

TENDER SPECIFICATION OF SONAR SIMULATOR (QUANTITY- 01 SET)**SECTION-A: GENERAL INFORMATION**

1. **Name of the Equipment.** Sonar Simulator.
2. **Quantity.** 01 (One) Complete set.
3. **Installation Site.** The Sonar Simulator with required features, configuration, software application and associated accessories shall be installed in a Naval Base (SMWT, Chattogram) of Bangladesh Navy (BN) as Turn-Key basis. The term 'Turn-Key' basis means the Bidder/Supplier shall be responsible for system design, manufacture, supply of equipment and software, installation at designated site of BN, commissioning of overall system, tests & trials, training and handing over to the Purchaser for immediate operation.
4. **Purpose.** The Sonar Simulator will be used for the training of BN Sonar operators and junior officers on the operation of sonar and conceptualization of underwater acoustic environment. The aim is to give the trainees a comprehensive and realistic concept about the Sonar, its operation and under-water acoustic environment in anti-submarine warfare role as a whole. The proposed system shall be a multi-platform sonar simulator able to simulate multiple scenarios and with a means to detect, identify, track and classify underwater target including features of underwater weapon firing means. The simulator shall physically look like the sonar system of modern warships with video display and audio simulation simultaneously, so that trainees can feel realism in simulation.
5. **Brand.** To be mentioned.
6. **Model.** To be mentioned.
7. **Year of Manufacture.** 2024 or later (To be mentioned).
8. **Country of Origin.** Australia, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Finland, Norway, Spain, Switzerland, Sweden, Turkey, UK and USA.
9. **Country of Manufacture.** Australia, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Finland, Norway, Spain, Switzerland, Sweden, Turkey, UK and USA.
10. **Manufacturer.** Name & Full Address with telephone number and e-mail of Manufacturer are to be mentioned.
11. **Bidder/ Supplier.** Name & Full Address with telephone number and e-mail of bidder/ supplier and local agent are to be mentioned.
12. **Local Agent.** Name & Full Address with telephone number and e-mail of supplier and local agent are to be mentioned.
13. **Simulation Standard.** The Sonar Simulator shall comply with HLA and DIS standard at least. The design, development, operation and functional configuration of the simulator and its sub-system shall conform to the standard of the relevant aspect of IEEE, IEC, DNV, etc. as applicable. The applicable standard(s) of the simulator and each offered item are to be mentioned and should be well supported by the Original Equipment Manufacturer (OEM) brochures/ certificates.

14. Qualification of Bidder/ Supplier.

- a. Manufacturers of Sonar Simulator/ Naval Simulator or their authorized distributor/ agent can submit offer as Bidder/ Supplier through their authorized local agent enlisted at DGDP, Bangladesh. In case of offer from distributor/ agent, relevant certificate of dealership/ agency ship from OEM is to be submitted with the offer.
- b. The Manufacturer shall have at least 05 (five) years working experience on developing, manufacturing and supplying sonar simulator and supplied, installed, commissioned, and maintained such simulators in at least 03 (three) different maritime forces (Navy/ Coastguard or equivalent) around the world. Relevant documents/ certificates are to be submitted with the offer.
- c. Bidder/ Supplier's qualification shall necessarily be satisfied by relevant documentation such as client list, ISO 9001 certification/ CMMI Level 3 certificate, compliance statement and at least 03 (three) client's list with name, postal address, email address and telephone number. Relevant documents/ certificates are to be submitted with the offer.
- d. Bidder shall have the capability to provide local presence and service support team for maintenance and operational support as and when required by BN during warranty period. Bidder shall provide certificate in this regard mentioning the response time and procedure for such support.

15. Bidder's Responsibility.

- a. The Bidder is to submit their offer in the double envelopes system as per the DGDP's rule namely Technical Offer and Financial Offer.
- b. It is the responsibility of bidder to have a valid Government Assurance Certificate that there is no restriction from the respective Government to export the offered system and its ancillary equipment to Bangladesh and export permit shall be issued to the bidder if the contract is awarded (if applicable).
- c. Bidder shall quote all main equipment and optional equipment as mentioned in section-B in foreign currency (USD/Euro/GBP) on Free on Board (FOB) basis. However, equipment, hardware, furniture, accessories supplied from local market are to be quoted in local currency. If any other item to be imported from foreign market, their price also needs to be quoted in foreign currency. However, price of optional items shall not be considered as criteria for selecting the lowest bidder. BN reserves the rights to select all/ partial / none of the optional items.
- d. Bidder is to comply with all clauses of this tender specification. The bidder is to submit full specification and relevant documents, latest brochures of the items and system along with the offer. The information in brochures needs to be self-explanatory and must support and validate the information mentioned in the tender specification. Deviation or variation of information between the brochure and formally offered documents would be treated as non-compliance.
- e. Bidder is to provide the detailed explanation of the technical and cross reference to relevant pages of their offer/ original supporting documents. The bidder is to provide

performance /technical data, specific figures and information as asked against each condition of tender specification.

f. The bidder may request for clarifications on any issue relating to the information contained in the tender specification from NHQ (Directorate of Naval Training) in writing with an information copy to DGDP.

g. All items proposed/supplied under this tender specification are to be brand new with original packing. Necessary certificates in this regard are to be provided at the time of delivery. Newly developed product under trial will not be accepted. The strict compliance of this article is to be ensured by the Bidder.

16. **Pre-Bid Meeting.** The Bidder shall attend a pre-bid meeting at NHQ within 03 weeks from the day of floating the tender by DGDP. In that case, Bidder is to submit necessary information and bio-data including photography and passport information of the team to NHQ (Directorate of Naval Training) at list two weeks before the meeting for arranging necessary security clearance. The date and time of the Pre-Bid meeting shall be informed to all concerned.

17. **Pre-Bid Site Survey.**

a. The Bidder or their representative shall conduct a pre-bid site survey with prior permission and on pre-agreed schedule from NHQ to assess/ determine precisely the action required for the installation of the offered Simulator and its ancillary equipment at the designated site. The Bidder shall assess all the installation requirements for the Simulator which may include the site preparation works such as earthing, laying of Inter-facility link (IFL) cables in conduit metal pipes, necessary foundation, civil engineering, electrical, lightning protection and other works.

b. The Bidder may submit a site survey report (optional). Site survey report shall contain detail information including layout plan for Simulator, Indoor equipment, power arrangement, Network management, Briefing Room, Instructor Room, Server Station, etc. The Site Survey report may be submitted with the offer for evaluation. The Bidder shall submit necessary information and bio-data including photography and passport information of the site survey team to NHQ at list two weeks before the date of site survey for arranging necessary security clearance.

18. **Presentation By Bidder.** The Bidder may be required to give a presentation at NHQ (or through online) on their tender offer as desired by BN any time after submitting the offer at Bidder's expense. The presentation shall cover detail aspects, which have been covered in the Bidder's proposal for clarity.

19. **Additional Feature offered by Bidder.** The Bidder may offer additional features which are not asked in the tender specification. In this case, Bidder shall explain the detailed advantage of that/ those features.

20. **Project Schedule.** Project schedule including timeline for manufacture, assembly, development, site preparation, installation of hardware, integration, configuration, testing and commissioning is to be submitted with the offer.

21. **Evaluation Procedure.** The offer submitted by the Bidder(s) shall be evaluated based on following elements:

- a. Compliance to eligibility criteria for bidding.
- b. Compliance to the Tender Specification.
- c. Financial Competitiveness of the Offer.

22. **Compliance Statement.** Bidder shall mention compliance/ non-compliance against each condition/ article. A compliance statement fulfilling all the requirement of the tender specification is to be submitted with the tender offer for evaluation. BN preserves the right to reject those offers which merely mention 'Complied/ Agreed' without highlighting required information/ data/ figures/ graphs as asked against each condition. Stating mere 'Yes or No' will not suffice and detailed evidences with description/ information, brochures/ booklet, drawing and diagram as required is to be given. An incomplete compliance statement may attribute to cancellation of the offer. If any clause of this specification does not commensurate with the offered Simulator, the deviation has to be spelt out clearly. Bidder shall comply all the terms and conditions of the tender specification as per below compliance statement tabular format:

Tender Article No	Description of Tender Terms and Condition	Compliance/Remarks by Bidder

SECTION-B: TECHNICAL SPECIFICATION

23. **Name of the Equipment.** Sonar Simulator.

24. **Quantity.** 01 (One) Complete set.

25. **Scope of Supply.** The offered Sonar Simulator shall be scalable system, which is to be offered as "Turn-Key" basis. The scope of supply is as follows, but not limited to:

- a. 01 x Complete set of Sonar Simulator with Server, Software and Associated accessories consisting of followings:
 - (1) 01 x Instructor Console with multiple monitors and necessary equipment.
 - (2) 20 x Student/Operator Consoles with dual monitors having underwater weapon firing features and necessary equipment.
 - (3) 01 x Briefing/ De-briefing Station with necessary equipment.
 - (4) 01 x System Server with RAID system and necessary equipment.

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- (5) 01 x Database Management Station and necessary equipment.
 - (6) 01 x Game Testing Station with necessary equipment.
 - (7) 02 x WADER System version v9 or latest (Sonar Range Prediction and Global Ocean Information System).
 - (8) 01 x Set of Communication Devices and CCTV Monitoring System with necessary equipment.
- b. Installation, Supervision, STW and Commissioning (as per paragraph 73).
 - c. Test, Trail and Final Acceptance (as per paragraph 74).
 - d. Training (as per paragraph 64-67).
 - e. Spares and Tools (as per paragraph 55 and 56).
 - f. Backup Software and Manuals (as per paragraph 54 and 69).
 - g. Auxiliary/ Ancillary Equipment (as per paragraph 57).

System Specification of Sonar Simulator

26. **System Features.** The simulator will provide following facilities, but not limited to (details to be mentioned in the tender offer):

a. The system shall realistically simulate all kinds of surface platform, sub- surface platform and air platform based Sonar(s) according to their type and configuration in all environment of sea. Some variants of Sonar are as follows, but not limited to:

- (1) Hull Mounted Sonar (HMS).
- (2) Variable Depth Sonar (VDS).
- (3) Dipping Sonar.
- (4) Towed Array Sonar.
- (5) Flank Array Sonar.
- (6) Conformal Array Sonar.
- (7) Mine Detection Sonar.
- (8) Mine Avoidance Sonar.
- (9) Sonobuoy.
- (10) Interceptor Sonar.

b. The Simulator shall render video display and audio simulation of the simulated signals of all kinds (own platform, background noise, sea noise target platform, shipping, reverberation, noise maker, ping generator, instructor/operator deployed/fired underwater weapon/ decoy, etc.) along with the realistic under-water environment

picture in both active and passive mode. The video and audio signal presentation shall be the result of the outcome of sonar equation and probability of detection.

c. The system shall provide some degrees of difficulties in a realistic way to detect, track, identify and classify the target of interest by sonar operators who will use active, passive and audio means including secondary information obtained from instructor source.

d. The system shall provide facilities for the development, conceptualization, validation and sonar equation assessment of realistic scenarios (involving sonar, own platform, targets, sea-area, environment, etc) using main simulator as well as game testing station.

e. The system shall provide facilities of sonar range prediction and global ocean information system (WADER Software version v9 or latest) so that BN personnel can use global environment data (sea-state, water column and bathymetry data along with use-supplied acoustic parameters) to generate propagation loss data and calculate sonar performance/ probability of detection. It shall be used for analysis, validation and training purpose and development of exercise.

f. The system shall provide a facility of weapon firing features in operator console along with other features. This feature shall be used for training on target detection, tracking, weapon parameters setting and firing on the target of interest. In case of torpedo simulation after firing, the torpedo should behave underwater as per standard weapon (search path, attack phase, homing phase, etc).

g. The system shall provide facilities to enable instructors to generate and distribute the computer based training (CBT) lessons on sonar theory, sonar technology, system, environment parameters, etc to the operator console through network with the scope of assessment of their knowledge through quiz. A good quality lesson items shall be stored at server for such purposes. The details of CBT lessons and facilities to be mentioned.

h. The system shall have the facility to run a separate exercise in each operator console (maximum 10 at a time) or to involve multiple operators in the same scenarios. It shall have the option to monitor any trainee console in real-time, record all data and replay facility for further analysis and effective de-brief session.

j. The system shall be capable to operate at least 12 hrs/day (extensive simulation use) on 24/7 basis with a minimum of 10 years effective working life.

27. **Sonar as Sensor**. The system shall provide facilities to design and select specific sonar, and set its physical and acoustic sonar parameters (SL, beam shape, beam width, DI, beam steering, operating frequency, receiver bandwidth, display processing, system gain, DT, receiver sensitivity, etc.) according to type of Sonar and the Platform where they are installed. These parameters will affect sonar range and performance prediction and probability of detection like real sonar according to sonar equation (SE) and sonar theory. As an example, once TAS is selected, the system shall have the option to change its length, number of active elements, their spacing, grouping, depth of operation, operation mode according to configuration, etc in addition to other sonar parameters so that the simulator generates realistic sonar transmission and reception beam according to selected options. The system

shall provide default values of sonar parameters according to its type, construction and configuration. The instructor and designer should be able to change the default values within a limit. During operation of Sonar, the operators shall be able to change few parameters as available in sonar display console. The system shall allow to simulate various types of sonar as mentioned at paragraph 26.a. The details of above are to be mentioned in the tender offer.

28. **Active Sonar Processing and Simulation.** The active Sonar processing and simulation should process and demonstrate at least the following aspects according to selected sonar type, construction and composition, but not limited to (details to be mentioned in the tender offer):

- a. Sonar operation facilities (realistic operation like on-off, start tx, frequency selection, mode of operation selection, SL adjustment, ripple tx, sector tx, etc).
- b. Active realistic detection to provide bearing, range, doppler and echo amplitude of targets surrounding own ship.
- c. Active auto detection and tracking.
- d. Active sector search for target detection, identification and classification.
- e. Detection of mines.
- f. Acoustic echo analysis.
- g. Display of the sound ray trace and sound intensity distribution.
- h. Propagation prediction facilities.
- j. Torpedo warning facilities.
- k. Active-Passive parallel operation.
- l. Active Plan Position Indicator (PPI) Display, A-Scope, B-Scope Display facilities as applicable.

29. **Passive Sonar Processing and Simulation.** The passive Sonar processing and simulation should process and demonstrate at least the following aspects according to selected sonar type, construction and composition, but not limited to (details to be mentioned in the tender offer):

- a. Sonar operation facilities (realistic operation like on-off, mode of operation selection, gain control, etc).
- b. Passive realistic surveillance facilities with broadband, narrowband, cavitation noise and tonal noise analysis facilities.
- c. Passive auto detection and tracking.
- d. Acoustic echo analysis.
- e. Passive ranging facilities.

- f. Torpedo warning facilities.
- g. Contact motion analysis facilities.
- h. Intercept operation.
- j. DEMON, LOFAR, PRS, Intercept, BTR (Bearing Time Record) Waterfall, etc analysis facility as applicable.
- k. Frequency Analysis Display (FAD) presentation.

30. **Own Platform.** Own platform shall impact Sonar performance according to its self-noise, radiated noise, hydrodynamic noise (flow noise, cavitation, waves), machinery noise (depending on its running machinery, speed, cavitation, laminar flow, etc), TS (when appeared as a target), etc. The system shall provide facilities to set these parameters with pre-set or default values. Own platforms according to type of Sonar are as follows (details to be mentioned in the tender offer):

- a. Surface Warships.
- b. Submarines.
- c. ASW Helicopter Unit (for Dipping Sonar only).
- d. ASW MPA Unit (for Sonobuoy only).

31. **Own Platform Movement.** Own platform will move according to the input values of instructor. However, the operator should be able to change values of movement parameters through a dialog box. (Details to be mentioned in the tender offer).

32. **Target Simulation.** The system shall have the facility to simulate targets in order to create impact at one or more sonar according to sonar equation and theory. The System shall provide pre-set or default values of realistic target parameters (target strength vs aspect, acoustic signature vs speed, depth, shape, active transmission, variation due to speed change, machinery running etc.) with the option to change the values by the designer and instructor. The system shall be able to insert single/ multiple platforms and features into training scenarios. It shall simulate the following targets, but not limited to (details to be mentioned in the tender offer):

- a. Surface Ships (Aircraft Carrier, Destroyer, Frigate, Corvette, Large Patrol Craft, MCMV, FAC, Auxiliaries, etc.).
- b. Submarines.
- c. Merchant Ships.
- d. Fishing Vessels.
- e. Mines.
- f. Torpedoes.
- g. Decoys.

- h. Noise Makers.
- j. Biological Noise e.g. Schools of Fish.
- k. Whale.
- l. Divers.
- m. Static Object- fixed or floating.
- n. Transitory contacts due to instantaneous natural variation of sea noise source.

33. **Environment Simulation.** Acoustic environment modeling is one of the very important aspects of the Sonar Simulator. It has many factors that affect sonar operations namely noises from all sources, water depth, reverberation, SVP profile, bottom configuration, acoustic spectrum characteristics, various sound propagation paths, diurnal and seasonal variation, remote noise, various manmade and natural noise sources, etc. The system should provide facilities to define all the above factors with default realistic values and curves (dB vs spectrum) and the designer/ instructor should also be able to change the values as well. The environmental modeling shall incorporate following factors, but not limited to (details to be mentioned in the tender offer):

- a. Temperature.
- b. Salinity.
- c. Depth of Water.
- d. Bathymetry.
- e. Wind.
- f. Seabed/ Bottom Classification.
- g. Reverberation, Self-Noise and Radiated Noise.
- h. Topography.
- j. Sound Velocity Profile (SVP).
- k. Sea State.
- l. Tides and Waves (Direction and Speed).
- m. Remote Traffic/ Marine Traffic.
- n. Underwater Ambient Noise (Thermal Noise, Ice Noise, Surface Noise).
- p. Rain Fall.
- q. Visibility.
- r. Lighting Status (Day, Night, Sun, Moon, Stars).
- s. Seismic Disturbance.
- t. Oceanic Turbulence.
- u. Whale.
- v. Biological Noise e.g. Schools of Fish.

34. **Scenario Generator and Simulation.** The simulator shall have the following scenario simulation facilities, but not limited to (details to be mentioned in the tender offer):

- a. **Scenario Generator.** The scenario generator shall have the facilities for generation of realistic underwater environment and tactical scenario to secure realism of the operation which will present in the display. It shall also have the option for exercise start, freeze, stop and exercise record-replay facility. The system shall have the facility to dynamically change the training scenario by the Instructor during game time through controlling followings:

- (1) Insertion of single/ multiple targets including under water weapon.
- (2) Controlling of targets.
- (3) Changing of target parameters.
- (4) Changing of environment features.
- (5) Changing of sound propagation features.

b. **Acoustic Modeling Facilities.** The system shall have the facilities to design, generate and analyze the required acoustic signature of target (strength, frequency and tone) and environment as required.

c. **Scenario Library.** The system shall have at least 50 (fifty) sets of already developed exercises involving own platform, target, sea-area, environments and scenarios for ready use training and operation. The exercises may be developed jointly by the OEM sonar experts and BN personnel during foreign/ local training.

d. **Customized Sea Area Generation.** The system shall have the facilities to generate and design customized sea areas.

e. **Use of Electronic Chart.** The system shall have the facilities to include the sea area of Bay of Bengal (BoB) based on nautical charts as a part of scenario and exercise development. The system shall also have the option to use licensed ENC of any sea areas for scenario and exercise development and game operation.

35. **Database Development and Validation Test of Sonar Equation.** The system shall have the provision for development, creation, editing, adjustment of any selected/ new types of sonar, own platform, environment, propagation features, targets, and scenario for simulation using main simulator as well as game testing station. Besides, the system shall allow instructor or designer to conduct validation test of a particular target detection in a given environment and scenario using sonar equation parameters (SL, TS, DI, DT, PL, BN, etc.). The details to be mentioned in the tender offer.

36. **Training Facilities for Identification/ Classification of Source of Noise.** The system shall have separate facilities for training the operators on identification and classification of the sources of noise. The following realistic recorded or generated sound sources shall be simulated either separately or simultaneously for training, analysis, testing and problem solving both in the system and in CBT, but not limited to (details to be mentioned in the tender offer):

- a. Platform Noise (All kinds of warships including submarine, Merchant vessel, Fishing Vessel, etc).
- b. Engine Sources.
- c. Propeller Cavitation.
- d. Flow noise.
- e. Sonar Pulse Intercepts.
- f. Transients.
- g. Various Sea Noise.
- h. Traffic Noise.
- j. Rain Noise.

- k. Whale.
- l. Biological Noise/ Schools of Fish.
- m. Reverberation noise.
- n. Any other sound sources relevant to underwater transmission and reception.

37. **Record and Replay Facility.** The system shall have record and replay facilities in real-time in order to post exercise analysis and/ or representation purpose during de-brief sessions. The system shall have adequate storage device to store all recorded files for covering minimum 30 days exercise activities. It shall have following facilities, but not limited to (details to be mentioned in the tender offer):

- a. Recording and monitoring of any trainee station in real-time to replay it directly on the stations for effective debriefing.
- b. Recording of all voice communications with an option to replay in sync with exercise time.
- c. Record and replay option of exercise data and scenarios. The exercise data shall be recorded in real-time and all the simulation parameters are to be taken into account.
- d. Accelerate/de-accelerate option to replay speed, jump to a specific marker in the timeline, and other tools.
- e. Recording and replaying facility of any game created by the instructor for further modification and development.

38. **General Arrangement/ System Composition.** The sonar simulator shall have the following system composition, but not limited to (details to be mentioned in the tender offer):

- a. Instructor Console.
- b. Student/ Operator Console.
- c. Briefing/ De-briefing Station.
- d. System Server.
- e. Database Management System
- f. Game Testing Station.
- g. Communication Devices and CCTV Monitoring.
- h. Back-up Power System.

39. **Sonar Simulation Engine.** The sonar simulation engine (algorithm) used in the simulator must be based on sonar equation, sound propagation, type of sonar, environment features, etc. The details of sonar simulation engine are to be mentioned in the tender offer.

40. **Facilities of Simulator Consoles.**

a. **Instructor Console.** The instructor console shall work as the master station for the Sonar Simulator. It shall have the facilities like, control of operation, scenario generation and simulation, development of training game and propagation features, controlling of target, graphical facilities, communication facilities, CBT management facility, record and replay facility, monitoring of student console, etc. The details facilities of the instructor console are to be mentioned.

b. **Student/ Operator Console.** The student/ operator console shall display the controlled output of various sonar simulations with all analysis features like active, passive, audio, echo and console contact analysis, visualization of raw echo data or tracks, visualization and control of console information, tx/ rx information, propagation information, listening and analysis of audio signal, communication facilities, etc. It shall have the facilities to be used as CBT or Sonar Simulator depending on instructor assignment. The console shall also enable the operator to use it as weapon firing console to manage underwater weapons and decoy system (Torpedoes, ASROC, Depth Charges, Acoustic Decoys) related to ASW operations. The details facilities of the student/ operator console including weapon firing features are to be mentioned in the tender offer.

c. **Briefing/ De-briefing Station.** The briefing/ de-briefing station of the simulator shall be fitted with smart board system to display the ongoing/ recorded simulation of the system for audio/ visual briefing. The details facilities of briefing/ de-briefing station are to be mentioned in the tender offer.

d. **System Server.** The system server shall host all the simulation system applications and database system. The details facilities of the system server are to be mentioned in the tender offer.

e. **Database Management Station.** The database management station console shall be used for creating and modifying the system database including all types of data (platform, environment, target, noise source, game area, water depth, etc) as well as to modify and create new gaming areas in case the instructor console are involved in running simulations. The details facilities of database management system/ console are to be mentioned in the tender offer.

f. **Game Testing Station.** The system shall act as a standalone mini simulator which shall have the provision for development, creation, editing, adjustment of any selected/ new types of sonar, training environment, propagation features, targets, sonar equation assessment and scenario for simulation using game testing station in-addition to main simulator. The details facilities of the game testing station are to be mentioned in the tender offer.

g. **Communication Devices and CCTV Monitoring System.**

(1) **Communication Devices.** The instructor console and student consoles shall be equipped with intercom facilities for various modes: intercom, audio/echo simulation and underwater telephony. The intercom communication shall have the standard features of one-to-one, multicast and broadcast facilities. The details facilities of the Communication System are to be mentioned in the tender offer.

(2) **CCTV Monitoring.** The simulator room shall have CCTV monitoring system consisting of appropriate number of cameras and NVR system. The CCTV system shall be integrated with the system server for controlling and monitoring facilities from instructor control station having other standard features including record and replay facilities. The detail facilities of the CCTV monitoring system are to be mentioned in the tender offer.

Equipment Specification – Sonar Simulator

41. **System Architecture and Network Diagram.** A diagram of complete system with configuration/ system architecture showing network connectivity is to be provided with the tender offer for assessment. The system shall be accommodated within the specified area of SMWT.

42. **Environmental Condition.**

a. All equipment of the simulator is intended to be installed inside the building, which shall meet following environmental conditions:

- (1) Temperature : -5°C to 45°C.
- (2) Relative Humidity (RH) : Up to 95% (non-condensing).

b. However, the recommended temperature and humidity for safe operation and storage of the system are to be mentioned, and the same are to be maintained with the supplied air-conditioning and dehumidification unit.

43. **Instructor Console.** The instructor console beings the master station of the Sonar Simulator shall have required workstation facilities with following hardware, but not limited to (details is to be mentioned in the tender offer):

Ser	Item	Specification
1.	Console Configuration	<p>a. The Main Instructor Station shall have 02 x monitors with communication devices control system and all necessary equipment to control the training sessions.</p> <p>b. The Repeater Display System shall have 04 x monitors to monitor any screen in the system for controlling trainees/ student's activity.</p>
2.	Quantity	01 (one) complete set
3.	Computer	<p>a. <u>Quantity.</u></p> <p>(1) Minimum 01 x PC for Instructor Console. (2) Minimum 01 x PC for Repeater with multiple monitors.</p> <p>b. <u>Specification.</u> As per paragraph 51a.</p>
4.	Monitor/ Display	a. Minimum 2 x 27 inch or higher LED Monitor for Main

Ser	Item	Specification
		Instructor Console. b. Minimum 3 x 24 inch or higher LED Monitor for Repeater Display System.
5.	Software	a. Operating System (OS). Latest version operating system (Windows) with original license shall be used. (Details are to be mentioned). b. Sonar Simulator Software. Latest version Sonar simulator software with original license shall be used. (Details are to be mentioned). c. Other Software. Latest version other software with original license shall be used. (Details are to be mentioned). d. Scalability. System shall have option for future expansion to accommodate more student console or additional simulation features are to be incorporated in the software. (Details are to be mentioned).
6.	Communication system	To be incorporated as per paragraph 49
7.	Headset with Microphone (PTT incorporated)	To be incorporated as per paragraph 49
8.	Dimension of Instructor Console	To be mentioned
9.	Weight of Instructor Console	To be mentioned
10.	Material Composition of Instructor Console	To be mentioned
11.	Power Consumption	To be mentioned
12.	Power Supply	220V, 50 Hz, 1 Ph.

44. **Student/ Operator Console.** The student/ operator console of the Sonar Simulator shall have the required workstation having an outlook-like warship sonar console with the following hardware, but not limited to (details are to be mentioned in the tender offer):

Ser	Item	Specification
1.	Console Configuration	a. The operator console should have the look and all the functionality of a real modern Sonar with dual monitors.

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Ser	Item	Specification
		<p>b. It shall be based on a generic interface, not resembling exactly a specific sonar equipment graphic interface. However, the HMS interface display shall also replicate the BN Sonar (ATLAS ASO-94-2).</p> <p>c. The system shall allow at least 10 independent platform-based sonar operation at a time.</p>
2.	Quantity	20 (twenty) complete set.
3.	Computer	<p>a. Quantity. Minimum 01 x PC for each student console. (Details are to be mentioned)</p> <p>b. Specification. As per paragraph 51a.</p>
4.	Monitor/ Display	Minimum 2 x 24 inch or higher LED Monitor for each student console. (Details are to be mentioned)
5.	Software	<p>a. Operating System (OS). Latest version operating system (Windows) with original license shall be used. (Details are to be mentioned)</p> <p>b. Sonar Simulator Software. Latest version Sonar simulator software with original license shall be used. (Details are to be mentioned).</p> <p>c. Other Software. Latest version other software with original license shall be used. (Details are to be mentioned).</p> <p>d. Scalability. System shall have option for future expansion to accommodate additional simulation features are to be incorporated in the software. (Details are to be mentioned).</p>
6.	Communication System	To be incorporated as per paragraph 49
7.	Headset with Microphone (PTT incorporated)	To be incorporated as per paragraph 49
8.	Dimension of operator Console	To be mentioned
9.	Weight of Operator Console	To be mentioned
10.	Material Composition of Operator Console (Work Station)	To be mentioned
11.	Power Consumption	To be mentioned
12.	Power Supply	220V, 50 Hz, 1 Ph.



45. **Briefing/ De-briefing Station.** The requirement of the Briefing/ De-briefing Station are as follows, but not limited to (details are to be mentioned in the tender offer):

Ser	Item	Specification
1.	General Feature	A debriefing station in conjunction with their sonar simulator, shall be established to facilitate comprehensive post-training analysis and feedback, enhancing overall operational effectiveness. This station shall enable immediate review and discussion during and after simulations.
2.	Quantity	01 (one) complete set
3.	Compositions	<p>a. 01 x All-in-One Touch Smart Board.</p> <p>b. 20 x Classroom chairs with lumber spine along with a foldable table for the students.</p> <p>c. 02 x HP Laser Printer (Capacity: 30 PPM or More) (Local supply).</p> <p>d. 01 x Sharp/ Toshiba/ Samsung Digital Photocopy Machine (Local Supply).</p>
4.	Debriefing Workstation	Instructor Console may be used as debriefing workstation.
5.	All-in-One Touch Smart Board	<p>a. Quantity. 1 x All-in-One Touch Smart Board</p> <p>b. Specifications.</p> <p>(1) Brand and Model. To be mentioned</p> <p>(2) Resolution. 4K.</p> <p>(3) Size. 120 inch.</p> <p>(4) Country of Origin and Manufacture. USA, EU, Japan, Korea, Taiwan, Malaysia</p> <p>(5) Power Supply. 220V, 50 Hz, 1 Ph.</p> <p>(6) Other Features. To be mentioned.</p>
6.	Communication System	To be incorporated as per paragraph 49
7.	Headset with	To be incorporated as per paragraph 49

Ser	Item	Specification
	Microphone (PTT incorporated)	

46. **System Server.** The system server shall be equipped with the necessary hardware and software, including but not limited to the following hardware components (detailed specifications to be provided with the tender offer):

Ser	Name of Item	Description
1.	General Feature	<p>a. The server should host all the simulation system applications and database system and the simulator architecture should be based on a centralized storage architecture.</p> <p>b. Failure of a computer in the system will not affect the running exercise, simply the functionality of such a non-operative computer will be not available, but exercise should continue without any problem.</p> <p>c. There should be a redundant server to ensure the system's reliability.</p> <p>d. The server should be a RAID system to minimize the possibility of data losses and all server components should have redundant.</p> <p>e. Standard configuration should be typically dual disk mirroring, therefore data should be saved contemporary on 2 separate arrays, improving the system reliability.</p>
2.	Quantity	01 Set
3.	Brand	Dell/HP/Cisco
4.	Model No	To be mentioned
5.	Country of Origin	Canada/ USA/ UK/ EU/ Japan.
6.	Country of Manufacture	Canada/ USA/ UK/ EU/ Japan/ China/ Taiwan.
7.	Processor	2 x Intel Xeon 6 th Generation GPU Server or latest Processor, Base Clock speed 2.20 GHz or higher
8.	Cache	96 MB or Higher
9.	Motherboard	Intel Motherboard compatible with the processor
10.	RAM	2 x 128 GB DDR5 ECC RDIMM or more
11.	Hard Drive	2 x 1 TB SSD for running the server operating system

Ser	Name of Item	Description
	(SSD)	
12.	RAID Controller	Compatible Hardware and Software are to be incorporated. Details to be mentioned
13.	NAS Storage	Brand – Seagate or Equivalent, Model - To be mentioned. Capacity- Minimum 4 x 1 TB SSD or higher (will be configured as per RAID system).
14.	Graphics	2 x NVIDIA A16 GPU, 64GB (4x 16GB) GDDR6- PCIe 4.0x 16 or higher
15.	Monitor	1 x 27" LED Monitor or Higher
16.	Keyboard	Standard Keyboard
17.	Mouse	Standard Mouse
18.	Sound Card and Optional Drive	Standard
19.	Network Card	Dual 10G Base –T Ethernet or higher
20.	I/O Expansions	As required. To be mentioned
21.	Ports and Interface	Standard ports and interfaces bundle with the package
22.	Operating System	Microsoft Windows Server latest version with a perpetual license
23.	Power Supply	Dual Power Supply System. (220V, 50 Hz, 1 Ph.)
24.	Server Rack	High Quality Standard Rack (1U/2U) is to be provided.

47. **Database Management Station.** The Database Management Station shall be equipped with the necessary workstation, including but not limited to the following hardware components (detailed specifications to be provided with the tender offer):

Ser	Item	Description
1.	General Feature	To be supplied in standard panel and with mounting. The system shall be able to edit and change the simulation parameters as well as can be used as an additional system station.
2.	Quantity	01 (one) complete set
3.	DBMS Software	Modern and higher configuration database system software (Windows-based DMS is preferable). Details to be mentioned.
4.	Computer	a. Quantity. As required. (Details to be mentioned) b. Specification. As per paragraph 51a.

Ser	Item	Description
5.	Monitor/ Display	2 x 27" LED Monitor or Higher
6.	Software	<p>a. Operating System (OS). Latest version operating system (Windows) with original license shall be used. (Details are to be mentioned).</p> <p>b. Bridge Simulator Software. Latest version Bridge simulator software with original license shall be used. (Details are to be mentioned).</p> <p>c. Other Software. Latest version other software with original license shall be used. (Details are to be mentioned).</p> <p>d. Scalability. System shall have option for future expansion to accommodate more bridge simulator or additional simulation features to be incorporated in the software. (Details are to be mentioned).</p>
7.	Communication System	To be incorporated as per paragraph 49
8.	Headset with Microphone (PTT incorporated)	To be incorporated as per paragraph 49
9.	Dimension of Console	To be mentioned
10.	Weight of Console	To be mentioned
11.	Material Composition of Console (Work Station)	To be mentioned
12.	Power Supply	220V, 50 Hz, 1 Ph.

48. **Game Testing Station.** The Game Testing Station shall be outfitted with the required workstation, incorporating but not limited to the following hardware components (specific details to be provided with the tender offer):

Ser	Item	Description
1.	General Feature	The system shall include capabilities for the development, creation, editing, and adjustment of various selected or new types of sonar, training environments, propagation features, targets, sonar equation assessments, and scenarios for simulation using a game testing station in addition to the main simulator.
2.	Quantity	01 (one) complete set

Ser	Item	Description
3.	Computer	<p>a. Quantity. Minimum 03 (Three).</p> <p>(1) 01 x PC for Instructor plus server. (2) 01 x PC for DBMS. (3) 01 x PC for repeaters with multiple monitors.</p> <p>b. Specification. As per paragraph 51a.</p> <p>c. Operating System/ Software. Microsoft Windows latest version OS with a perpetual license and other relevant licensed version software (Details to be mentioned).</p>
4.	Monitor	At least 5 x 24" or higher LED Monitor.
5.	Power Supply	220V, 50 Hz, 1 Ph
6.	Communication System	To be incorporated as per Paragraph 49
7.	Headset with Microphone (PTT incorporated)	To be incorporated as per Paragraph 49

49. Communication Devices and CCTV Monitoring System.

a. **Communication Devices.** Communication Devices shall be outfitted with the required hardware and software, incorporating but not limited to the following components (specific details are to be provided with the tender offer):

Ser	Item	Description
1.	General Feature	<p>a. The instructor console and student consoles shall be equipped with software-based intercom facilities for various modes: intercom, audio/echo simulation and underwater telephony. The intercom communication shall have the standard features of one-one, multicast and broadcast communication features.</p> <p>b. Communication system should use VOIP (Voice over IP) technology. It should have the facility to record the communication, monitor it in real-time and inject disturbance.</p>
2.	Technical Specification	<p>a. Type. All components including headsets and handsets shall be of robust and Industrial Grade. (To be mentioned)</p> <p>b. Quantity. As required for all the Consoles. (To be mentioned)</p> <p>c. Brand. To be mentioned.</p> <p>d. Model. To be mentioned.</p>

Ser	Item	Description
		<p>e. <u>Year of Manufacture</u>. 2024 or later. To be mentioned.</p> <p>f. <u>Country of Origin</u>. USA/ UK/ EU/ Japan.</p> <p>g. <u>Country of Manufacture</u>. USA/ UK/ EU/ Japan/ China/ Taiwan.</p> <p>h. <u>Redundant Option</u>. To be incorporated.</p> <p>j. <u>Headsets and Handsets</u>. As required for all the Consoles. (To be mentioned).</p> <p>k. <u>Other Technical Features</u>. To be mentioned</p> <p>l. <u>Dimension</u>. To be mentioned.</p> <p>m. <u>Power Supply</u>. 220V, 50 Hz, 1 Ph.</p>

b. **CCTV Monitoring System**. CCTV monitoring system shall be outfitted with the required hardware and software, incorporating but not limited to the following components (specific details are to be provided with the tender offer):

Ser	Item	Description
1.	Quantity	01 (one) complete Set.
2.	Function	Sonar Simulator room shall be equipped with CCTV monitoring facilities for recording, re-playing and monitoring purposes by the instructor. It shall also be possible to display in the All-in-One smart board for de-brief session.
3.	Technical Specification	<p>a. <u>Type</u>. Industrial Grade. (To be mentioned)</p> <p>b. <u>Quantity</u>. As required. (To be mentioned) (1) Camera: To be mentioned. (2) NVR: To be mentioned.</p> <p>c. <u>Brand</u>. To be mentioned for Camera, NVR, Network Switch, etc.</p> <p>d. <u>Model</u>. To be mentioned for Camera, NVR, Network Switch, etc.</p> <p>e. <u>Year of Manufacture</u>. 2024 or later. To be mentioned</p> <p>f. <u>Country of Origin</u>. USA/ UK/ EU/ Japan.</p> <p>g. <u>Country of Manufacture</u>. USA/ UK/ EU/ Japan/ China.</p> <p>h. <u>Redundant Option</u>. To be incorporated.</p> <p>j. <u>Storage Capacity</u>. Min 30 days storage capacity. To be</p>



	mentioned.
	<p>k. Technical Features. Details are to be mentioned for Camera, NVR, Network Switch, etc.</p> <p>l. Cable and Accessories. As required.</p> <p>m. Power Supply. 220V, 50 Hz, 1 Ph.</p>

50. **WADER Software.** WADER Software shall be supplied, incorporating but not limited to the following specifications (specific details to be provided in the tender offer):

Ser	Item	Description
1.	General Feature	<p>a. The system must include capabilities for sonar range prediction and a global ocean information system (using the latest version of WADER software), enabling Bangladesh Navy personnel to utilize global environmental data.</p> <p>b. This will facilitate the generation of propagation loss data and the calculation of sonar performance metrics, including the probability of detection.</p> <p>c. It shall be used for analysis, validation and training purpose.</p>
2.	Quantity	02 x WADER System version v9 or latest (sonar range prediction and global ocean information system software; one to be incorporated in Simulator and one with separate Laptop)
3.	Simulator incorporated WADER Software	1x WADER software shall be installed in the Instructor Console.
4.	Standalone Laptop	<p>a. One rugged laptop with latest configuration is to be provided to facilitate the standalone use of WADER software installed in it.</p> <p>b. Brand DELL/HP Laptop.</p> <p>c. Model. Latest Model. To be mentioned</p> <p>d. Hard disk. 1 TB SSD or higher.</p> <p>e. Processor. Intel Core i9 with 14th generation or latest..</p> <p>f. RAM. 64 GB or higher.</p> <p>g. Display. 14/ 15 inch Full HD (1920x1080) display.</p> <p>h. Graphics: NVIDIA® GeForce. (Details to be mentioned)</p> <p>h. Operating System. Original windows OS latest version (64-</p>

Ser	Item	Description
		bit). (To be mentioned)
5.	WADER Software Update	Software update facilities are to be provided.

51. **Computer and Other Accessories.** The following necessary hardware are to be provided to facilitate the networking of the simulation system, but not limited to (if additional items are required, those are to be offered. Detailed specifications are to be provided in the tender offer):

a. **Computer/ PC.**

(1) All PC shall have similar specification except the high definition graphics processor card which shall be used for visual generation. The PCs are to be interchangeable so that it can be changed as and when required.

(2) The license shall be of perpetual with or without dongle binding. The license with MAC binding shall not be accepted.

(3) **Specification of PC.**

Ser	Description	Specification
1.	Type	Industrial Grade/ Heavy Duty
2.	Brand	HP/DELL
3.	Model	Latest Model. (To be mentioned)
4.	Country of Origin	USA/UK/ Japan
5.	Country of Manufacture	USA/ UK/ EU/ Japan/ China/ Taiwan
6.	Year of Manufacture	2024 or later. (To be mentioned)
7.	Processor	Intel Core i9 with 14th generation or latest. (To be mentioned).
8.	Motherboard	Intel Chipset Motherboard compatible with the processor. (To be mentioned).
9.	RAM	64 GB or Higher. (To be mentioned).
10.	Hard Disk	1TB SDD or Higher.
11.	Graphics	Latest version of NVIDIA®GeForce. (To be mentioned).
12.	Keyboard and Trackball	Industrial quality
13.	Sound Card	Standard
14.	Network Card	High-Speed Network Card/ 10G Network Card (To be mentioned).
15.	I/O Expansions & Ports	Includes all standard ports and slots to support the complete system.
16.	Cooling	Advanced cooling system.

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Ser	Description	Specification
17.	Cables and Accessories	All standard cables and accessories are to be supplied for immediate use and smooth functioning (as required).

b. **Network Switch (Manageable).**

Ser	Name of Item	Description
1.	Type	Rack Mounted
2.	Quantity	As required. To be mentioned
3.	Brand	CISCO
4.	Model	To be mentioned
5.	Country of Origin	Canada/ USA/ UK/ EU/ Japan
6.	Country of Manufacture	To be mentioned
7.	Product Features	To be mentioned
8.	Network Ports	28 GE or Higher, Compatible with Server and other Consoles.
9.	Memory/Flash	Min 1GB or Higher

c. **Router.**

Ser	Name of Item	Description
1.	Type	To be mentioned
2.	Purpose	For remote login.
3.	Quantity	As required. To be mentioned
4.	Brand	CISCO
5.	Model	To be mentioned
6.	Country of Origin	Canada/ USA/ UK/ EU/ Japan
7.	Country of Manufacture	To be mentioned
8.	Product Features	To be mentioned
9.	WiFi Network Standards	IEEE 802.11b/g/n 2.4GHz, IEEE 802.11a/n/ac 5GHz. To be mentioned
10.	Number of Concurrent User	Up to 30 User or more

d. **KVM Switch.**

Ser	Name of Item	Description
1.	Type	Rack Mounted
2.	Quantity	As required. To be mentioned
3.	Brand & Model	To be mentioned
4.	Country of Origin	Canada/ USA/ UK/ EU/ Japan
5.	Country of Manufacture	To be mentioned
6.	Brand & Product Model	To be mentioned
7.	Ports	To be mentioned, Compatible with Server and other Consoles.

52. **Backup Power Supply.** The power supply at site is 400V ± 10%, 50 Hz, 3 Ph and

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220V ± 10%, 50 Hz, 1 Ph. All equipment are to be suitable to run at above mentioned power supply. The following necessary equipment is to be provided to provide the backup power of the simulator system (if additional items are required those are to be supplied and detailed specifications are to be provided):

Ser	Item	Description	
1.	Name of Item	Online UPS	
2.	General Feature	The Simulator should have a minimum 30 minutes backup power supply	
3.	Quantity	02 (Two), Each shall be 30 KVA or more as per 30-minutes backup requirement. One will be used at a time and other will be remained standby.	
4.	Technical Parameters	a. Input Voltage	220V ± 10%, 50 Hz, 1 Ph
		b. Output Voltage	220V ± 1%, 50 Hz, 1 Ph
		c. Brand and Model	To be mentioned
		d. Capacity (KVA)	To be mentioned
		e. Dimension	To be mentioned
		f. Weight	To be mentioned
5.	Country of Origin	Details to be mentioned	
6.	Country of Manufacturer		

53. **Standard Accessories.** The following accessories are to be provided with the sonar simulator, but not limited to:

Item	Qty	Country of Origin and Manufacture	Description	Remarks
Laptop	01	Country of Origin: USA/UK/Japan. Country of Manufacture: To be mentioned	Brand: Dell/ HP. Model: Latest Model. To be mentioned. Processor: Intel Core i9 with 14 th generation or latest. RAM: 64 GB or more. Graphics: NVIDIA® GeForce. HDD (SSD): 512 GB SSD or Higher.	To facilitate software installation and debriefing

Item	Qty	Country of Origin and Manufacture	Description	Remarks
Portable SSD Hard Disk	02	Country of Origin: USA/UK/Japan/ South Korea. Country of Manufacture: To be mentioned	a. Capacity: 2TB b. Interface: USB 3.1 Gen 2 (USB 10Gbps)	
Other Accessories	Other accessories must include all items which are essential to operate the simulator, whether those are mentioned in the specification or not. All necessary cables, connectors, rack, etc shall be provided.			

Other Specification

54. Software and Backup Software.

a. **List and Particulars of Software.** The system shall be provided with all the necessary software. Software shall be of modern and best configuration quality to be ensured with options for future up-gradation/ modification. A list of all necessary software is to be submitted with the offer. The following information about all software and its functionality are to be mentioned for tender evaluation and assessment:

Ser	Name of Item	Description
1.	Name of Software(s)	To be mentioned
2.	Purpose/ Function	To be mentioned
3.	Version	To be mentioned
4.	Country of Origin/Developer	To be mentioned
5.	Software Developer Company	To be mentioned
6.	Year of Release	2024 or later
7.	Software update option	To be mentioned
8.	Requires Operating System (OS)	To be mentioned
9.	Quality Assurance Certificate	To be mentioned
10.	Security Features	To be mentioned

b. **Software Backup and System Restoration.** Necessary software and backup software with licensed copies of all related software for the simulator are to be provided in portable SSD and portable memory devices. Method of loading and recovery of software is to be provided through training. Moreover, the step-by-step procedures for installing any software are also to be provided. In case of any software crash, BN personnel should be able to install the backup software using those step-by-step instructions to restore the whole system. Details is to be mentioned.

c. **Intellectual Property (IP).** Manufacturer is to grant a royalty-free, non-exclusive license to enable the end-user to use such IP only as it required in order to

use the delivered equipment in accordance with its intended use.

d. **Providing Software Compatibility Support for 10 Years.** The supplier will provide 10-year software compatibility support to BN simulator. This support entails that the supplier will ensure that the software remains compatible with future computer and operating systems for 10 years after the system is accepted. For instance, if BN needs to replace defective PCs with the available upgraded PCs at the time of need and if the upgraded PCs including OS is not compatible with the sonar simulator, the supplier shall take the necessary arrangements to ensure compatibility at no additional cost. The supplier shall provide updates, patches, and modifications required to maintain software compatibility within the 10-year support period.

55. **Tools.** 01 (one) set of following tools, but not limited to is to be provided along with the equipment that may be required for the installation, replacement of unit or any other maintenance purpose:

- a. 1 x Ethernet Cable Crimping Tool.
- b. 1 x Ethernet Cable Tester.
- c. 1 x Wire Strippers.
- d. 2 x Screwdriver Set.
- e. 2 x Cable Management Tool Kit.
- f. 2 x Flashlight or Headlamp.
- g. 2 x Fluke Multimeter.
- h. 1 x Fiber Optic Cable Cutter.
- j. 1x Fiber Optic Cable Splicer.

56. **Spares.** The following spars should be supplied with the system, but not limited to (if additional spares are required, those are to be offered. Detailed are to be provided):

- a. 12 x Trackball.
- b. 12 x Keyboard (6 x Industrial Grade Keyboard, 6 x Standard Keyboard).
- c. 2 x GPU Card (NVIDIA® GeForce).
- d. 2 x 24 inch for Operator Console.
- e. 12 x Headset.
- f. 5 x Handset.
- g. 3 x Communication System PCB.
- h. 12 x Power Supply Unit for PC.
- j. 3 x Computer with monitor as per System Configuration.
- k. 2 x HDD/ SSD as per System Configuration.
- l. 2 X 64GM DDR5 RAM.

57. **Ancillary/ Auxiliary Items.** Various ancillary and auxiliary items like Air Conditioning Unit (locally available good quality standard) and required furniture (rostrum, chairs, tables, mini conference table, bookshelf, etc - Bangladesh HATIL Standard) should be supplied by the bidder from the local market as per the overall requirements, cooling requirement and floor space. The details of required ancillary items (brand, model, capacity, power supply, dimension, weight, etc) and furniture which shall be provided are to be quoted with item wise price. The available floor space for installing the simulator along with associated equipment is given below:

- a. **Server Room.** 4.75 m x 2.97 m x 3.0 m (L x W x H).
- b. **Simulator Room-1.** 4.75 m x 7.4 m x 3.0 m (L x W x H).
- c. **Simulator Room-2.** 9.9 m x 10.3 m x 3.0 m (L x W x H).

58. **Site Preparation and Installation Works.** The Bidder shall be solely responsible for all the site preparation work such as minor civil works, earthing, laying of IFL cables in conduit metal pipes, foundation, etc. for the installation of Sonar Simulator equipment at the designated site, including electrical and other works. The Bidder shall prepare the work plan which shall contain detailed information of preparation activities which need to be accomplished prior to system installation.

SECTION-C: OTHER TERMS & CONDITION

59. **Detailed Project Plan.** The Bidder shall conduct an assessment study at SMWT after signing the contract. The bidder shall work and coordinate with BN to determine any site restrictions and constraints and identify the best solution for the installation of the complete system. The Bidder shall provide detailed project plan. The project plan shall contain detailed information of all site preparation activities to be accomplished by the bidder prior to installation including main power, backup power, communication, cable layouts, painting, interference mitigation (if any), lightening arrester, support structure, air-conditioning, de-humidification, etc. The assessment study report shall be delivered to BN within 60 days of contract award, which must be vetted by NHQ.

60. **Installation Materials.** All installation materials, cable, cabinet, steel accessories, mountings, etc are to be provided by the Bidder. All types of power, control and communication cable should be fire redundant and wire shielded (rat protected) to ensure uninterrupted service.

61. **Standard Accessories.** All standard accessories shall be provided by the Bidder. The standard accessories must include every item and accessories, which are essential to make the system operational, whether those are mentioned in the tender specification or not. A list of such items/ accessories is to be submitted with the tender offer.

62. **Optional Accessories/ Items.** Optional accessories/ items (if any) are to be quoted separately mentioning their usages. BN will have the right to select or reject optional accessories/ items.

63. **Factory Acceptance Test (FAT).**

- a. Factory Acceptance Test of Sonar Simulator will be carried out at OEM premises by a team of 04 (four) members for duration of 07 (seven) working days, at the Buyer's expense.

- b. Both way airfare, accommodation and food will be borne by BN for FAT team. All internal transportation of the team within the manufacturer/ Bidder's country, reception and arrangement for entry into country/ concerned area will be arranged by the Bidder.
- c. On return from the country of supplier, the FAT team will submit the report to concerned Directorate at Naval Headquarters. Naval Headquarters will, in turn, forward final decision along with FAT report, basing on which DGDP will render clearance for shipment of stores to the supplier concerned. The supplier will not make shipment of any item of the contract without clearance from DGDP.
- d. Supplier will provide all necessary documents including certificates of country of origin, certificate of manufacture of Sonar Simulator and its system equipment to FAT team.
- e. FAT will be carried out at manufacture's factory premises following FAT protocols. The bidder is to send the proposed FAT protocol for approval of BN at least 08 weeks prior to the conduct of FAT. During FAT, required tests will be carried out to fulfill the necessary condition mentioned in technical specification and FAT protocol. Various test results with their performance are to be recorded and signed by both parties.

64. Training.

- a. Training Objective. The training should be combination of both theoretical training and practical training. The objectives of training are as follows:

- (1) On completion of operator training, BN personnel shall have basic knowledge on SONAR theory and operation principles. Based on basic knowledge and subsequent system based training, BN personnel shall be able to design, create, edit, and configure all kinds of database in order to run and analyze SONAR simulation environment, scenario and exercises through the operation of instructor and operator console.
- (2) On completion of maintenance training, BN maintainers will be able to operate the simulator, install and re-install relevant software, configure, replace the Line Replaceable Unit (LRU), set to work the system and carryout periodic and preventive maintenance. They should also be able to restore the system using step-by-step procedures and backup software.
- (3) The trainees shall be able to maintain the simulator at least 10 years after the expiry of warranty period. They shall also be able to replace the defective hardware with COTS compatible hardware available in the market during that period.

- b. Training Plan and Curriculum.

- (1) The bidder is to mention detailed breakdown of the training schedule, plan and syllabus. The training will be conducted both in OEM premises and in Bangladesh. All training related to simulator operation and maintenance shall be held in line of operation and maintenance manuals of OEM. Following documents/ manuals are to be provided to BN trainees during training:

- (a) Operation Manual.

- (b) Maintenance Manual.
- (c) Installation Manual.

(2) The bidder is to provide a detailed training plan of conducting training highlighting the subject wise (based on simulator) period requirement, no of hours including theoretical and practical training as per the group.

65. **Foreign Training.** A comprehensive theoretical and practical training shall be conducted at OEM's premises. Accommodation, food, international air fare and internal transportation will be borne by the supplier. The theoretical and practical training will be as follows:

a. **Simulator Operator Training.** Detail theoretical and practical training for 06 (six) BN personnel is to be provided on simulator operation, game planning, conducting evaluation examination, sonar concept, sonar operation, etc. The duration of the training will be 03 (three) weeks. Training will be conducted in English and 8 (eight) hour/ day and 5 (five) days/ week and sonar operation training shall be provided by actual sonar expert. The details of training syllabus is to be provided with the tender offer. The composition of the trainees will be as follows:

- (1) 1 x Cdr (X) – Team Leader.
- (2) 1 x Lt Cdr (X).
- (3) 4 x TD Ratings.

b. **Simulator Maintainer Training.** Detail theoretical and practical training for 06 (six) BN personnel is to be provided on simulator operation, game planning, conducting test, sonar concept, sonar operation, maintenance, software installation and configuration, replace LRU, component level repair, etc. The duration of the training will be 06 (six) weeks (03 weeks operation and 03 weeks practical maintenance training). Training will be conducted in English and 08 (eight) hour/ day and 05 (five) days/ week and sonar operation training shall be provided by actual sonar expert. The training should include maintenance in details. The details of training syllabus is to be provided with the tender offer. The composition of the trainees will be as follows:

- (1) 1 x Cdr (L) – Team Leader.
- (2) 1 x Lt Cdr (L).
- (4) 3 x REA.
- (5) 1 x EA.

66. **Local Training.** A group of operators and technicians about 20 (twenty) personnel has to be trained locally in Bangladesh for 03 (three) weeks by OEM expert on completion of installation and Test/Trial of Simulator. The training shall be conducted on simulator operation, game development, maintenance, software installation, system setup etc. All costs related to transportation, food, accommodation, etc of OEM expert are to be borne by the bidder.

67. **Certificate of Authorization and Qualification of Trainees.** On completion of each session of training, BN trainees shall be assessed by OEM experts to ascertain their level of understanding of the Simulator operation and technical competence. The OEM shall provide the trainees with the **Certificate of Training and Authorization** mentioning individual trainee's ability to conduct operation and maintenance of Sonar Simulator on successful completion of their training.

68. **Stage Inspection.**

a. One BN expert team consisting of 04 (four) members shall visit the OEM premises during the development process of the system for a total duration of 05 (five) working days. The stage inspection shall be conducted within 06 months of simulator development work from the contract effective date. The stage inspection shall have specific milestones including critical design review of software functionality, Software architecture plan, simulator layout plan and architecture details; and completion of at least 25% of simulator database structure for own platform, target ship and environment; simulator-wise equipment, hardware and software functionality; procurement plan of equipment, hardware, construction material, furniture items; etc. The supplier should inform the buyer about the schedule of Stage Inspection, milestones, and inspection criteria at least 12 (twelve) weeks prior to the date of inspection. The milestones and the inspection criteria shall be approved by BN. On successful completion of stage inspection, the stage inspection certificate shall be signed by both parties. Basing on the report of successful stage inspection, FAT and Training schedule shall be confirmed by BN. In case, stage inspection is not successful, re-inspection shall be conducted by BN team at the supplier's cost including international airfare, accommodation, food and internal transportation.

b. Both way airfare, accommodation and food cost shall be borne by BN. Internal transportation of BN team within the manufacturer/ supplier's country, reception and arrangement for entry into country/ concerned area shall be arranged by the supplier without any extra cost.

69. **Manuals.** The following documents (03 sets each) is to be provided in English including all text in illustrations, drawings and circuit diagrams at free of cost during delivery for the Simulator:

a. **Operator Manual.** The operator manual shall cover but not limited to:

- (1) Basic information of Simulator with block and necessary diagrams.
- (2) Simulator operating procedures.
- (3) System setup and operation.
- (4) Description of all operational mode and menu with explanations.
- (5) Game design, environment, target, sonar, own platform simulation details.
- (6) Conduct of exercise.
- (7) Management of Instructor console and game testing station.
- (8) Detailed software function.
- (9) Record and replay process including database management.
- (10) Details of CBT.
- (11) System check.

b. **Technical and Maintenance Manual.** The technical and maintenance manual shall contain descriptions based on figures, diagrams and tables. The system description should cover the following information but not limited to:

- (1) System functionality with detail description.
- (2) Functional build-up of the system and its sub units (hardware and software).

- (3) Necessary block diagrams and circuit details for the system and its sub-system
- (4) Software installation, system setup, restore and reconfiguration procedures.
- (5) Fault finding and remedial actions.
- (6) Logical and physical networking description.
- (7) Database management.
- (8) Assembly and de-assembly procedure of computer components for maintenance work.

c. **WADER Software Manual.** As per OEM standard.

70. **Shipment & Delivery.**

a. The supplier will deliver the complete system within **09 (nine) months** (without import duties) after signing the contract to the following consignee:

The Commanding Officer Naval Stores Depot New Mooring, Chattogram, Bangladesh	Or	Officer In Charge Naval Stores Sub Depot Dhaka Naval Unit Khilkhel Namapara, Dhaka-1229, Bangladesh
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b. The complete system shall be transported by ship/air from the assemble place/ factory. In case of FOB, the supplier will carry the items from Chattogram Sea Port/ Airport (as applicable) to NSD Chattogram at the cost and risk of supplier. Before shipment, the supplier is to get a written clearance from DGDP for shipment of the system.

c. All items are to be delivered in seaworthy packing to ensure safe transit by sea.

d. All packages are to have packing notes showing their contents in detail and all packages shall be marked with the name and address of the consignee and gross weight. Package is to provide protection from the external mechanical and environmental factors exposure during its transportation and storage.

71. **Port of Shipment.** Any port of the country of origin/ manufacture of the whole system.

72. **Lead Time.** The installation works including commissions and test/ trial is to be completed within **03 (three) months** of delivery of the items.

73. **Installation, Supervision, STW and Commissioning.**

a. The bidder shall send an installation team to Bangladesh for the assembly and installation of whole system. Necessary items for installation and commissioning shall be provided by the supplier. After the successful completion of site preparation, removal of various items of existing sonar simulator and minor civil works, the supplier shall install all supplied equipment and system at the site. During installation, any damage, burnt-out or de-shaped part, equipment or spare should be replaced with the new one, no repaired or modified item will be accepted.

- b. Qualified manufacture's/supplier's engineers are to be employed for the installation and setting to work (STW) of offered sonar simulator.
- c. After completion of installation of the system, the supplier shall carry out a detail test of all the equipment and Simulator operation in presence of BN experts/ technicians.
- d. After completion of installation and detail test of all the equipment and system, the supplier will confirm the readiness of the Simulator for final acceptance test. The bidder shall provide technical assistance as required to support initial commissioning and test/ trail of the system.
- e. All expenses for OEM installation team including accommodation, food, air fare, etc are to be borne by the bidder.

74. **Test, Trial and Final Acceptance.**

- a. **Test/ Trail.** The supplier will ensure satisfactory tests, trial and functioning/ commissioning of the Simulator at purchaser's premises.
- b. **SAT.** System Acceptance Test (SAT) will be carried out on completion of setting to work (STW).
- c. **SAT Protocol.** The SAT protocol/ procedures are to be submitted by the bidder and to be approved by BN well in advance. Supplier shall submit two copies of SAT Protocol to the purchaser not less than eight weeks prior to the commencement of SAT.
- d. **Final Acceptance.** The supplier shall carry out SAT of the Simulator in the presence of the BN team. On completion of satisfactory SAT, the final acceptance certificate will be jointly signed by the purchaser and supplier.

75. **Certificates.** Following certificates are to be provided in English for the Simulator and all associated equipment during delivery/ with tender offer (as applicable):

- a. Certificates of Standard.
- b. Quality Assurance Certificates.
- c. Factory Acceptance Test (FAT) Certificate.
- d. Stage Inspection Certificates.
- d. Guarantee and Warranty Certificates.
- e. Country of Origin and Country of Manufacture Certificates.
- f. Year of Production Certificate.
- g. OEM Authorization Certificate.

76. **Brochures/ Booklet.** One set of original brochures / booklets in English having detail technical information about the offered Simulator including software features are to be provided along with the tender quotation for evaluation/ assessment.

77. **User List/ Client List.** List of users of offered Simulator is to be mentioned with full address. The list shall provide the name of various Navies/ Coastguard/ Maritime Agencies with

respective model and brand of Simulator and year of delivery. The user list/ client list will be used for the assessment of the tender offer.

78. **Maintenance Support.**

- a. **Reliability & Maintainability.** The simulator shall be highly reliable and easy to maintain with low maintenance cost. Modular design of site replaceable units would be highly preferable. The built in self-test facility for the simulator and all section and sub-section are to be incorporated.
- b. **Special Tools.** Special tools and special test equipment (network related tools, test equipment and other tools) shall be provided by the bidder that may be required for the installation, assembling, replacement of unit or any other maintenance purpose.
- c. **Preventive Maintenance.** The bidder is to highlight the schedule of required maintenance for the offered system.
- d. **Expected Life.** The bidder is to mention the expected life of the offered system, which shall not be less than 15 years.
- e. **After-Sale Service.** The technical service through online support or physical support of OEM expert is to be provided as and when required during warranty period. Moreover, at the end of warranty period BN may go for maintenance contract with OEM based on mutual consent of both the parties.

79. **Warranty.**

- a. Minimum 24 (twenty-four) months warranty is to be provided from the date of acceptance by the buyer. If any component of the supplied items becomes defective during the warranty period, the warranty shall be extended automatically (for relevant component) for the period of the subject component remains defective.
- b. For warranty repair/ replacement, the supplier will collect the defective item from NSD, Chittagong/ NSSD, Dhaka (as applicable) and re-supply the same to collecting place after warranty repair or for replacement within 60 (sixty) days from the date of defect at no cost to the purchaser. Freights and insurance charges for both the ways for the item and cost of site visit by OEM engineer (if needed) are to be borne by the supplier.
- c. The supplied items/ equipment on warranty shall be identified by attaching a warranty label/ disc or stenciling as shown below:

Contract No and Date	
Warranty Begins on	
Warranty Expires on	

80. **Guarantee for Spares Support.** The supplier is to give guarantee of continued supply of spares for at least 10 years at a reasonable price. The price of the required spare parts are to be quoted separately. Yearly increase of price of spares should not be more than 3% of the price list that is to be submitted with the tender offer.

81. **Liquidated Damage (LD) (As per DGDP Rule).** In case the Supplier fails to complete the shipment, delivery and installation within the stipulated date due to Supplier's reason/ fault, the purchaser has the right to impose and recover Liquidated Damage (unless waived off) at the rate of 2%, but not less than 1% of the value of the unsupplied quantity of the item(s) per month for the period exceeding the original delivery period, subject to the provision that the total liquidated damages thus liable shall not exceed 10% of the total contract value.

82. **Grace Period (As per DGDP Rule).** Delay in supply of stores up to 21 (twenty-one) days shall be regarded as "Grace Period" available to the supplier and delivery date shall be considered to have been automatically extended up to that limit without issuance of any formal amendment. For delay beyond 21 (twenty-one) days, formal amendment to the delivery period shall be required. For purpose of imposing LD, if and when imposed, grace period shall be inclusive i.e. LD shall be calculated from the original delivery date and not from the expiry of the grace period.

83. **Performance Guarantee (PG) (As per DGDP Rule).** The supplier shall furnish a Performance Guarantee (PG) before signing the contract as per DGDP format in the shape of Bank Guarantee @ 10% of the CFR/LC value in foreign currency as security of the contract. The PG is to be submitted in favour of Senior Finance Controller (Navy), Lalasarai, Sailors Colony, Mirpur-14, Dhaka-1206, Bangladesh through any schedule bank located in Bangladesh. The PG must remain valid for at least 03 (three) months after the test and trial of the simulator. The PG shall be released by the SFC (Navy) on receipt of a certificate from DGDP to the effect that the supply has been completed satisfactorily and No Objection Certificate (NOC) has been received from the purchaser. If the contractual obligation warrants the extension of the validity of the PG, the Supplier shall remain liable to do so at his own cost. If however, the Supplier, despite being requested by DGDP, fails to extend PG before expiry of validity, necessary steps shall be taken by DGDP to encash the PG without further notice. In case of failure of the Supplier, to fulfill the contractual obligation as per terms and conditions of the contract, PG in full or part thereof may be forfeited at the discretion of the purchaser.

84. **End User Certificate (EUC) (As per DGDP Rule).** The purchaser shall provide the supplier with an End User Certificate (EUC) (if asked) on original copy after signing the contract. However, the requirement of EUC should be submitted within 01 (one) month of signing the contract. In case of unusual delay, the purchaser shall not be responsible for delay in executing the contract.

85. **Offer Validity:** The offer will remain valid up to 30 June 2025.

86. **Price.**

a. Price of each element of the total offer is to be shown separately (e.g. price of the main items, additional and optional items, Installation and STW, Training, Warranty/ Guarantee, etc) and the grand total of the foreign currency to be shown on the original offer submitted by the supplier. The price to be quoted for each of the following but not limited to:

- (1) Main Equipment including hardware, software, accessories showing item-wise price breakdown
- (2) Optional Equipment/ Item (if any).

- (3) Foreign Training.
- (4) Local Training.
- (5) Installation, STW and Commissioning.
- (6) Spares and Tools.
- (7) Warranty.

b. Price/ cost of locally supplied items is to be quoted separately in local currency.

87. **Terms of Payment.** 100% payment (except payment in local currency) will be made through irrevocable Letter of Credit (LC) opened with scheduled bank in Bangladesh for the complete scope of supply with the following terms of payment:

a. First installment of 20% (twenty percent) of CFR value shall be paid to the supplier upon presentation of following documents:

- (1) Bank Guarantee (BG) for the total amount (20% of the total LC value).
- (2) On successful completion of Stage Inspection.
- (3) Submission of Stage Inspection Certificate signed by both SUPPLIER and SUPPLIER.
- (4) Submission of SUPPLIER's signed Commercial Invoice and export permission.

b. Second installment of 20% (twenty percent) of CFR value shall be paid to the supplier on completion of FAT and shipment of all items including equipment, hardware, software and submission of all necessary documents as per DGDP rule, such as:

- (1) Original bill of lading/ airway bills issued by the carrier. Freight amount must be shown in the bill of lading/ airway bills.
- (2) Supplier's signed invoice(s) and packing list.
- (3) Certificate of Country of Origin and Country of Manufacture.
- (4) Certificate of Brand New Item and Genuineness.
- (5) Warranty and Guaranty Certificate(s).
- (6) FAT Certificates.
- (7) Shipment Clearance Letter of DGDP.

c. Third installment of 40% (forty percent) of CFR value shall be paid to the supplier on successful completion installation and STW of Sonar Simulator in PURCHASER's location.

d. Fourth installment of 20% (twenty percent) of CFR value shall be paid to the

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89. **Special Condition.** The offered simulator will be considered as defense stores and shall be used by the Bangladesh Navy only. Hence, the simulator along with associated accessories shall be exempted payment of custom duties and sale Tax as per Ministry of Finance Memo Number 9(41)/NBR/CUS-IV/72/246 dated 10 April 1981.

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