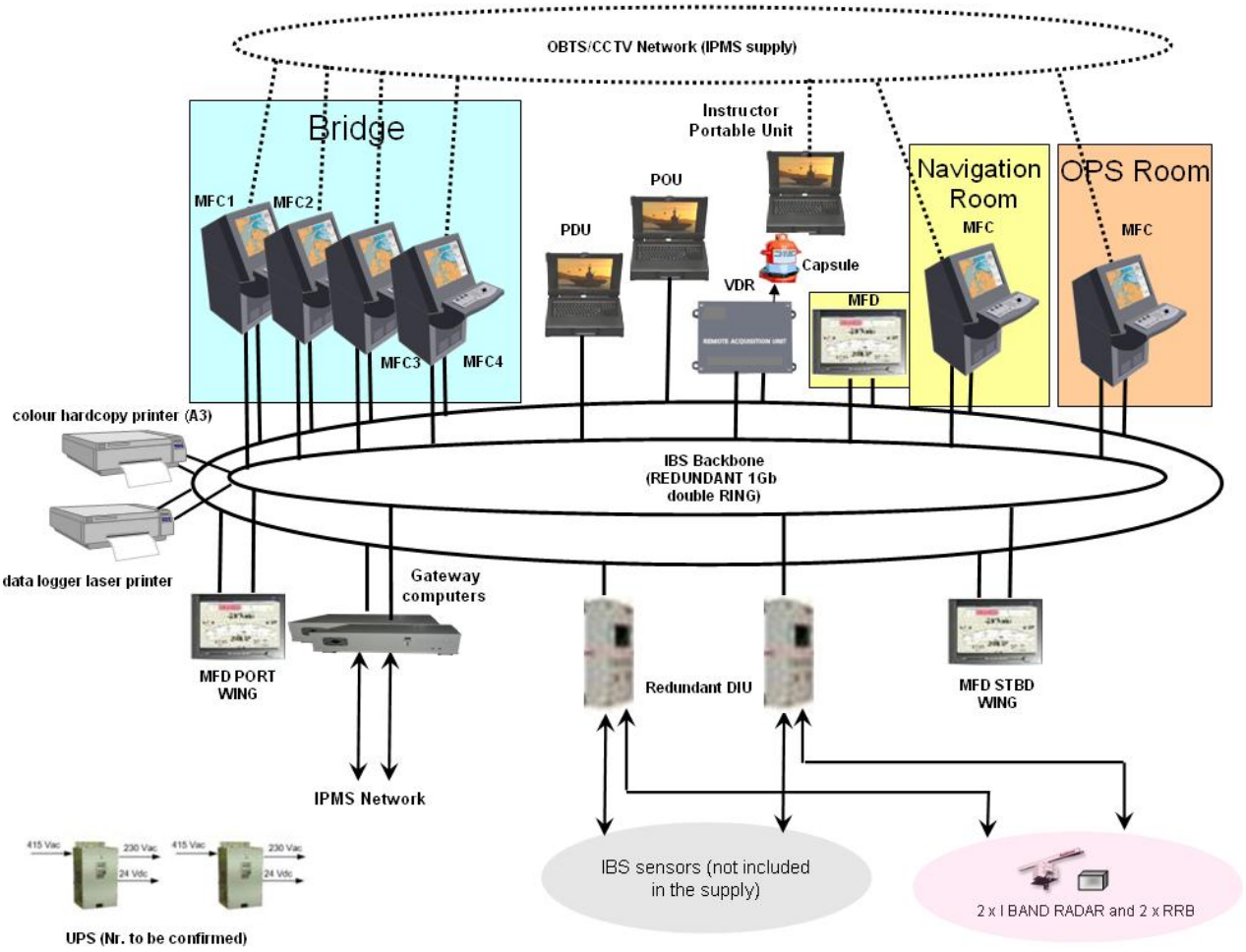
(f) Multi redundant system

(g) COTS equipment/ease of maintenance

(h) Master-Master communication (not Client-Server)

The IBS will consist of multi-functional workstations connected by a dual redundant Gigabit Ethernet network, each being able to function as any main navigational system selectable on a menu, i.e. ECDIS, RADAR, conning Display and Automation/Safety/Alarm Monitoring. All the Navigation Systems and Sensors are to be integrated into the IBS Network, allowing operation, and monitoring and alarm identification on any of the Multi-Function Consoles (MFC). The track filed at a is required to be provided to the Ship's Data Network (SDN) for onward transmission to others ink equipment onboard.

A Typical IBS Architecture



SECTION - 3

QUALIFYING REQUIREMENTS

3.1 Technical Capability

The Prospective Business Partner shall be an OEM who has designed, manufactured, supplied and commissioned IPMS/IBS to any major countries. The Prospective Business Partner shall indicate the Type & Quantity of such systems supplied in the last 10 years against commercial orders. This data may be furnished as per the format below:

PROFORMA FOR PROSPECTIVE TECHNOLOGY PARTNER'S QUALIFYING EXPERIENCE

SL. NO.	CUSTOMER NAME, ORDER REFERENCE & DATE	ITEM DESCRIPTION	QTY	CUSTOMER'S CONTACT DETAILS • NAME • DESIGNATION • PHONE NO. • FAX NO. • EMAIL ID	DATE OF SUPPLY/ COMMISSIONING	PERFORMANCE CERTIFICATE FROM CUSTOMER REGARDING SATISFACTORY PERFORMANCE

3.2 Information Transfer

Prospective Business Partner should be willing to transfer the information/software related to sourcing, inspection, testing, commissioning, trouble shooting, servicing/maintenance, quality assurance methods etc., for the systems. Specific confirmation on the points listed in Section–1, Cl. 1.8 are to be furnished.

SECTION – 4

COMPANY PROFILE

4.1	**GENERAL INFORMATION:**
4.1.1	NAME OF COMPANY (ownership details for the last 5 years):
4.1.2	DETAILS OF HEAD OFFICE: ADDRESS: TELEPHONE: FAX: E-MAIL: WEB SITE: NO. OF COUNTRIES OPERATING FROM:
4.1.3	DETAILS OF FACTORY / WORKS: ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.4	DETAILS OF MARKETING AGENT (OUTSIDE INDIA, IF ANY): ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.5	DETAILS OF INDIAN AGENT, IF ANY: ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.6	CHIEF EXECUTIVE:

4.1.7	CONTACT PERSON(S) FOR PRODUCT OFFERED: NAME(S): DESIGNATION: ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.8	YEAR OF ESTABLISHMENT:
4.1.9	PRODUCTION CAPACITY PER ANNUM FOR IPMS/IBS: (Manpower in design, R&D, manufacturing, testing, QC and after sales support)
4.1.10	PARTICULARS OF PRODUCT INCLUDING SPECIFICATION AND RANGE: (ATTACH BROCHURES AND CATALOGUES) Compliance to international standards such as ISO, IEEE, MIL
4.2	**COUNTRY OF ORIGIN FOR OFFERED PRODUCTS AND TECHNOLOGY**
4.3	**FINANCIAL INFORMATION:**
4.3.1	ANNUAL TURNOVER AND PROFIT-AFTER-TAX FOR LAST 3 YEARS: (attach copies of audited Balance Sheet and Profit& Loss Account) YEAR – 2011: YEAR – 2012: YEAR – 2013: (Break-up of overall revenue and revenue from IPMS /IBS)
4.3.2	DUNN AND BRADSTREET REPORT FOR THE COMPANY
4.4	**QUALITY AND ENVIRONMENTAL MANAGEMENT SYSTEM:**
4.4.1	IS THE COMPANY ISO:9001 OR EQUIVALENT CERTIFIED : YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.4.2	IS THE COMPANY ISO:14001 OR EQUIVALENT CERTIFIED : YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.4.3	IS THE COMPANY OHSAS 18001 OR EQUIVALENT CERTIFIED: YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE

4.4.4	IS THE COMPANY ISO 27001OR EQUIVALENT CERTIFIED : YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.5	**EXPERIENCE LIST FOR OFFERED/SIMILAR ITEMS**
4.6	**LIST OF SOFTWARE COMPLIANCE STANDARDS FOR DEVELOPMENT, DESIGN, TESTING AND LIFE CYCLE MANAGEMENT**
4.7	**ANY OTHER INFORMATION**

SECTION – 5

CHECKLIST OF DOCUMENTS TO BE SUBMITTED AS RESPONSE TO EOI

Information/documents to be provided along with response to Expression of Interest:

Sl. No.	Information / Document	Compliance
1	Covering Letter signed by an Authorized Signatory on Company letterhead, listing clearly the Enclosures.	Yes / No
2	Catalogue of IPMS / IBS	Yes / No
3	Technical Write-up describing features for IPMS / IBS	Yes / No
4	Reference list of systems supplied/commissioned	Yes / No
5	Acceptance for Business Sharing Agreement (BSA)	Yes / No
6	Organization Chart	Yes / No
7	Details required in Section–1 – Clause 1.8.1	Yes / No
8	Details required in Section–1 – Clause 1.8.2 – a to k	Yes / No
9	Filled-up Qualifying Criteria Format – Section–3	Yes / No
10	Filled-up Company Profile – Section–4	Yes / No