REQUEST FOR INFORMATION

PROCUREMENT OF NAVAL MULTI ROLE HELICOPTER (NMRH), SIMULATORS AND ASSOCIATED EQUIPMENT AS FOR INDIAN NAVY (*IN*) THROUGH STRATEGIC PARTNERSHIP

1. **Introduction**. The Ministry of Defence (MoD), Government of India, intends to procure approximately 123 Naval Multi Role Helicopters (NMRH) along-with spare engines, three flight simulators, one maintenance simulator, and infrastructure including ToT, 10 year Performance Based Logistics, associated shore support, Engineering Support Package (ESP), training, documentation and spares package along with contemporary state of the art equipment, weapons and sensors under Strategic Partnership i.a.w. Chapter VII of DPP 2016. The **Indigenous Manufactured** portion of the procurement is to be manufactured in India based on design to be provided by the foreign OEM to the selected Strategic Partner.

2. The MoD, Government of India seeks information from the helicopter OEMs/ authorized agencies for participation in NMRH project in accordance with Chapter VII of DPP 2016. The RFP for the acquisition is likely to be issued by mid 2018.

3. **RFI Structure**. This Request for Information (RFI) consists of two parts as indicated below: -

(a) **Part I**. The first part of RFI incorporates the intended use of helicopter, Essential Parameters, Transfer of Technology, desired indigenous content, delivery schedule and training that should be met by the OEMs.

(b) **Part II**. The second part of the RFI states the methodology of seeking response of OEMs. Submission of incomplete response format will render the OEMs liable for rejection.

Part-I

4. **Intended Use of Helicopter**. The helicopters would be procured in two variants viz NMRH (Multi Role) and NMRH (Special Ops). The intended use of the helicopters are as follows:-

(a) **NMRH (Multi Role)**

(i) Anti Submarine Warfare (ASW).

(ii) Anti Surface Warfare (ASuW).

(iii) Electronic Intelligence (ELINT).

(iv) Search and Rescue.

(v) External Cargo Carrying (min 2500 kg).

(vi) Limited Casualty Evacuation.

(b) **NMRH (Spl Ops)**

(i) Special Ops and Commando Role

(ii) Troop Carriage

(iii) Maritime Interdiction including Anti-Piracy Operations.

(iv) Combat Search and Rescue (CSAR)

(v) External Cargo Carriage (min 2500 kg)

(vi) Limited Casualty Evacuation (CASEVAC)

(vii) Humanitarian Assistance and Disaster Relief (HADR).

(viii) Logistics and Communication duties.

5. **Essential Technical Parameters**. The helicopter should be twin-engine; having wheeled landing gear, dual flying controls (two pilot seats) and blade fold capability with weight less than 12.5 Tons. The helicopter should be capable of operating from ships and ashore. Towards maritime surveillance and targeting capability, sensors and weapons to meet the envisaged role would be required to be integrated with the helicopters. OEMs are requested to provide quantified technical, operational and maintenance parameters as queried in **Appendix A**, as per existing/ achievable capabilities (with time frame). In addition, the OEM is to provide **Para-wise** compliance for all aspects brought out at **Appendix A**, along with specific comments for compliance (if any). Supporting relevant documents and literature are to be provided. Vendors may also utilise this opportunity to recommend the capabilities proposed in terms of Essential Parameters–A and Essential Parameters-B i.a.w DPP 16. OEMs may provide additional info, if any, considered suitable towards performance of helicopter.

6. **Field Evaluation Trials**. The Field Evaluation Trials will be conducted in accordance with Chap VII of DPP 16. OEMs may indicate suggested trial methodology and parameters for which evaluation can be done through simulation/ certification/ documentation/ demonstration etc at TEC/ FET stage.

7. **Approximate Cost Estimate**. The OEM is to provide indicative cost for NMRH program under SP Model outlined in Chapter VII of DPP 2016. The OEMs

should take into account all aspects of supply of production material, manufacturing, Transfer of Technology, trials, 10 years Performance Based Logistics, documentation, training and life cycle support for a period of 30 years. Other aspects (if any) may be mentioned specifically. Breakdown of cost is to be indicated.

8. **Basic Design**. The Foreign OEM is to indicate the Basic Design (Base Model) of a proven helicopter based on which the current design is being proposed along with the names of customer navies or Coastguard to whom the same or similar helicopter (model of helicopter) has been contracted or delivered. In addition, the range of Air launched missile, Light Weight Torpedoes and Depth Charges that are available in the world market and have already been integrated or capable of being integrated into the basic design of helicopter on offer is to be indicated.

9. **Acceptance of Foreign OEMs Govt**. The foreign OEM is to state in unambiguous terms that, "*as a part of response to the Expression of Interest (EoI), OEMs will provide a formal acceptance of their Govt that necessary license to transfer technology will be granted in case the OEM is selected as a partner for the Indian SP to manufacture the platforms or equipment in India, wherever required, prior to issuance of RFP*". Requirement to conclude inter governmental agreements between India and the countries concerned, at the stage of award of contract may also be intimated.

10. **Transfer of Technology (ToT).** The Government of India, Ministry of Defence is desirous of acquiring technologies including detailed manufacturing know how of the helicopter being offered by the OEM. The key requirements related to ToT which are to be fulfilled by the OEMs are given at **Appendix B**. In case any ToT requirement cannot be met, the level of minimum acceptable ToT as per Appendix G to Schedule 1 to Chapter II of DPP 2016 along with the percentage of achievable value addition is to be indicated. Government of India reserves the right to negotiate ToT terms subsequently but the availability of ToT would be an essential pre requisite for processing the instant case. The OEMs are to give Para wise compliance to the ToT requirements at **Appendix B**. Guidelines for ToT is laid down at **Appendix C**. The ToT plan is to be submitted highlighting the following:-

(a) Range, depth and scope of technology transfer offered in identified areas.

(b) Extent of indigenous content proposed.

(c) Extent of eco-system of Indian vendors/manufacturers proposed.

(d) Measures to support SP in establishing system for integration of platforms.

(e) Plans to train skilled manpower in India.

(f) Extent of future R & D planned in India.

11. **Indigenisation Content (IC)**. In line with the 'Make in India' initiative of the Government of India, the OEM is to ensure that all efforts are made to maximize the Indigenous Content (IC) of the project without any deterioration in performance standards as specified at **Appendix A**. India has developed a vibrant industrial ecosystem of helicopter equipment which is engaged in design and manufacture of cutting edge components and equipment for use on other Projects. OEMs are to maximize IC in the proposed design. The IC will be stipulated in the EoI and shall not be less than 40% on cost basis of the Make portion of contract as calculated in accordance with Para 13 of Chapter 1 of DPP-16.

12. **Integration of Weapons and Sensors**. The OEM is to indicate experience in integration of customer designated or nominated weapons and sensors. The weapons and sensors integration experience shall include airborne Missiles, Light Weight Torpedo (LWT), Depth Charge and sensors {such as Electro Optical (EO) Pod, Data Link, Self Protection Suite, Software Defined Radio, Identification Friend Foe (IFF) responder etc}. The details of weapons and nominated equipment shall be intimated at a later date. Any reservation regarding integration of weapons and sensors from suppliers of other countries is to be highlighted in unambiguous terms. However, Ministry of Defence, GoI shall facilitate necessary clearances for release of the required interface codes of weapons from weapon suppliers to the OEM or their sub-vendors (as per requirement).

13. **Tentative Delivery Schedule**. The OEM is required to indicate the overall time frame of delivery of 'Fully Furnished Buy' component of helicopter and helicopters 'made' in India. It should include stage wise break-up of the entire project post conclusion of contract. The delivery schedule is to be in line with the training schedule and schedule of Technology Transfer. In drawing up the delivery schedule the following guidelines are to be borne in mind:-

(a) Helicopters and simulators are to be delivered in batches along with proportional spares, spare engines, Ground Support Equipment (GSE), Ground Handling Equipment (GHE) and documentation.

(b) Missiles, Torpedoes, ammunition, are to be delivered in a phased manner proportionally along with the Multi Role Helicopter.

(c) Maintenance Repair and Overall (MRO) facility is to be set up in India in stages and commissioned for all maintenance facility at least one month prior to delivery of helicopter at designated place.

14. **Warranty**. The supplied helicopter (s) and equipment shall carry a warranty of 24 months from the respective date of delivery or acceptance of each helicopter, simulator and equipment, whichever is later. The warranty should cover both hardware and software as applicable. The simulators shall carry Comprehensive Annual Maintenance Contract of 10 years after warranty.

15. **Training of Crew and Maintenance Personnel**. The OEM is to provide broad plan of training of all personnel as applicable (instructors, pilots, aircrew men diver, maintenance staff etc). OEM should also indicate the place of training of crew.

16. **Service Life of Helicopters**. The minimum Service Life of the Helicopter is required to be 30 years. The OEM is required to give details of the reliability model, reliability prediction and its validation by designer or manufacturer to ensure reliability of stores throughout the service life of the Helicopters. In addition availability of stores/ spares is to be ensured as stipulated in 'Product Support Requirements'.

17. **Manpower Requirements**. The OEM is to indicate the Broad requirements of crew to man the Helicopter, for Indian Helicopter Training Team, Shore Support Organisation, Logistics Establishment, Operational Maintenance staff, etc. Need to keep manpower requirement to minimum commensurate with operational and functional efficiency is to be borne in mind.

18. **Broad Methodology to be Adopted**. Post receipt of the response of the RFI, the methodology adopted to progress the NMRH program will be in accordance with Chapter VII of DPP 2016.

19. **Information Proforma**. The OEM is to furnish details as per the Information Proforma at **Appendix D**. In addition, the OEM is to indicate capability and willingness to execute the NMRH programme and provide support to the SP including the following :-

(a) Technical support for manufacturing of helicopter by the SP. This shall include but not limited to consultancy for setting up and modification of infrastructure with SP, training of personnel from SP in requisite skills related to design, manufacture, quality assurance, quality control, preservation of equipment & storing techniques, basic operation of maintenance of helicopter equipment, provision of suitable documentation, providing overseeing support by OEM specialists, etc.

(b) Maintenance and life cycle support to the helicopter during its service life, including Performance Based Logistics and warranty through SP.

(c) Upgradation of helicopters as part of capability augmentation and to overcome obsolescence during its lifecycle.

(d) Willingness of accepting responsibility in conjunction with the selected SP for the timely production and performance of the helicopters. The same could be implemented by one to one contracts with the SP or tri-partite contracts involving MoD, SP and OEM as per Chapter VII of DPP 16.

(e) Willingness to provide product support for Life cycle of the platform, which includes spares and maintenance tools/jigs/fixtures for field and component level repairs through MRO.

(f) Willingness to accept all conditions of DPP-16, if not, which Para or Clause of DPP-16 is not acceptable is to be indicated. Further, the vendor may be required to accept the general conditions of contract given in the Standard Contract Document at Chapter VII of DPP placed at www.mod.nic.in.

(g) Earliest date by which the OEM is willing to give a presentation at IHQ MoD (N)/DAA, New Delhi. The presentation is to be provided by a team of specialists with the required knowledge and mandate for addressing various queries/clarifications made by the Indian Navy.

20. The offers shall be evaluated in accordance with provisions of Chapter VII of DPP-16. The Foreign OEM is liable to be disqualified for any materially false statement.

Part-II

21. **Procedure for Response**.

(a) **Format**. The details of technical requirements and ToT are to be forwarded as mentioned in **Appendix A** and **Appendix B** of RFI respectively in terms of specifications, parametric information, description and particulars as mentioned against each item. The guidelines for Transfer of Technology are placed at **Appendix C**. In addition, vendors are to provide specific inputs sought for requirements as indicated against each in the Annexure. OEM must also fill the form of response as given in **Appendix D** of RFI. Apart from filling details about company, details about the exact product, planned infrastructure, past track record etc should be carefully filled. Additional information on the product and product support facilities can be also attached with the form.

(b) **Address for Response**. The filled form and the response (hard and soft copies) should be dispatched to the under mentioned address:-

The Principal Director
Directorate of Aircraft Acquisition
Room No 96, IHQ MoD (Navy), 'A' Block Hutments,
Dara Shukoh Road, New Delhi 110011

Fax: 011-23010528

Contact Details: JDAA 011- 23010514

(c) **Time for Response**. Last date of acceptance of receipt of response is **06 Oct 17.**

22. The Government of India invites responses to this RFI only from Original Equipment Manufacturers (OEM) or Authorised Vendors or Government Sponsored Export Agencies (applicable in case of countries where domestic laws do not permit direct export by OEM). The end user of the equipment is the Indian Navy.

23. Reply to this RFI (and further communication on the case, including equipment description, training and documentation) are to be made in English language only. Response to the RFI is to be provided in hard and soft copy. The compliance tables to all aspects are required to be provided in editable form (preferably Microsoft excel).

24. This RFI is being issued with no financial commitment and the Ministry of Defence reserves the right to change or vary any part thereof at any stage. The Government of India also reserves the right to withdraw it, should it be so necessary at any stage.

25. The response needs to be detailed with provision of specific or not less than or not exceeding parameters so as to facilitate formulation of Staff Qualitative Requirements at IHQ MoD(N)/DAA.

Appendix A
(Refers to Para 5 of RFI)

BROAD IMPORTANT TECHNICAL, OPERATIONAL AND GENERAL PARAMETERS FOR WHICH INFORMATION IS REQUIRED NAVAL MULTI ROLE HELICOPTER (NMRH)

1. **Basic Configuration – NMRH (Multirole)**.

(a) Can the baseline NMRH (Multirole) offered by OEM be equipped with standard mandatory equipment and systems for day and night flying manned by crew of maximum four persons (two pilots and two crew) along-with with Data Link, Surveillance Radar, Electronic Support Measure (ESM), Sonar and Sonics system, Electro Optical Device (EOD), Identification Friend or Foe (IFF), Aeronautical Information System (AIS), Tactical Air Navigation System (TACAN), Flight Data Recorder (FDR), Cockpit Voice Recorder (CVR), Emergency Locator Beacon (ELT) , Satellite Communication (SATCOM), Software Defined Radio (SDR) (two V/UHF & one HF set), rescue hoist and deck lock system?

(b) Can it have the provision for carrying and firing role-appropriate weapons and expendables, integrated self protection suite for continuous monitoring, warning and countermeasures dispensing against infrared, laser and radar guided threats besides standard mandatory fittings for day and night flying manned by crew of maximum four persons?

2. **Basic Configuration – NMRH (Spl Ops)**. Can the baseline NMRH (Spl Ops) be equipped with at least two pintle mounted guns in the cabin, Data-Link, Weather Radar, AIS, TACAN, IFF, EOD, FDR, CVR, ELT, SATCOM, SDR (two V/UHF & one HF set), rescue hoist, Deck Lock system, Integrated Self Protection Suite for continuous monitoring, warning and countermeasures dispensing against infrared, radar and laser guided threats besides standard mandatory fittings for day and night flying manned by crew of maximum four persons (two pilots and two crew)?

Conditions for Use of both Variants

3. **Operating Environment**. All performance parameters specified for the helicopter, equipment and payloads are to be met iaw Indian Reference Atmosphere (IRA). Hover out of Ground Effect (HOGE) should be considered for all take offs and landings. The relevant parameters for IRA are as specified below:-

(a) Reference temperature for hover, takeoff and landing International Standard Atmosphere (ISA) +20°C.

(b) Reference temperature for sea level mean temperature- ISA+15°C.

(c) Reference temperature for upper air operating temperature (cruise and climb):- ISA+15°C.

(d) Lapse Rate – 6.5°C / km from sea level upto 16 km.

(e) Mean sea level pressure – 1013 mb.

4. **Certification**. Will the helicopters along with equipment and its payload be certified or qualified for airborne operations as per latest mil standards or equivalents prior to delivery?

5. **Ship-borne Operations**. Can the helicopter meet following conditions:-

(a) Operate from frigate and larger ships up to Sea State 4. Provided with Tie down / lashing points on the helicopter to ensure lashed stability when tethered to the deck as per operating manual.

(b) The maximum folded dimensions of the helicopter not more than 15.1 M in length, 5.0 M in width and 5.2 M in height for accommodating in hangar size of length 15.5 M, Width 5.5 M and height 5.3 M .

(c) Have necessary arrangements for securing to an adaptive Traversing Gear for movement of helicopter on ships decks.

Common Design Features and Systems for Both (Multirole as well as Spl Ops Variants)

6. **General Characteristics**. Can the helicopter's common design features for both variants have following features:-

(a) Total life of helicopter 30 years or more?

(b) The helicopter able to meet all role requirements including range endurance criterion with max All Up Weight of 12.5 Tons?

(c) Provisioning of Emergency Floatation Gear?

(d) Provisioning of Survival raft(s) or its equivalents for all crew members?

(e) Suitable means to ensure safe exit of all personnel onboard in case of ditching at sea?

(f) Availability of proven design with state-of-the-art technologies and provided with **IR** suppressors?

(g) Provisioned with redundancy for critical systems. No failure of one system leads to a catastrophic failure?

(h) The Integrated Self Protection Suite (ISPS) including Electronic Warfare system (in Multirole)/ Radar Warning Receiver (in Spl Ops), Missile Approach Warning System (MAWS) and Counter Missile Defence System (CMDS) against Infra Red, Radar and Laser Guided threats. In addition, fitted with Laser Warning Receiver (LWR) and Directed Infra Red Counter Measure (DIRCM) system?

(j) RWR having capability of intercepting, identifying and prioritising multiple airborne and surface based RF emitters and be able to activate / trigger the onboard CMDS?

(k) Fully programmable CMDS capable of dispensing both chaff and IR flares in automatic, semi-automatic and manual modes of dispensation?

(l) Quick erase facility for erasing the data stored in the storage media?

7. **Night Capability**.

(a) The helicopter cleared for day and night operation from ashore and afloat.

(b) The helicopter must be capable of night missions including hover over sea under dark-night conditions.

(c) NVG compliant cockpit/cabin/ external lights.

(d) Searchlight (with normal & IR filament) @ one per helicopter to be provided.

8. **Power Plant**. Will the helicopter have following wrt its power plant:-

(a) Full Authority Digital Engine Control (FADEC) / digital electronic engine governing with redundancy in case of failure of one engine?

(b) Engine health monitoring and diagnostic system?

(c) Self contained starter system without usage of external power?

(d) Engine of modular design?

(e) One Engine Inoperative (OEI) training mode available?

(f) Power plant providing quick response to power changes?

(g) Engine overhaul not be less than 1500 hrs?

(h) Interchangeable Engines?

9. **Transmission Systems**. Will the Transmission System have following:-

(a) Dry running capability for at least 30 minutes?

(b) Chip detection and neutralisation mechanism?

(c) Ballistic tolerance against gun fire from at least 7.62 MM calibre guns?

10. **Rotor System**. Will the Helicopter rotor system have following:-

(a) Foldable main rotor blades and tail pylon for storage and transportation with simple folding mechanism? Can the blade folding mechanism conform to the following:-

(i) Operate on a Frigate size ship by day and night?

(ii) Operate with a maximum of 02 ground personnel in less than 15 minutes in Primary mode?

(iii) Operate under relative winds up to 40 knots from any direction?

(iv) Require use of minimal tools and special equipment?

(v) Primary and alternate modes available?

(b) Provisioned with Rotor brakes?

(c) Ballistic tolerance against gunfire from at least 7.62 mm calibre guns?

(d) Replacement of individual main rotor blades if so required?

11. **Flight Control System**. Can the Flight control system of helicopter have following features:-

(a) Fully duplicated flying controls?

(b) Dual lane Automatic Flight Control System (AFCS) with stability and control augmentation?

(c) Four-axis stabilisation in auto pilot controlled manoeuvres.

(d) Pilot, co-pilot and hoist operator hover trim control?

(e) Automatic height control and autonomous/ independent plan position control in hover?

(f) Cable hover for NMRH (Multirole variant only)?

(g) Autopilot coupled modes for navigation, search patterns, coupled approaches to airfield and ships and transition down to hover at designated heights?

(h) Autonomous transition to and from hover?

12. **Fuel System**. Can the Helicopter fuel system be provisioned with following features: -

(a) At least one point each for pressure and gravity refuelling?

(b) Crash resistant, self sealing fuel tanks?

(c) Hover-In-Flight-Refuelling (HIFR) capability?

(d) Fuel jettisoning facility?

(e) Provision for fitment of additional internal/ external fuel tanks?

(f) Operate on JP5 and / or ATFK-50 and equivalent grades of fuel.

13. **Cockpit and Cabin**. Will the offered helicopter have following features:-

(a) Fully integrated glass cockpit with multi function colour displays?

(b) Sunlight, cross-cockpit and NVG readable MFDs with facility to exchange information between displays? Capability to display aircrew check list as a menu option?

(c) NVG compatible. Towards this, can it be equipped with suitable panel and cabin lighting compatible with GEN III+ or better NVG? Will all the internal and external lighting be compatible with GEN III+ or better NVGs? Will the helicopter be capable of undertaking operations with and without NVGs?

(d) **Helmet Mounted Sights (HMDS)**. Helmet Mounted Sight and Display System (HMDS) capable of displaying sensor, targeting and piloting information to the pilots? Will the HMDS have the capability to integrate night vision devices of GEN III+ or better form? Indicate following about HMDS:-

(i) **Day Display Module**

(aa) Symbology -

(ab) Contrast -

(ac) Distortion -

(ad) See-through transmission -

(ae) Exit pupil -

(af) Weight -

(ag) Compatibility –

(ah) Safety -

(ii) **Night Display Module**

(aa) Symbology -

(ab) Contrast -

(ac) Distortion -

(ad) Weight -

(ae) Compatibility-

(af) Safety -

(iii) **Control Unit**

(aa) Weight -

(ab) Illumination -

(iv) **Tracker**

(aa) Concept -

(ab) Tracker technology-

(v) **ASDC(Advanced Sight and Display Computer)**

(aa) Operation modes –

(ab) Power -

(ac) Weight -

(ad) Compatibility -

(e) Central fault detection and warning system.

(f) Audio warning for critical emergencies.

(g) Adjustable and crashworthy crew seats.

(h) Crew station compatibility with 5 to 99 percentile of Indian aircrew population.

(j) Environment control system.

(k) Rear view mirrors.

(l) Facility for escape & egress of crew from cockpit and cabin during emergency?

(m) Portable fire extinguisher for cockpit and cabin?

(n) Emergency exits clearly marked and illuminated to ensure visibility under dark conditions, with / without NVGs?

(p) Stress resistant windshield and cockpit structure to be provided.

(q) External loudhailer with microphone in the cabin or cockpit.

14. **Undercarriage**. Will the helicopter have following:-

(a) Crash worthy Landing Gear?

(b) Clearance under the helicopter to allow access for maintenance, fitment of weapons and traversing system on ships.

(c) Suitable Parking brake system capable of being used even when the helicopter is in switched off condition and can be recharged without need to start helicopters.

15. **Altitude Envelope**. Indicate following of the helicopter:-

(a) Absolute ceiling

(b) Service ceiling

16. **Speeds.** Indicate following at mean sea level:-

(a) Maximum Speed : ≥

(b) Cruise Speed :≥

17. **Miscellaneous**. Can the helicopter fitted with following additional equipment:-

(a) Sonar Locator Beacon.

(b) Mission Data Recorder.

(c) Health and Usage Monitoring System (HUMS) including in-flight vibration monitoring system along with licensed soft copy of the software.

(d) Telebrief System for communication between helicopter and flight deck crew.

(e) Relief tube.

18. **Electro Optic Payload**. Indicate at least following characteristics.

EO/IR FLIR.
(a) MWIR (Thermal Imager Camera) –zoom and FPA
(b) Type and capability of camera
(c) Controlled through own handgrip and capable of being connected to radar, DVR, MFD and GPS.
(d) Short Wave Infra Red (SWIR) facility for clarity of picture with ---------- pixels, ---------- um
(e) On Gimbal IMU facility of FOG technology or better, Geo-pointing & Geo-location/ranging. Accuracy better than 2.5 mrad in heading/ 1 mrad in attitude.
(f) Range at ambient temperature 25°C and RH 80% visibility 10 to 19 Km should be as follows:-
(i) **Fast Patrol Boat** - Maximum Detection and Maximum Recognition
(ii) **Merchant Vessel** – Maximum Detection and Maximum Recognition
(g) Range at ambient temperature 25°C and RH 80% visibility 20 Km or more should be as follows:-
(i) **Fast Patrol Boat** - Maximum Detection and Maximum Recognition
(ii) **Merchant Vessel** – Maximum Detection and Maximum Recognition
(h) The prime contractor should be responsible for installation and integration of the equipments and for interfacing it with radar.

19. **Search Light**. Will the helicopter be provisioned with normal and IR filament searchlight?

20. **Crashworthy Crew Helmet (NVG Compatible)**. Will the offered Helicopter be provisioned with crashworthy aircrew helmets compatible with Gen III night vision goggles (with colour display)?

21. **Navigation System**. Will the helicopter be provisioned with following:-

(a) Inertial Navigation System Global Positioning System (GPS/INS) coupled navigation system of contemporary technology with accuracy of the order of equal to or lesser than 2% RMS for the entire duration of sortie, whether flying over land or sea. Can the ***INS-GPS*** be based on Ring Laser Gyroscope (RLG) or Fibre Optic based system. In addition, will the system be upgradeable to include Global Navigation Satellite System (GLONASS) in place of GPS. Will the software be capable of providing navigation information at all latitudes and longitudes?

(b) Navigation system capable of giving necessary output directly or through a controller to other mission systems? Can a digital moving map display be included along with digital maps of the Indian Ocean Region (IOR) (upgradeable)? In addition, will it have facility for the user to load maps of any desired area?

(c) Navigation system having quick settling time (not greater than eight minutes after switching on the equipment).

(d) Indication for Radio Altimeter and Clock for both pilots.

(e) Stand-by equipment to allow safe and accurate navigation in the event of failure of internal avionics or inputs from external sources.

(f) Interfaced with other mission systems for targeting and navigation.

(g) One additional stand alone satellite based navigation system capable of operating independently or with INS in coupled mode.

(h) Certified and capable of IFR operations and be fitted with ILS, VOR /DME and TACAN.

(j) Enhanced GPWS.

(k) System architecture of the navigation equipment possessing spare capacity for future upgrades.

22. **Communication**. Can the helicopter be provisioned with three Software Defined Radio (SDR), two for V/UHF and one for HF as per details placed at **Annexure IV**. Will it have following:-

(a) At least two digital and modular V/UHF sets (SDRs)?

(b) One HF modern modular digital set (SDR)?

(c) Interoperability with user defined data link equipment?

(d) **SATCOM**. **UHF Band**

23. **Data Link**. Can the helicopter be provisioned with Buyer nominated Data Link.?

24. **Automatic Identification System (AIS)**. Will the helicopter be provisioned with compact lightweight AIS transmitter and receiver? Will the AIS transmitter be capable of being user controlled? Can the received data be capable of being viewed in cockpit in addition to being transferred by data-link?

25. **Identification Friend Foe (IFF)**. Can the helicopter be provisioned with IFF Mk XII (S)?

26. **Rescue Winch**. Can the helicopter be fitted with a removable Rescue Hoist with compatible rescue strop and with cable length of at least 200 feet capable of at least three lifts in 30 minutes of weights equal to 275 Kgs? In addition can the following be provided:-

(a) Secondary mode of operation to cater for failure of primary mode of operation of rescue hoist?

(b) Rescue hoist fitted with cable cutter operable by pilots as well as rear crew in emergency situations?

(c) Winch speeds selectable by the operator?

(d) Winch equipment located to facilitate ease of helicopter in Flight Refuelling (HIFR) through pressure refuelling point?

(e) Double lift rescue strops (for two men simultaneous lift) @ two per helicopter along with the helicopter? Can the rescue hoist incorporate operator selectable variable speed control? Provided with trainable flood light with both ***IR*** and normal filaments for undertaking night winching operations?

27. **Cargo Operations**. What would be the under slung cargo capacity of the cargo hook in Spl Ops version?

28. **FDR, CVR & ELT**. Can the helicopter be provisioned with fourth generation FDR, CVR along-with automatic and manual means of deployment over land and sea? Can the ELT be provided? Will it have Licensed software (by means of CD etc) to milk and analyse the data on desktop PC. What would be the maximum duration of recording of FDR and CVR? What would be the life of ELT in water?

29. **Self Protection Suite**. What would be the configuration of Self Protection Suite for NMRH (Multirole) and NMRH (Spl Ops)? Indicate separately.

30. **Ground Based Mission Planning and Debriefing System**. Can the following be provided:-

(a) Modern design Mission Planning and Debriefing System with data transfer facility?

(b) Facility for loading flight, mission and navigational information including digital maps and charts to Mission Control System?

(c) Facility to download mission log file for playing back the reconstructed mission on desktop PC?

(d) Capability to system interface with helicopter through suitable data loaders or input-output devices?

31. **Availability and Reliability**. What would be the average helicopter availability and Mission Reliability with the helicopter Utilisation Rate (UR) being 30 hours per month?

32. **Weapon Sensor Integration**. Will it be possible for vendor to install weapons nominated by ***IN,*** in lieu of the weapons proposed by OEM?

33. **Maintenance**. For requirements of ship based operations and ease of maintenance, can the following be provided as per categories mentioned against each:-

(a) Continuous health monitoring of all avionics, airframe and engine equipment by the maintenance software resident in the mission computer?

(b) Systems designed with inbuilt capability of carrying out system checks after defect rectification or parts replacements for avoiding test equipment at frontline?

(c) Incorporation of Prognostic Health Monitoring (PHM) which includes automated scheduling of helicopters for flights, maintenance and spares demand?

(d) Built in test/ performance/ defect monitoring of systems/ equipment for both on line and off line modes?

(e) Access panel for facilitating front line servicing of the helicopter and quick release fasteners to facilitate front line maintenance?

NMRH (Multirole) Operational Characteristics

34. **Specific Performance Requirements – NMRH (Multirole)**. Will the NMRH have following in NMRH (Multirole):-

(a) Capable of compiling an integrated surface and subsurface picture of the area under surveillance?

(b) Ability to locate and attack surface and sub surface targets?

(c) Capable of providing targeting data to other units?

(d) In addition to basic configuration defined above, ASW suite as per **Annexure I**.

(e) **Weapons and Expendables**. At least two weapon stations so as to enable operating Anti Ship Missiles (ASM), Light Weight Torpedoes, and Depth Charges. At least two Anti Ship Missiles (ASM) in ASuW role and at least two light weight torpedoes in ASW role. Capable of launching both short range EO / IR data-link enabled or wire guided ASMs and long range fire and forget missiles. ASW Weapon outfit as per **Annexure II** and ASM as per **Annexure III**.

(f) **Range and Endurance**. Will the Basic Variant of the helicopter, as defined in **Para 5** indicate Range and Endurance criterion as follows:-

(i) **ASuW Role**. In Anti Surface Warfare (ASuW) role, what would be the maximum range that the helicopter would be capable of transiting from the launching ship with a maximum ASuW payload of two long range fire and forget Anti Ship Missiles (ASMs) and return to the launch position (with both ASMs unspent) with sufficient (15 % of mission fuel) reserve endurance?

(ii) **ASW Role**. In Anti Surface Warfare (ASuW) role, what would be the maximum range from the launching point that the helicopter would be capable of proceeding for engaging in ASW dunking operations for 02 Hrs duration (Time on Task) with a maximum ASW payload of two torpedoes and return to the launch position (with both torpedoes unspent) with sufficient (15 % of mission fuel) reserve endurance?

(iii) **Ferry Range**. What would be the maximum deployment range of the helicopter with internal fuel?

35. **Mission Control System**. Can the helicopter be equipped with following:-

(a) Dual redundant Mission Control System integrating all weapons and role sensors on board the helicopter, based on Mil 1553B, ARINC 419 and/or ARINC 429 data bus on as required basis?

(b) Open architecture with feasibility for easy integration for 'add-on' equipment?

(c) Mission Control by the TACCO and SENSO on board helicopter through centralised weapon / sensor exploitation?

(d) Digital recording of the mission including EOD on suitable media. Usable on Ground Based Mission Planning and Debriefing System mentioned above?

(e) Integrated contact data processing and display of Target Motion Parameters?

(f) Sensor and flight control systems data exchange facility?

(g) Sensor functions for both TACCO and SENSO?

(h) Software is to be developed in accordance with IEEE 12207 standards. Development stages shall be customized?

36. **Tactical Display System (TDS)**. Can the TDS be part of Mission Control system and have following features :-

(a) Display of all targets received from the radar, AIS, sonar, Sonics system, ESM and EOD to be selectable by TACCO, SENSO?

(b) Visual representation of pre-programmed searches and sonobuoy plans?

(c) Continuously updated `present position' of the helicopter with heading and speed vectors?

(d) Tracking of targets, including group targets?

(e) Easy retrieval of target parameters?

(f) Suggested solutions for attack and necessary software interface for firing of weapons?

(g) Visual representation of sonobuoys in water.

(h) Indication of ESM bearings.

(j) Flight plan display including waypoints (minimum 60) settings.

(k) Mission flight parameters viz date and time, payload, endurance etc.

37. **Radar**. Can the helicopter be provisioned with following:-

(a) Contemporary airborne surface search radar (**max weight including antenna, cable and accessories 80 Kgs**) designed for the detection and tracking of ships, submarine periscopes and detection of low flying air targets against heavy sea surface clutter?

(b) Radar with at least following features (indicate additional features, if any) : -

(i) Automatic target tracking of minimum 100 targets of all types.

(ii) Capable of auto tracking of operator designated targets to cater for fast manoeuvring targets and “picture freeze” function.

(iii) **Bearing Accuracy**. $\pm$ 2^0 or better

(iv) All round radar coverage with total blind sector less than 20^0.

(v) Group tracking of targets and ISAR (Inverse Synthetic Aperture Radar) capability.

(vi) ECCM features.

(vii) Target position information as selected by operator from radar be automatically transferred to TDS page.

(viii) Facility to integrate IFF interrogator (Buyer furnished) and AIS with Radar / Tactical Display.

(ix) **Slave EOD Feature**. Provision to Slave EOD with Radar / Synthetic contact as well as way point.

(x) **Target History**. Tactical Display system with facility to display history of the targets in the form of trails / dots.

(xi) **Tracking Accuracy**. Minimum accuracy of +/- 5° deg (Course) and +/- 1 knot (Speed).

(xii) **Range Discrimination**. Equipment operating at lower range scale at shorter pulse width capable of discerning two small targets on same bearing, separated by not more than 75 m in range.

(xiii) **Bearing Discrimination**. Equipment operating at lower range scale capable of discerning two small targets both detected at same range and separated by not more than 3^0 in bearing.

(c) Multiple modes of operation as follows:-

(i) **Surface**. Long and short range surveillance capability with ISAR capability.

(ii) **Weather**. Capable of indicating cloud densities in colour.

(iii) **Navigation**. Ground mapping facility with flight plan and waypoint overlay.

(iv) **Air-to-Air mode**. Air-to-air search capability with ability to search and detect air targets.

(v) **Zoom facility**. Display zoomed picture for a selected area for enhanced target discrimination.

(d) **Surface Surveillance**. Ability to detect targets as follows (indicate additional capability, if any): -

(i) **1 M^2 Target (Periscope)**. Detection range better than 15 nm at about 500 ft helicopter altitude.

(ii) **10 M^2 Target (Small Boat)**. Detection range better than 25 nm at about 1000 ft helicopter flight altitude.

(iii) **100 M^2 Target (Small Ship/FPB)**. Detection range better than 50 nm at about 3000 ft helicopter flight altitude.

(iv) **1000 M^2 Target (Frigate)**. Detection range better than 65 nm at about 3000 ft helicopter flight altitude.

(e) **ISAR (Inverse Synthetic Aperture Radar) Capability**. ISAR mode to generate a 2D image of surface targets, with a range resolution of 3m. Provisioned with associated memory bank for developing a target library by the buyer for identifying targets. Will the performance parameters meet following (indicate additional capability, if any): -

Target RCS (in square m)	**Altitude** (feet)	**Classification Range (nm)** (Equal to or better than)
100 (Patrol Boat)	3000	40
1000 (Frigate)	3000	60

(f) What would be maximum weight of radar including all accessories?

38. **Sonar.** Will the onboard Sonar be a portable, integrated panoramic variable depth sonar operating at frequencies of 5 KHz or lesser and capable of being trailed during transit between dunks. Can the sonar system be combined with a Sonics system? Details placed at **Annexure I**.

39. **Sonics System.** Will the Sonics system be capable of deploying active and passive sonobuoys in the low frequency range covering the LOFAR spectrum and processing the information received from the buoys for localisation and identification of targets as per details placed at **Annexure I**?

40. **Sonobuoys**. Will the sonobuoys associated with the system have the following features:-

(a) Acoustic frequency range covering the LOFAR spectrum.

(b) Active and passive sonobuoys.

(c) Hydrophone with adjustable cable length between 20 and 400 metres or more.

41. **ESM System**. Will the ESM system have at least following features (indicate additional capability, if any):-

(a) Frequency coverage from 0.5 to 40 GHz.

(b) DF accuracy variations in 0.5 to 2.0 GHz and 18 to 40 GHz are to be not greater than 5 RMS and in 2 to 18 GHz not greater than 2 RMS.

(c) Pulse width from 50 nano seconds to at least 200 µsec.

(d) Sensitivity -65 dbm or better.

(e) 360° azimuth, +/- 45° elevation coverage.

(f) Freq measurement accuracy at least 1 MHz.

(g) Minimum dynamic range of 60 db.

(h) Able to detect and automatically define various PRI types, such as jitter, stagger, hopping dwell & switch and pulse group reception.

(j) Suppression/ blanking of onboard emitters including IFF through hardware/ software means.

(k) Able to report different pulse types such as CW, LFM (up/down), PW changing, Multi mode and Phase Modulated Signals.

(l) Minimum pulse density 1 million pulses per second.

(m) Programmable library with memory of at least 2000 signatures.

(n) The system be able to track 128 tracks simultaneously.

(p) The system has facility for Post Mission Analysis (PMA) and Pre flight messaging, field data loader.

(q) The system capable of interfacing with GPS, Radar, Tactical Display System, Data link and self Protection suite.

(r) The system capable of providing inter and intra pulse analysis capability.

(s) Built in test equipment. Audio and video warning against emitters categorised as 'Threat'.

(t) Self Protection Suite integrated with ESM.

NMRH (Spl Ops) Operational Characteristics

42. **Specific Capabilities – NMRH (Spl Ops)**. Can the specific capabilities **in Special Ops / Troop Carrying variant** include the following in addition to the Basic variant defined in **Para 6**:-

(a) Detachable armour protection for crew seats and for cabin.

(b) Availability of at least two fast ropes (one on each side) for rapid insertion of multiple troops. Safe working load of strong point at least 350kg.

(c) Additional attachment point for fast rope on each slithering station as back up.

(d) Possibility of simultaneous fast roping and cabin gunning.

(e) Quick release mechanism to jettison empty rope after troop deployment.

(f) Tie down points in the cabin for stowing cargo.

(g) Load spreading sheets for the cabin floor. NATO size standard cargo pallets for palletised cargo and need to be provided along with the helicopter (@ two per helicopter).

(h) Cargo retention tie down points and floor rollers for ease of loading and unloading.

(j) Cargo nets for high density/ high volume load.

(k) Capability to undertake landing on unprepared surfaces.

(l) A foot platform near each exit to assist rapid emplaning/deplaning of troops.

(m) Fitted with at least one hard point with safe working load of 1500kg in proximity to under slung load suspension point as an additional safety for securing Special Troops Insertion and Extraction gear.

(n) Engine inlet protection against dust, sand and foreign objects. Helicopter must be capable of operating from deserts and sandy areas.

(p) Laser Obstacle Avoidance System (LOAS) and mechanical wire cutters / wire strike protection system to be provided.

43. **Troop Carriage Configuration**. In the troop carriage role, will the NMRH (Spl Ops) be able to individually (one at a time) stow and carry the following:-

(a) 12 fully equipped troops (each troop weight 100 kg) along with 400 Kg of equipment.

(b) Eight fully equipped troops and one auto inflatable craft (AIC / Zodiac) of stowed dimension 5ft X 4ft X 2.5ft and weight 400 kg.

(c) **ROA**. The minimum radius of action of basic variant of Spl Ops with 10 troops / commandoes (@ 100 kg each) more than 100 nm.

(d) In addition to a sliding door on one side, a rear ramp or another sliding door on the other side available for quick egress / ingress.

44. In the logistics and communication role, will the NMRH (Spl Ops) be able to accommodate six dignitaries on executive seats. Can each 'VIP Kit' comprise of 'six executive seat and six noise reduction head-sets (having the capability to be integrated with helicopter internal communication system)'. Can the same o be provided with every NMRH Spl Ops helicopter? Will the provided VIP kit enable quick reconfiguration from VIP to other role?

45. **CASEVAC Configuration**. In the CASEVAC configuration, will the NMRH (Spl Ops) be able to accommodate at least six stretchers with provisions for first aid equipment kit.

46. **Rescue Configuration**. For over sea rescue, will the helicopter be provided with two sets each of compatible rescue litter and rescue net, per helicopter?

47. **Combat Free Fall (CFF) Jumps** Will the helicopter be able to facilitate CFF? Will it have Audio visual indications in the cabin for emplaning and deplaning troops?

48. **Ferry Range**. Will the helicopter be capable of self deployment with a payload of 500 kg to a range of at least 350 Nm without external fuel tanks? For 'ferry range' the needs to be in the 'Spl Ops basic configuration'

49. **Weather Radar**. Will the NMRH (Spl Ops) be equipped with following (indicate additional capability, if any):-

(a) Modern Weather Radar (**max weight 60 Kgs**). Capable of detecting prevailing weather at a range of at least 100 nm with digital colour display indicating the density of the clouds.

(b) Limited surveillance search mode for detection of surface targets in the following criteria:-

(i) 10 m^2 target (small target) - detection range better than or equal to 12 nm at about 3000 ft helicopter flight altitude.

(ii) 100 m^2 target (small ship/FPB) – Detection range better than or equal to 24 nm at about 3000 ft helicopter flight altitude.

(iii) 1000 m^2 target (Frigate) – Detection range better than or equal to 60 nm at about 3000 ft helicopter flight altitude.

(c) What would be the maximum weight of radar?

50. **Weapons and Expendables**. Will the helicopter be provisioned with the following weapon systems:-

(a) At least two stations capable of being fitted with 70mm rocket pods and/or 7.62 mm gun with associated targeting and firing system.

(b) Mounts for fitment and firing of crew serviced 7.62 mm machine guns from the cabin for the coverage on either side to be provided.

(c) Chaff and Flares.

(d) Strap on external weapon and store carriers of easy fitting type for quick role reconfiguration onboard ships.

Simulators for NMRH

51. **Full Mission Simulator (FMS)**.

(a) Can the NMRH be supported by a Full Mission level 'D' Simulator (FMS)? Will the crew station modules of simulator be replica of the offered platform's layout and include all primary and secondary flight control, all instrumentation & avionics, lighting, aircrew station/equipments and seating as available in the actual helicopter?

(b) Will the FMS support realistic, operational training scenarios (full motion and synthetic) for ASW/ASuW and special ops variants?

(c) Can the FMS operate for more than average 08 hours per day, 6 days per week, 50 hours per week, 2600 hour per year? Indicate the maximum utility rate. Will the FMS have the required features for under mentioned training tasks:-

(i) Operation of helicopter systems and sensors.

(ii) Perform normal procedures in accordance with the approved helicopter procedures.

(iii) Perform emergency procedures in accordance with the approved helicopter procedures.

(iv) Manage equipment and system malfunctions.

(v) Perform realistic flight handling throughout the approved flight envelope, including autorotation and landings on ship decks.

(vi) Perform realistic flight handling in emergency situations that may not be performed safely or economically in flight, including loss of tail rotor authority, flight control failures and engine off landings.

(vii) Perform procedural instrument flying including instrument approaches.

(viii) Mission specific procedures and emergencies for crew training.

(ix) Simulation of helicopter dynamics to provide realistic feedback to pilot on flight conditions and force feedback of control surfaces through the control column. Will the system be configured for optimised onset of feedback cues and synchronised with the visual and sound system.

(x) Simulation of all helicopter systems under normal and malfunction conditions including Propulsion, Fuel, Hydraulics, Electrical, Flight Controls, Communication and Navigation with instrumentation as depicted in the .

(xi) Visual Representation System for Out of the Window (OTW) representation have high quality visualisation of external surrounding using display systems covering horizontal plane and vertical plane of the pilot's Field of Vision as far as possible. The cockpit windows including side windows be covered in the pilots FOV criteria.

(xii) The instructor's console (separate for front and rear crew stations) to monitor and control aspects of training being imparted. Facility for the instructor to generate emergencies related to the weather and helicopter equipment failure from the console.

(xiii) Recording flight parameters and audio communication exchanged during the sortie, so as to be able to play back the sortie for effective debrief.

(xiv) For deck landings, simulation of deck air-wake turbulence correlated with simulated wind speed and direction, turbulence and ships heading, ship's wake, etc.

(d) Will the FMS be equipped with a modern image generator capable of providing high quality weather effects including:-

(i) Cloud layers, scattered/ broken, transition.

(ii) Thunder clouds/ storms including lightening.

(iii) Rain and snow.

(iv) Fog, homogenous and layered.

(v) Simulation of different sea states.

(vi) Day, Dawn, Dusk, Night, Moon phase.

(e) **Database**. Will the FMS be supplied with a database including user defined geo-specific database, ships and airfields to utilise the FMS and undertake envisaged training?

(f) **Display System**. Will the FMS be provided with a direct projection system of at least 200 degrees horizontal field of view and 60 degrees vertical field of view? Will it have resolution, brightness and contrast of a high degree? Will it have Built In test Equipment (BITE) for offline and online

monitoring of system parameters as well as for fault identification and defect rectification for the ease of maintenance?

52. **Maintenance Simulator.** Will the Maintenance Simulator be capable of simulating all helicopter systems? Will it include a module for Interactive Computer Based Training System for Maintainer Training? Will it consist of at least the following:-

(a) **Instructor Console**.

(i) Instructor console consisting of a work station for instructor for conduct of classes as per the defined training syllabus for the helicopter.

(ii) The work station to undertake electronic assessment and grading of trainees.

(b) **Student Workstations**. Can the workstations for 10 students be provided to conduct complete training followed by fault analysis and rectification procedures on all helicopter systems and mission systems in a virtual environment? Can the following systems be covered:-

(i) Helicopter Airframe and Engines.

(ii) Mission Systems.

(iii) Helicopter Systems.

(iv) Avionics.

(v) Helicopter Weapon Systems.

(vi) On-ground test equipment.

(c) **3-D Virtual Simulation**. Will it be able to simulate helicopter systems and trouble shooting of defects by use of 3-D virtual models? Will the 3-D virtual models be capable of depicting all the onboard systems including mission systems, major assemblies and weapon systems up to the module/card level?

(d) **Procedure Trainer**. Will the simulator include a virtual Procedure Trainer to practice operation of cockpit and rear-cockpit controls & indications, and simulation of helicopter airborne equipment inspections/checks during pre-flight checks? Can the Procedure Trainer be designed for practical training of engineers, technicians and aircrew for the following:-

(i) Assimilation of cockpit (front & rear) interior, arrangement & view of controls, and information on control instrumentation.

(ii) Development of skills for handling of controls / indications in the cockpit during control of helicopter and its systems in different modes of operation.

(iii) Practical study of procedures for testing different systems and equipment of the helicopter.

(iv) Failure analysis and fault finding procedures for undertaking defect investigations.

(e) **Information & Reference System**. Wil there be an 'Information and Reference' system to provide hyper-linking of all helicopter documents for undertaking helicopter inspection, maintenance and defect investigation procedures.

53. **UPS**. Will a suitable UPS be provided along with simulators to ensure systematic shut down of the entire system in case of a power breakdown?

Annexure I
(Refers to Para 38 (d) of Appendix A)

BROAD OPERATIONAL AND TECHNICAL CHARACTERISTICS OF ASW SUITE FOR NMRH

1. **Introduction.** The Indian Navy requires an ASW Suite comprising of a Low Frequency Dunking Sonar (LFDS) and LOFAR Sonic Processing subsystem, capable of being fitted on the Multi Role Helicopters.

General

2. Will the ASW Suite be capable of receiving and processing data from active and passive acoustic sonobuoys and dunking sonar, and coherent and impulsive active sources, for providing the following functionality against sub-surface targets:

(a) Detection

(b) Localization

(c) Classification

(d) Position fixing

(e) Tracking

3. Will it be a single operator, software oriented system, with modular design? Will it comprise the following essential components:-

(a) Sonics Processing Sub-System (SPSS)

(b) Dunking Sonar Sub System (DSSS)

(c) Acoustic Processor

(d) Combined Multi Function Sonar/Sonic Displays

(e) Winch Control Unit

(f) Reeling Machine, Cable and Reel

(g) Wet end - Sonar Body

(h) Acoustic Recorder

4. Will the Dunking Sonar Sub System (DSSS) continue to operate with no degradation in performance, in the event of failure or absence of the Sonics Processing Sub System (SPSS)?

5. Will the SPSS continue to operate with no degradation in performance, in the event of failure or absence of the DSSS?

6. Will the Acoustic System concurrently process and monitor sonobuoys and operate the Dunking Sonar? Will the Acoustic System be capable of digital recording as follows:-

(a) Raw acoustic data from all channels, to enable detailed onshore classification.

(b) Processed data from all sonic/sonar sensors, to aid de-brief of a sortie.

(c) The Acoustic System to interface with the Communications System and Internal Communications System of the helicopter, for the control of sonobuoys and the reception of SPSS and DSSS audio.

7. **Operator Aids**. Will the system be capable to provide the following aids to the operator :-

(a) Environmental Prediction models for calculating the range of the day and Best Body depth, with Detection and Transmission loss Mosaics.

(b) Auto/manual deployment of the sonobuoys, as per the capability of the helicopter.

(c) The system to provide REAL TIME analysis of the bathy thermal sonobuoy data and Dipping sonar bathy sensor information. Will the output be available in temperature versus depth and sound speed versus depth formats?

SONOBUOY PROCESSING SUB –SYSTEM (SPSS)

8. Will the SPSS be capable of deploying both active and passive sonobuoys, covering the entire LOFAR spectrum and processing the information received from the buoys for localisation and identification of targets, using state of the art processing techniques? Will it provide the following features:-

(a) Simultaneous Active and passive detection and localisation.

(b) Broad Band and Narrow band spectral analysis with DEMON facility.

(c) Advanced classification and analysis tools for the operator.

(d) Maintenance/ serviceability status of sonobuoys and the Sonics system.

(e) Bathymetric measurement and display.

(f) Auto tracking of at least 3 targets in active mode.

(g) Inbuilt LOFAR signature library and database management feature, - programmable by user - providing automatic signature correlation/ identification.

(h) Sonobuoy dispensing system.

(j) Sonobuoy On Top Position Indicator (OTPI) with homing facility.

9. Will it have the facility to receive, control, and concurrently process all versions of the following types of sonobuoys:-

(a) Bathythermograph (BT).

(b) LOFAR

10. Will it receive and process RF channels of sonobuoys from 1 to 99?

On Top Position Indicator (OTPI)

11. Will the Acoustic System include an On Top Position Indicator feature, accessible to the Pilot and Co-Pilot?

(a) Will the OTPI be capable to provide bearing information from the current position of the helicopter, to any deployed sonobuoy, operating on one of the selectable 99 RF channels?

(b) Will the OTPI be capable to provide an on-top indication accuracy of about 25-50 yards of the position of the selected sonobuoy, within the helicopter's operating envelope?

(c) Will the OTPI be capable of automatic indication when the closest point of approach has been reached?

(d) Will the OTPI be capable to provide the bearing information, to the Navigation System of the helicopter?

12. **Sonic Processing**

(a) Will the Sonics processor be capable to store and retrieve processor and display settings?

(b) Will it be capable of tuning, controlling and monitoring the status of all the operating modes of the sonobuoy receiver and receiver channels?

(c) Will it be capable of receiving and processing concurrently, 8 sonobuoys, in any combination?

13. **Low Frequency Active Operation**. Will the SPSS include Low Frequency Active sonar operations, to receive and process Bi-static/Multi-static coherent and incoherent echoes?

14. **Audio Monitoring**. Will the SPSS be capable to provide to the crew, sonobuoy audio including for those sonobuoys, not selected for display? Additionally:

(a) Will it provide manual and automatic steered directional audio?

(b) Will it include DIRECT and HETERODYNED aural monitoring for any combination of sonobuoy and dunking sonar?

(c) Will it provide selectable audio replay, with facility for buoy selection, start time, duration and termination?

(d) Will it provide replay of the stored audio in REAL TIME and selectable multiples of 0.1 and ten times than REAL TIME?

15. **Passive Real Time Processing**. Will the SPSS be capable to provide multi-resolution narrowband/broadband/DEMON analysis, processing and display, in the frequency spectrum of 10 Hz to 2800Hz? Will it provide:

(a) Broadband processing and display, to permit spectrum analysis in the selected frequency spectrum, with the capability to select the centre frequency, about which the broadband acoustic information is to be displayed/processed.

(b) Passive processing operator tools for target detection and tracking.

(c) A transient signal analysis mode using selectable frequency windows and time resolutions.

(d) Continuous processing with at least 60 minutes of the most recent historical data available for display, such that the crew can monitor all other mission sensors and display formats without interrupting the processing of acoustic data.

(e) All the tools for calculating the position and Target Motion Analysis of the contact.

16. **Active Real Time Processing Modes**. Will the SPSS be capable to process and display range, Doppler, and bearing information simultaneously? Will it be capable of processing the following waveforms received from different sonobuoys or active sonar's:-

(a) Continuous Wave (CW)

(b) Linear FM

(c) Exponential FM

17. **Ambient Noise Measurement**

(a) Will the SPSS be capable to provide an ambient noise processing mode to process and display ambient noise as a function of amplitude, frequency and bearing across the entire processing spectrum?

(b) Will the SPSS be capable to retrieve and compare the sound speed versus depth data, from at least two BT buoys simultaneously?

18. **MMI**

(a) Will the SPSS be capable to provide acoustic and tactical plot data tools, for both mono-static and multi-static operations?

(b) Will the SPSS be capable to provide active and passive target localization processing and display tools?

(c) Will the SPSS be capable to provide a target classification management capability?

19. Will the SPSS be capable to provide passive and active auto-detect processing, display and alert features?

(a) Will the SPSS be capable to provide colour as a contact discriminator in bearing or in frequency to aid in acoustic processing display formats?

(b) Will it include three dimensional waterfall displays, as an aid to the operator for classification?

Dunking Sonar SubSystem (DSSS)

20. Will the Sonar be a portable, integrated, panoramic system, operating at frequencies below 5 KHz? Will it be capable of being trailed during transit between

dunks? Will the DSSS consist of a reeling machine and cable, Winch Control Unit, Submersible Sonar Body, Off-line control panel, Acoustic Processor and associated displays? Will the Sonar Sub System have the following salient features:-

(a) Single operator software oriented with modular design.

(b) Panoramic search capability and facility for sector display.

(c) Operator selectable frequency for active and passive capability.

(d) Sonar search capability, up to a body depth of ≥ 350 metres.

(e) Ability to integrate into a multi static Sonar environment with compatible Sonars.

(f) Sonar body raising/ lowering speeds of at least 5 metres/ second in the primary mode of operation.

21. Will the DSSS be capable to provide a minimum search rate of 800 square nautical miles per hour in the following conditions:-

(a) Sea State upto 3.

(b) Open ocean to shallow water with a minimum depth of 100 feet.

(c) 50% probability of detection.

(d) 10^{-6} Probability of False Alarm.

(e) Target strength of 10 dB for FM and 0 dB for CW

(f) Helicopter transit speed of 110 Knots ground speed.

(g) Will the DSSS be capable to operate as both a coherent transmitting source and as a receiver to enable both mono-static and multi-static operations?

22. **Accuracies**. Indicate following with reference to DSSS:-

(a) Bearing (in RMS)

(b) Range

(c) Doppler

23. **MMI**

(a) Will the DSSS be capable to provide an MMI, which includes the use of colour to aid in detecting targets?

(b) Will the DSSS be capable to provide display formats for detection, tracking, localization, and classification?

(c) Will the DSSS be capable to provide display formats to include colour Planned Position Indicator (PPI)?

24. **Static Discharge.** Will the DSSS be capable of dissipating the build up of static electricity for insulate the helicopter from the detrimental effects of a static discharge through the cable and submersible sonar body?

25. **Winch Control Unit (WCU)**

(a) Will the WCU be capable of controlling the operation of the submersible sonar body? Will it be located at the SENSO position for remote operation and also near to the winch for Local Operation?

(b) Will the WCU have the following features:-

(i) A 'Guarded Switch' to operate the auxiliary raise motor.

(ii) Display of Submerged, Trail and Housed status of the sonar body.

(iii) Cable paid out indication (up to 1 meter accuracy).

(iv) Watertight integrity indication of the Sonar and Cable.

(v) Operational status of the submersible unit.

(c) Will the WCU be capable of providing the under mentioned measurements of sonar cable angle during the hover:-

(i) From the true vertical for AFCS and Pilot.

(ii) From the helicopter Vertical for SENSO.

(d) Will the WCU be capable of providing two guarded Cable Cutter switches (one at SENSO position and one accessible to both Pilot and Co Pilot) for emergeny cutting of cable?

(e) Will the WCU be capable of providing facility for indicating the last turn of usable cable length is paid out from the Cable Reel Assembly?

26. **Winch and Cable**. Will the useable length of cable be commensurate to the sonar operations at depths of at least 350 meters with operational helicopter hover height? Will the winch have the following three modes of independent operation:-

(a) Normal Motor – Primary

(b) Auxiliary Motor - for redundancy.

(c) Mechanical Raise and Lower operation for raising the sonar body in the event of failure of primary and auxiliary raise methods.

27. Will the system have following features:-

(a) Capable of 95% removal of components from the helicopter, in less than 30 min, with manpower of 3 or less.

(b) Hydraulic connections of quick disconnecting and self sealing type?

(c) No sonar body 'Run Out' in normal and emergency mode of operation.

(d) Possibility of one man manual winching.

28. Will it have the following safety features:-

(a) Complete automatic pre-flight test of the deployment/recovery sequences.

(b) Mechanical lock for the wet-end in seated position.

(c) Electric Static Discharge (ESD) sequence at water entry.

(d) Continuous cable tension monitoring and control to prevent mishap during lowering and raising of the sonar body.

(e) Mechanical raise speed limitation when sonar body is 15-20 m below the helicopter.

(f) Auto calibration of Paid-Out Cable Length (POCL), 15 meters below the helicopter.

(g) Automatic stop at trail position during recovery.

(h) Manual control from trail to seated positions.

(j) Back-up electrical motor in case of hydraulic failure.

(k) Quick reaction cable cutter for emergency operation.

(l) Automatically stop winch when last turn of usable cable length has been paid out from the cable reel.

29. **Sonar Body**. Will the Sonar body have following features

(a) Aero and hydro dynamically stable to ensure safe uninterrupted deployment and retrieval.

(b) No impact on the performance of the helicopter in the trail position, except that resulting from the additional drag.

(c) Achieve a stable state for active operations within ten seconds of achieving the selected depth.

(d) Provide a transmit beam that is omni-directional within one dB, over the full range of operating frequencies.

(e) Automatically stop when the transducer is 50-75 feet from the water bottom.

(f) A manual override function to enable positioning of the sonar body to less than 50 feet from the water bottom.

(g) Hydrostatic depth indication with an accuracy of +/- 2% of the body depth.

(h) Water ingress indication of the sonar body.

(j) Sensors for measurement of Hydrostatic depth, bottom proximity and temperature.

30. **Sonar Processor**. Will the Sonar processor have following features:-

(a) Operating frequency in active mode of transmission lesser than 5 KHz.

(b) Minimum of three operator selectable operating frequencies.

(c) Selectable CW, FM or Combination of CW and FM, pulse type selection.

(d) Bathy thermal processing mode to process and display sonar information in depth versus sound velocity profile format and transducer depth versus ray path plot. Both Detection Threshold and Range prediction formats should be available.

(e) Audio (Direct and Heterodyned), to discrimination of the active signal returns.

(f) Passive sonar audio monitoring when not in the active mode.

(g) Selectable omni directional and directional audio.

(h) Store a minimum of the last ten recordings of both dipping sonar and underwater telephone audio for audio replay.

(j) Provisioning of selectable audio replay including start time, duration, and termination.

31. **Acoustic Source Level**. Will the DSSS have an acoustic on-axis source level of not less than 215 dB, referenced to 1 µPa, at one meter, at each operating frequency? Will it have following features:-

(a) An acoustic source level, which is automatically adjusted to operate at the maximum power possible without cavitations, at depths above 50 feet.

(b) Allow operator selectable variation of the acoustic source level.

32. **Miscellaneous**. Will the system have the provision for at least 20% incremental up-gradation? In addition will it have following features:-

(a) Sonar cable capable of at least 500 cycles of lowering and hoisting operations before requiring renewal or major inspection.

(b) Suitable protection of the LFDS and associated equipment, whether sheltered or unsheltered, against the Solar Radiation, Lightning Strikes, Fungus, Rain, Salt Spray, Sand and Dust, Wind Velocity, Shock, Degree of Enclosure, EMI/EMC/RFI and Safety Distance for active emitters.

(c) Comply with relevant latest Mil Standards or equivalents for certification purposes

33. **Interface**. Will the system provide dual redundancy ARINC 419/429 /MIL 1553B data bus protocols and be capable of interfacing with the radar, Tactical Mission System, Data Link and Automatic Flight Control System. In addition, will it have following:-

(a) BITE facility for fault detection and diagnostic upto PCB level. The health of the system should be available in real time during the operation of the system.

(b) MTBF not less than 1000 hrs.

(c) Total weight of the entire system less than 400 Kgs.

34. **Power Supply.** Will the system be capable of utilising the existing Power Supply on board the helicopter?

35. **Continuous Operation**. Will the system be capable of providing continuous operation of at least 10 h?

36. **Up gradation**. Will the system be of open architecture and facilitate sonar software and hardware upgrade during the life of the equipment.

Annexure II
(Refers to Para 34(a) of **Appendix A**)

ASW WEAPON OUTFIT FOR NMRH
AIRBORNE LIGHTWEIGHT TORPEDO

1. Will the offered airborne lightweight torpedo be capable being launched by the helicopter? Will it be capable of successfully targeting acoustically quiet, anechoic-material coated, conventional and nuclear submarines, in intense torpedo countermeasure environment? Will the torpedo be amenable to cost-effective mid-lifecycle upgrades?

2. **General Capabilities**. Will the torpedo possess following general capabilities: -

(a) Targeting conventional, nuclear and midget submarines.

(b) Being launched from the Multi Role Helicopter.

(c) Will the weapon have following dimensions:-

Ser	Parameter	Value
(i)	Diameter	< 324 mm +/- 1mm
(ii)	Length	< 2750 to 2850 mm
(iii)	Weight	< 320 Kgs

(d) **Variants**. Will the torpedo have following variants: -

(i) **Combat**. Live, explosive-filled article, in negatively buoyant configuration.

(ii) **Exercise**. Non-explosive self-propelled article with performance recording devices, and in positively buoyant recoverable configuration.

(iii) **Drill and Practice**. Inert un-propelled positively buoyant article that can be air-launched.

(e) **Other Capabilities**. Will the Torpedo: -

(i) Be capable of detection and classification and engaging of quiet submarines coated with anechoic materials, and transiting at slow speeds submarines.

(ii) Have a high probability of hit (above 80 per cent) in an intense torpedo countermeasure environment.

(iii) Have low radiated noise levels.

(iv) Capable of navigating to ensure target acquisition with more than 50% probability, at 70% of the maximum engagement range of the torpedo.

(v) Guarded against bottom seduction.

3. **Speed / Range**. Indicate following:-

(a) Max speed of the Torpedo (in Knots).

(b) Range (in Km) of the torpedo at min speed.

4. **Depth Capability of Torpedo**. Indicate following:-

(a) Search Depth -

(b) Minimum depth of water for launch -

(c) Maximum Operational Depth -

(d) Collapsing Depth -

5. **Target Detection Capability**. What would be the maximum target acquisition range of helicopter in Isothermal conditions?

6. **ACCM Capability**. Will the torpedo have the ACCM feature of Decoy Classification in a complex Counter Measure scenario?

7. **Homing System**. Will the system have following:-

(a) **Mode** : Active, Passive and Mixed.

(b) **Beam Pattern**. Beam pattern should ensure high bearing accuracy, minimal side-lobes, and optimal insonification of the maximum area in the vertical and horizontal planes.

8. **Search Patterns**. Will the torpedo have suitable search, attack and re-attack patterns, effective in both shallow and deep waters? Will it have a multi-pattern lost contact search, selected autonomously based on the geometry of target motion parameters?

9. **Warhead**. Will the torpedo warhead possess following features: -

(a) **Safety**. Incorporated with Multi safety devices in the Warhead, including features to safe guard the firing platform. Will the warhead be

designed to be safe during depot stowage, transportation and onboard stowage on ships, helicopter?

(b) **Initiation**. Can the initiation of the warhead be facilitated either by contact or by the action of a proximity fuse?

10. Will the following presetting be possible: -

(a) Search Mode (On Top/ Initial Straight Run).

(b) Ceiling Depth, Floor Depth and Search Depth.

(c) Initial Straight Run.

(d) Initial Search Course.

(e) Torpedo search pattern should be such that full coverage in vertical plane and azimuth is achieved.

11. **Quality Assurance**. Can the OEM provide MQAP giving detail of quality assurance/ control?

12. **FIAMs**. Will there be a requirement of Torpedo FIAMs to enable its launch from the MRH.

13. **Special & Test Equipment.** Will all the Special & Test Equipment (S & TE) for Warshot and Exercise torpedo be provided?

14. **Exercise Head**. Will the Exercise Head have the following features: -

(a) Same dimensions as the warhead section.

(b) Digital recorder to record the torpedo, environmental and homing parameters, required for firing analysis. PC based software for analyzing the torpedo performance, after the firing, without disassembling the torpedo onboard the recovery ship.

(c) Inflatable collar system to achieve positive buoyancy at the end of the run, and localizing devices to provide greater than 95% probability of torpedo recovery.

15. **Maintainability**. Will the depot level maintenance be more than two years for assembled torpedo and more than six years for disassembled torpedo?

16. **Reliability**. Will it have following:-

(a) No onboard maintenance/testing required on the torpedo, after issue from the depot.

(b) Exercise Head capable of 20 or more firings.

(c) Torpedo shelf life of more than 20 years through life extension plan.

17. **Torpedo Simulator**. Will the Torpedo have a Simulator, and the Drill & Practice Variant capable of recording the torpedo preset data and software models to test the efficacy of homing heads, which could be checked with PC based software after the firing?

18. **Operating Conditions**. Will the torpedo be capable of being launched and operated successfully under the following environmental conditions: -

(a) Sea Water temperature range - 0 deg C to 34 deg C

(b) Sea State - Up to 6.

19. **Environmental Qualifications**. Will the torpedo and associated components be capable of withstanding vibration, shock and corrosion, as required for marine equipment, adhering to the followings specifications: -

(a) Environmental conditions as per MIL STD – 810F or its equivalent.

(b) Software standards as per IEEE 12207. Software configuration management procedures for upgrades are to be specified.

(c) The entire system having total electro-magnetic compatibility with all equipment onboard the helicopter. EMI-EMC, including for system power supply, conforming to MIL STD 461E / 464 or latest DO 160 or equivalent.

20. **Safety Aspects**

(a) **Static Current**. Will the torpedo have an on board safety circuit to ensure safety of the torpedo from static current.

(b) **Emergency Jettisoning**. In an emergency, will it be possible to carry out selective and simultaneous jettison of the entire loaded torpedo with the warhead and fuses rendered safe without endangering the launch platform?

21. **Depth Charges**. Can the helicopter manufacturer install and integrate two Depth Charge dropping mechanism to enable successful firing of Depth charge?

22. **Handling Equipment**. Will the OEM provide all equipment required for handling, loading /unloading on the launch platform? In addition, can the OEM provide all base and depot handling equipment?

23. **System Upgrades**. Will the manufacturer commit to provide support for at least 20 years? Will the system be of open architecture and facilitate software and hardware upgrade during the life of the equipment?

24. **Standards and Specifications**. Can the specifications for design and development, operation, maintenance of the system conforming to latest mil standards/IEEE or its equivalents be provided along with the torpedo?

Annexure III
{Refers to Para 34(e) of Appendix A}

REQUIREMENTS FOR AIR LAUNCHED ANTI SHIP MISSILE SYSTEM

1. **Requirement**. The current requirement is to induct two types of Anti Ship Missile (AShM), which can be launched from NMRH (Multi role). The technology incorporated in such an ASM, should be of fourth generation and should not require any major upgrades, to retain it as a highly effective ASM for at least 20 years after induction. The is to be provided with the following types of missiles:-

(a) Long Range Fire and Forget Missile.

(b) Short Range EO/IR data link enabled/wire guided missile.

LONG RANGE FIRE AND FORGET MISSILE

Physical Characteristics

2. **Dimensions**. Will the dimensions of missile be such that the loaded missiles(s) do not affect either the flight profile or the ground clearance for the safe operations of the helicopter?

3. **Range**. Will the maximum range of the Long Range Fire and Forget missile should not be less than 70 Km.

4. **Design**.

(a) Will the missile be fully integrated (incorporating contemporary proven technology available, and designed for standard interfaces) and modular in construction.

(b) Will it be stabilised for roll, pitch and yaw, in flight?

5. **Transportation**. Can the storage of the missile be in canister which can also be used for transportation?

6. **Protection against Inclement Weather Conditions**. Will all the equipment have protection against inclement weather conditions such as lightning rain, thunderstorm, sandstorms and gale?

Operational Characteristics

7. **Warhead**. Will the missile have following:-

   (a) Weight - not less than 70 Kgs

   (b) Optimised for blast and fragmentation/penetration.

8. **Homing Head**. Intelligent homing head with advanced ECCM features.

9. **Fire Control System**.

   (a) Will the fire control system and other associated equipment be provided to enable missile planning and missile launch.

   (b) Will it be capable of single and salvo launch of missile from platform?

10. **Shelf Life**. Will the missile have shelf life not be less than 10 years and extendable thereafter through life extension program?

11. **Navigation and Guidance System**. Can the following technologies wrt navigation and guidance system be available:-

   (a) **Navigation System**. Inertial Navigation System or Satellite based navigation system.

   (b) **Homing System for Terminal Guidance**. The AShM with radar/multispectral EO/IR sensors (to include SAR/MMW radar/IIR as appropriate) Terminal guidance system. Can the details of homing head operations and search logic be provided?

12. **Application**

   (a) It is proposed to use this AShM in a configuration of at least two missiles per helicopter.

   (b) Can the missile be capable of being fired either singly or in salvo (with permissible time delay between the releases)?

Operation and Maintenance

13. **Operating/Stowage Conditions**.

   (a) Operating Temperature - -20 to +55 degrees centigrade

   (b) Stowage Temperature - -40 deg to +65 deg centigrade

(c) Relative Humidity - not less than 95 percent

14. **Safety Aspects**.

(a) **EMI-EMC**

(i) Will the complete missile have electromagnetic compatibility (iaw MIL STD 461 E / 464 or latest DO 160 or equivalent) with the equipment of launch platform?

(ii) Can the EMI/EMC test reports, including details on response of EEDs and warhead, to varying frequency spectrum and energy levels be provided?

(iii) Can the missile be subjected to EMI/EMC test with actual launch platform?

(iv) Will the detailed procedure and instrumented missile(s) for carrying out the test be provided during evaluation stage?

(v) Will the warhead, propellant, EEDs and the fuse be shielded from EMI during stowage and transportation?

(vi) Can the OEM certify that EMI is lower than the safety norms established for the missile systems? Will the design qualification EMI/EMC trials conducted on the missile be provided for analysis?

(b) **RADHAZ, Vibration & Magnetism**. Will the missile components be adequately shielded/ protected against RADHAZ, vibration and magnetism? Can the manufacturer in this regard indicate thresholds/limitations, if any?

(c) **Static Current**. Will the missile have an on board safety circuit to ensure safety of the missile from static current?

(d) **Misfire**. In case of misfire, will it be possible to isolate the missile sub system to make it safe for disposal?

(e) **Emergency Jettisoning**. In an emergency, will it be possible to carry out selective and simultaneous jettison of all the loaded missile(s) with the warhead and fuses rendered safe without endangering the launch platform?

(f) **Safety Arming**. Will the missile have separate specified minimum safety stages of arming of the exploder mechanism and warhead to ensure safety of the launch platform?

15. **Handling Equipment**. Will all the equipment required for handling, loading /unloading on the launch platform be provided? In addition can all base and depot handling equipment be also provided?

16. **System Upgrades**. Will the manufacturer commit to provide support for at least 20 years? Will the system be of open architecture and facilitate software and hardware upgrade during the life of the equipment?

17. **Standards and Specifications**. Will the specifications for design and development, operation, maintenance of the system conforming to latest mil standards/IEEE or its equivalents?

18. **Types of Missiles**. Can the following types of missiles is to be provided:-

(a) **Combat**. Fully configured missiles to be used for inflicting damage/ destruction of the target.

(b) **Drill and Training**. Required for training of crew in loading/unloading drill and carrying out missile attack procedures.

Note.

(a) Buyer may nominate an AShM of its own choice. Notwithstanding the source of supply the vendor will be responsible for the integration of the AShM onboard NMRH, be it the AShM offered by vendor or nominated by the buyer.

(b) However, the helicopter manufacturer would be responsible for installation and integration of armament carriers, pre-setters, launch and jettison panels, interface devices, mounting trays, cabling etc and interface the same with the Tactical Display System and Weapon release unit onboard the helicopter to enable the helicopter to accurately launch or jettison these weapons in case of emergency.

SHORT RANGE EO / IR DATA LINK ENABLED MISSILE

Physical Characteristics

19. **Dimensions**. Will the dimensions of missile be such that the loaded missiles(s) do not affect either the flight profile or the ground clearance for the safe operations of the helicopter?

20. **Warheads**. To be optimise for Heat, Fragmentation, PBF.

21. **Range**. The maximum range of the short range EO / IR data link enabled missile should not be less than 25 km.

22. **Design**.

(a) Will the missile be fully integrated (incorporating contemporary proven technology available, and designed for standard interfaces) and modular in construction?

(b) Will the missile be stabilised for roll, pitch and yaw, in flight?

23. **Transportation**. Can the storage of the missile be in canister which can also be used for transportation?

24. **Protection against Inclement Weather Conditions**. Will all the equipment have protection against inclement weather conditions such as lightning, rain, thunderstorm, sandstorms and gale?

Operational Characteristics

25. **Homing Head**. Intelligent homing head with advanced ECCM features.

26. **Fire Control System**.

(a) The fire control system and other associated equipment provided to enable missile planning and missile launch.

(b) Capable of single and salvo launch of missile from platform.

27. **Shelf Life**. Shelf life of the missile not be less than 10 years and extendable thereafter through life extension program.

28. **Operation and Guidance**. The following technologies for navigation and guidance system is be available:-

(a) **Navigation System**.

(i) Data Link

(ii) EO/IR

(b) **Homing System for Terminal Guidance**. The AShM with real-time wireless data-link with electro-optical seeker. Can the details of homing head operations and search logic be provided?

29. **Application**

(a) It is proposed to use this AhSM in a configuration of at least two missiles per helicopter.

(b) The missile capable of being fired either singly or in salvo (with permissible time delay between the releases).

Operation and Maintenance

30. **Operating/Stowage Conditions**. Will the missile meet following operating conditions:-

(a)	Operating Temperature	-	-20 to +55 degrees centigrade
(b)	Stowage Temperature	-	-40 deg to +65 deg centigrade
(c)	Relative Humidity	-	not less than 95 percent

31. **Safety Aspects**.

(a) **EMI-EMC**

(i) Will the complete missile have electromagnetic compatibility (iaw MIL STD 461 E / 464 or latest DO 160 or equivalent) with the equipment of launch platform?

(ii) Can the EMI/EMC test reports, including details on response of EEDs and warhead, to varying frequency spectrum and energy levels be provided?

(iii) Can the missile be subjected to EMI/EMC test with actual launch platform?

(iv) Can the detailed procedure and instrumented missile(s) for carrying out the test be provided during evaluation stage?

(v) Can the warhead, propellant, EEDs and the fuse be shielded from EMI during stowage and transportation?

(vi) Can the OEM certify that EMI is lower than the safety norms established for the missile systems? Will the design qualification EMI/EMC trials conducted on the missile be provided for analysis?

(b) **RADHAZ, Vibration & Magnetism**. Will the missile components be adequately shielded/ protected against RADHAZ, vibration and magnetism? Can the manufacturer in this regard indicate thresholds/limitations, if any?

(c) **Static Current**. Will the missile should have an on board safety circuit to ensure safety of the missile from static current?

(d) **Misfire**. In case of misfire, will it be possible to isolate the missile sub system to make it safe for disposal?

(e) **Emergency Jettisoning**. In an emergency, will it be possible to carry out selective and simultaneous jettison of all the loaded missile(s) with the warhead and fuses rendered safe without endangering the launch platform?

(f) **Safety Arming**. Can the missile have separate specified minimum safety stages of arming of the exploder mechanism and warhead to ensure safety of the launch platform?

32. **Handling Equipment**. Can all equipment required for handling, loading /unloading on the launch platform be provided? Will all the base and depot handling equipment be provided?

33. **System Upgrades**. Can the manufacturer commit to provide support for at least 20 years? Will the system be of open architecture and facilitate software and hardware upgrade during the life of the equipment?

34. **Standards and Specifications**. Will the specifications for design and development, operation, maintenance of the system conform to latest mil standards/IEEE or its equivalent be provided?

35. **Types of Missiles**. Can the following types of missiles be provided:-

(a) **Combat**. Fully configured missiles to be used for inflicting damage/ destruction of the target.

(b) **Drill and Training**. Required for training of crew in loading/unloading drill and carrying out missile attack procedures.

Note.

(a) Buyer may nominate an ASM of its own choice. Notwithstanding the source of supply the vendor will be responsible for the integration of the ASM onboard NMRH, be it the ASM offered by vendor or nominated by the buyer.

(b) However, the helicopter manufacturer would be responsible for installation and integration of armament carriers, pre-setters, launch and jettison panels, interface devices, mounting trays, cabling etc and interface the same with the Tactical Display System and Weapon release unit onboard the helicopter to enable the helicopter to accurately launch or jettison these weapons in case of emergency.

Annexure IV
(Refers to Para 22 of Appendix A)

BROAD OPERATIONAL AND TECHNICAL CHARACTERISTICS OF COMMUNICATION SUITE FOR NMRH

1. **CCS/Intercom.** Will the helicopter be of fourth generation and capable of providing all audio inputs from sensors and communication sets to all stations in the helicopter?

2. **Software Defined Radio (SDR)**. Can the helicopter be provisioned with three SDR, two for V/UHF and one for HF?

3. **V/UHF (SDR).** Does the helicopter have at least two digital and modular V/UHF sets with Mercantile Mobile Band coverage and indigenous Speech Secrecy Equipment? Will the offered communication set have following or be of following configuration:-

(a) Digital, modular light weight construction.

(b) **Frequency Coverage**. Can the communication set provide frequency coverage in the bands enumerated below: -

(i) 30 to 88MHz (FM)

(ii) 108-155.975 MHz (AM)

(iii) 156-173.975 MHz (FM)

(iv) 225-399.975 MHz (AM)

(v) 400-407 MHz (FM).

(**Note**: Transmitter **only** inhibited in 108-117.975 MHz band)

(c) **Channel Spacing**. Not greater than 8.33 kHz.

(d) **Guard Frequencies**. 121.5, 243 and 406 MHz.

(e) **Built In Test Facilities**. Power ON, Periodic and Initiated BIT facilities.

(f) **Squelch Facility**. Operator selectable and tuneable squelch facility.

(g) **Radio Relay**. Radio relay facility available.

(h) **Preset channels**. Operator settable channels. Channels pre-settable in air or on ground.

(j) Controllable from the cockpit and capable of operating from all stations.

(k) Adaptability to homing device, SSE (Speech Secrecy Equipment and Data Link.

4. **HF (SDR)**. Can the helicopter be provisioned with one HF modern modular digital set having following specifications:-

(a) Voice AM (H3E) Suppressed carrier (USB/LSB compatibility AM).

(b) Operate in fixed and frequency hopping mode.

(c) Secure mode of communication.

(d) Scanning of minimum four preset features.

(e) Automatic Link Establishment (ALE) facility (MIL STS – 188A).

(f) Quick emergency erasure of parameters.

(g) Modem compatible with Mil 110 PSK mode, STANAG 4285 PSK mode and STANAG 4529 PSK Mode.

5. **SATCOM**. UHF SATCOM.

Appendix B
(Refers to Para 10 of RFI)

ToT REQUIREMENTS – NAVAL MULTI ROLE HELICOPTERS

1. **Key Technologies**. MoD desires that at least following key technologies are transferred to Indian companies in India:-

Sr	Description of Technology	Proposed Technical Gate (Minimum Qualifying Technology)
(a)	Rotor Blades & associated systems-Including Main & Tail Rotor assemblies, Blade Folding System, Fluid Elastic Dampers, Elastomeric Bearings and associated System.	(i) Methodology/ know how and know why for following:- (aa) To undertake the design and manufacturing of the rotor blade for enhancing lift and reduction of noise and vibration. The manufacturer should be capable to undertake modifications to achieve suitable design for Helicopter. The manufacturer should be capable to establish repair technologies. (ab) To configure rotor hub for blade folding. The required technology would allow the Indian design agency to design blades and rotor hub to enable folding of blades. (ac) To design and manufacture of main rotor damper technologies. (ad) To enable the manufacturer to undertake electronic balancing of rotor blades.
(b)	Rotating Upper Control System	Methodology/ design know how and know why to enable manufacturing agency to design systems for supporting hinge less rotor blades onto the hub.
(c)	**Transmission System** – Including Main, Tail & Intermediate Gear Boxes, Housings, Gears, Drive Shafts and associated	Methodology, design know-how and know-why for following:- (i) Manufacturing of the bevel gears. (ii)To provide emergency lubrication for the minimum period of 30 min.

Sr	Description of Technology	Proposed Technical Gate (Minimum Qualifying Technology)
	Systems.	
(d)	Vibration Isolation System	Methodology, design know-how and know-why related to Active/passive devices for vibration reduction/control including rotor fuselage interface, if available in the Helicopter.
(e)	**Fuel Tanks** - Main & Auxiliary Tanks	Methodology, design know-how and know-why for following:- (i) To manufacture crashworthy rubber tanks using rubber compound which are resistant to fuel as well as capable of leak resistant in case of battlefield damage. (ii) Manufacturing, tooling & repair technologies for the tanks.
(f)	AFCS	(i) Know-how and know-why about control law algorithms for basic stability augmentation and auto pilot modes. (ii) Methodology, design know-how and know-why of System Safety analysis.
(g)	Wheeled Landing Gear, Wheel Brake & Parking Brake with capability to operate from ship.	Methodology, design know-how and know-why for the following:- (i) Designing of retractable Under Carriage system. (ii) Manufacturing of precision forgings.
(h)	Hydraulic System LRUs – including Main & Tail Rotor Actuators	Methodology, design know-how and know-why for following:- (i) To design actuators and hydraulic pumps, which would enable manufacturing and repair of actuators and hydraulic pumps?
(j)	Health & Usage Monitoring System (HUMS)	(i) Methodology, design know-how and know-why to download data from HUMS about the health and usage of all the systems linked with the HUMS. (ii) Details of types of sensors and recommended location of sensors. (iii) Details of algorithms to monitor health & usage.

Sr	Description of Technology	Proposed Technical Gate (Minimum Qualifying Technology)
		(iv) Details of algorithms for predictions. (v) Methodology, design know-how and know-why for development of software/algorithms.

2. **Extent of Technologies**. The OEMs are to indicate following:-

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
(a)	Rotor Blades & associated systems- Including Main & Tail Rotor assemblies, Blade Folding System, Fluid Elastic Dampers, Elastomeric Bearings and associated system.	Methodology/ know how and know why for following for a helicopter:-					
		(i) Design and manufacturing of the rotor blade for enhancing lift, higher speed and reduction of noise and vibration.					The manufacturer should be capable to undertake modifications to achieve suitable design for Helicopter. The manufacturer should be capable to establish repair technologies.
		(ii) Techniques to reduce the compressibility effects on the rotor blade tips.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(iii) To configure rotor hub for blade folding.					The required technology would allow the Indian design agency to design blades and rotor hub to enable folding of blades.
		(iv) Design and manufacture of main rotor damper technologies.					
		(v) Blade balancing.					
		(vi) Lightning protection of composite blades.					
		(vii) Analytical techniques for optimization of blade design.					
		(viii) Technology for Manufacture of rotor blades using automated layup techniques.					
		(ix) Closed mould technology for rotor blades manufacture.					
		(x) Rigging technology for rotor system.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(xi) State of the art inspection/ thermal Scanning of Rotor Blades.					
		(xii) Design of rotor system parts for TBO as per Helicopter.					
		(xiii) Technology for elastomeric bearings to achieve required dynamic characteristics.					
(b)	Rotating Upper Control System	Methodology/ design know how and know why to enable manufacturing agency to design systems for supporting hinge less rotor blades onto the hub of the helicopter.					
(c)	Vibration Isolation System	Methodology, design know-how and know-why related to Active/passive devices for vibration reduction/control including rotor fuselage interface, if available in the Helicopter.					
(d)	Active Vibration Control System	(i) Technology for active vibration control system for					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		helicopters.					
		(ii) Techniques for mapping the vibration pattern on the helicopter.					
(e)	Internal Noise Control	Technology for internal noise reduction including design & manufacture of fire resistant noise blankets.					
(f)	Hydraulic System LRUs – including Main & Tail Rotor Actuators	Methodology, know-how and know-why to design and manufacture of actuators, hydraulic pumps and package.					The required technology would enable manufacturing and repair of actuators, hydraulic pumps and package.
(g)	AFCS	(i) Know-how and know-why about control law algorithms for basic stability augmentation and auto pilot modes.					
		(ii) Design process, development of mathematical model of the helicopter.					
		(iii) Methodology, design					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		know-how and know-why of System Safety analysis.					
(h)	Integrated Self Protection System/ EW Suite	(i) **Missile approach warning System (MAWS).** Technology for integration of passive (non-radiating) MAWS capable.					
		(ii) Technology for Laser Warning Receiver (LWR).					
		(iii) Technology for Directional Infra-Red Counter Measure (DIRCOM).					
		(iv) Integration aspects: (aa) Technology for Integration of EW processor, MAWS/ RWR, LWR, IR Jammer/ DIRCOM and CMDS. (ab) Automatic initiation of CMDS to dispense flare and chaff. (ac)Threat library					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		management.					
(j)	**Fuel Tanks** - Main & Auxiliary Tanks	Methodology, design know-how and know-why for following:-					
		(i) To manufacture crashworthy rubber tanks using rubber compound which are resistant to fuel as well as capable of leak resistant in case of battlefield damage.					
		(ii) Manufacturing, tooling & repair technologies for the tanks.					
(k)	**Transmission System** – Including Main, Tail & Intermediate Gear Boxes, Housings, Gears, Drive Shafts and associated Systems.	Methodology, design know-how and know-why for following:-					
		(i) Technology for Manufacturing of the bevel gears, housings, lube system of gear boxes to ensure TBO of Helicopter.					
		(ii) To provide emergency lubrication for the minimum period of 30 min.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(iii) High strength thin walled Aluminum Investment Castings.					
(l)	Wheeled Landing Gear, Wheel Brake & Parking Brake with capability to operate from ship.	Methodology, design know-how and know-why for the following:-					
		(i) Designing of retractable Under Carriage system.					
		(ii) Manufacturing of precision forgings.					
(m)	Health & Usage Monitoring System (HUMS)	(i) Methodology, design know-how and know-why to download data from HUMS about the health and usage of all the systems linked with the HUMS.					
		(ii) Details of types of sensors and recommended location of sensors					
		(iii) Details of algorithms to monitor health & usage.					
		(iv) Details of algorithms for predictions.					
		(v) Methodology, design know-					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		how and know-why for development of software/algorithms.					
(n)	Engine manufacturing & ROH technologies	(i) Special Coatings for corrosion/ erosion protection, bonding, plasma coatings.					
		(ii) Surface Treatment Technologies.					
		(iii) High temperature coatings.					
		(iv) Linear Friction Welding.					
		(v) Electron Beam Physical Vapour Deposition.					
		(vi) Direct Vapour Deposition.					
		(vii) Laser Shock Peening for highly stressed rotor bores, blade roots and fir tree areas.					
		(viii) Technologies for NVGs & other Hot end parts.					
		(ix) Manufacture of forging for turbine & compressor discs, blades & vanes.					
		(x) Full Authority Digital Engine Control (FADEC) – control law, hardware and software.					
(p)	Engine	(i) Wide chord fan technology.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
	development Technologies	(ii) Single crystal castings & blade manufacturing.					
		(iii) Directionally solidified castings technology.					
		(iv) Lubrication system design for very low oil consumption.					
		(v) Rotor dynamics and vibration technology for twin spool engines.					
		(vi) Measurement of rotor temperature and stress pattern with telemetry.					
		(vii) Measurement of blade vibration using non-contact methods.					
		(viii) Measurement of flame tube pattern factor.					
		(ix) Vibration guides vanes and stator actuation technology including the hydraulic spools and linkages.					
		(x) TiAl (Titanium Aluminide) material technology for HP compressors and LP turbines.					
		(xi) Integrated particle separator for helicopter engine					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		air intakes.					
(q)	Avionics	(i) **HMDS**: Technology for data processing, graphics processing, high resolution – high accuracy binocular display, optical head, head tracking/ eye tracking system and digital video interface.					
		(ii) Technology for Data Link.					
		(iii) **SATCOM**: Technology for Ku band T/R module, steerable antenna, and modem with efficient error correction schemes.					
		(iv) **Software Defined Radio (SDR)**: (aa) Technology for direct RF sampling receivers and algorithms, demodulation for burst mode/ TDMA applications, Dynamic TDMA algorithms with minimum overheads.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(ab) Efficient forward error correction algorithms. (ac) Efficient source coding schemes for voice and image data compression. (ad) Miniaturized high power amplifiers.					
		(v) **Terrain Avoidance & Warning System (TAWS)**: (aa) Technology for TAWS for helicopters with compliance to FAA Class A requirement (ab) Technology for integration of audio-visual warning for impeding terrain with forward looking capability.					
		(vi) **Night vision devices (NVD)**: (aa)Technology for					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		aviation grade Night Vision Devices with dual eyepieces. (ab)Technology for integration of these NVDs with avionics package through helmet mounted displays.					
(r)	Composite Materials & Processes	(i) Development of light weight composite materials with improved material characteristics in terms resistance to abrasion, temperature, corrosion, etc.					
		(ii) Contemporary composite part manufacturing technologies like automated Fibre & ply placement, Resin Transfer Mould (RTM) technology, Collapsible Invar Tooling for Composite Manufacture, out of autoclave curing process, Machining technology for composite parts.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(iii) Technology for light weight armour protection.					
(s)	Manufacturing Technologies	(i) Technology for Teflon linear bonding.					
		(ii) Manufacturing of airworthy components using Electron beam plasma Deposition techniques.					
		(iii) Thermal Wave imaging techniques.					
		(iv) Contemporary manufacturing technologies including automation of aero structures assembly (Robotic Drilling & Riveting), automation of final Assembly Line (Equipping), moving lines assembly, Jig-less assembly, High Speed Machining with In-process gauging, on-site NDT techniques					
(t)	Radar and associated Systems	Design and manufacturing of Radar and its associated systems capable of meeting the following criteria:-					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(i) More than 270 degree scan (ii) Automatic target tracking of minimum 64 targets of all types. (iii) ISAR (inverse synthetic Aperture Radar) capability. (iv) Multiple modes of operation such as:- (aa) Surface – long and short range surveillance capability with ISAR capability. (ab) Weather – capable of indicating cloud densities in colour. (ac) Navigation – with ground mapping facility with flight plan and waypoint overlay.					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		(ad) Air-to-air mode- the radar should be capable to search and detect air targets. (ae) Zoom facility- display zoomed picture for a selected area for enhanced target discrimination (v) Detection Range– Radar Cross Section criteria (Sea State 1, Probability of Detection 90%):- (aa) 10 sqm target at 3000 ft altitude - at-least 28 Nm (ab) 100 sqm target at 3000 ft altitude – at-least 50 Nm (ac) 1000 sqm target at 5000 ft altitude - at-least 80 Nm					
(u)	Sonar	The technology to design and					

Ser	Key Technology Domain	Technologies Sought	Will the capability, Technologies & knowledge be transferred	Description of Capability Area	Description of extent & depth of ToT	Description of specific data, technologies & knowledge transferred	Remarks
		manufacture portable sonar with integrated panoramic variable depth technology operating at frequencies of 5 kHz or lesser and capable of being trailed during transit between dunks.					

3. **Description on Filing up of RFI**. The above mentioned chart is meant to provide details and extent of the capabilities being provided by OEMs of Helicopters. The OEMs are to fill the chart as per following guidelines:-

(a) **Column 1 (Will the Capability, Technologies and Knowledge to be Transferred)**. The OEM should mention whether the listed Capability Area/ ToT would be transferred or not.

(b) **Column 2 (Description of Capability Area)**. In this column, the OEM should provide general description and content of the capabilities being transferred.

(c) **Column 3 (Description of Extent and Depth of ToT)**. In this column, the OEM should specify the depth and to what extent the ToT is being offered for each capability areas. The extent and depth of ToT being provided should enable the Indian Production Agency a long term and self sustained capability.

(d) **Column 4 (Description of Specific Data, Technologies and Knowledge Transferred)**. In this column, the OEM could provide the following information for each capability area:-

(i) Specific data and documentation required to enable the ToT transferred to the Indian Production Agency.

(ii) List and describe the technologies required to be transferred to enable the ToT

Appendix C
(Refers to Para 10 of NMRH RFI)

GUIDELINES FOR TRANSFER OF TECHNOLOGY NAVAL MULTI ROLE HELICOPTER

1. MoD, would shortlist Original Equipment Manufacturers (OEM) for helicopters based on the SQRs, Technology Transfer and indigenous roadmap. OEMs having platforms meeting SQR of helicopters need to provide ToT along with the delivery of helicopters. The Naval Utility Helicopters for the Indian Navy are expected to be in the weight category of 5 Tons. The helicopters would primarily operate from ships of Indian Navy.

2. The OEM need to recommend the range, scope and depth of ToT which would enable the Production Agencies/ SPs to manufacture, assemble, integrate, test, install and commission, use, repair, overhaul, support and maintain the helicopters from CKD/SKD/ IM kit. The OEM would be required to provide the latest version of Configuration Control Document which would provide detailed breakdown of the product structure in terms of sensors/subsystems/ assemblies/ sub-assemblies/ modules / detail parts/ PCBs/ wiring diagrams, etc with their latest modification status. All updates as per the 'contract terms' would be provided as and when issued. Consolidated list of updates during the year would have to be provided during the first quarter of subsequent year.

3. **Definitions**. The following would define the scope of ToT:-

(a) **Transfer of Technologies**. It shall mean the quantum and scope of technology being offered by the Buyer and which shall be transferred to the Indian recipient body as part of Buyer Indigenization plan.

(b) **Range**. It shall mean the field (engineering, manufacturing, maintenance) of the Scope of technologies to be transferred.

(c) **Depth**. It shall mean the extent of the Range to be transferred.

(d) **Scope**. It shall mean identification (naming) of the technology.

(e) **Design Technology**. It involves the transfer of design and the knowhow and know why of the equipment. On successful transfer of the technology, the Production Agency (PA) should be equipped with data and knowledge to develop similar products/equipment.

(f) **Manufacturing Technology**. It involves the transfer of required know how and know why for the entire manufacturing process of the particular equipment/ product. On successful transfer of the technology, the PA should be equipped with the requisite data and knowledge to undertake manufacture

of similar equipment which may have been designed based on the design technology acquired.

(g) **Transfer of Algorithms**. This would involve the transfer of requisite software, the rationale behind the algorithms and the methods involved in arriving at the particular algorithms.

4. **Product Offering**. The OEMs need to convey in brief and with adequate clarity, their Transfer of Technology (ToT) offer for indigenous manufacture of Helicopter in India towards 'Make in India' initiative of the Government of India.

5. **ToT Requirements**. The Transfer of Technology should meet following requirements:-

(a) ToT should be comprehensive covering design and manufacturing technology.

(b) The technical information provided by OEM should enable the Indian Production Agency (IPA) to manufacture, assemble, integrate, test, install, commission, repair/overhaul, support and maintain the helicopter. In addition, ToT should facilitate obsolescence management, life extension and subsequent integration of sensors/systems and weapons.

(c) At the end of technology transfer process, it is essential to indigenously manufacture the helicopter, which shall be defined based on mutual work-share agreement between the OEM, major sub-contractors of the OEM and the Indian Production Agency.

(d) The extent of Key Technologies, which will be provided, should be indicated along with scope and depth being provided for each technology as per format at **Appendix B**.

6. The transferred knowledge should contain possibilities for design / development/ sourcing/ integration/ production/ maintenance ('O', 'I', & 'D' levels)/ upgrade, as applicable. Further, it is mandatory that the transferred capabilities/ technologies should be capable of being utilized/ implemented in the ongoing and future indigenous programs.

7. **General Guidelines for ToT**. It is essential to adhere to the general guidelines for ToT provided at **Appendix G** to Schedule I to Chapter II of DPP 2016. The specific requirements listed therein, which would not be feasible, should be clearly brought out in the response to the RFI. In order to facilitate fair assessment of the depth of technology being transferred, OEMs would be required to identify sensors/system/sub-systems under Category 1 to 4. The sensors/ system/ sub-system/ assembly/ sub-assembly/ module/ detail parts classified as category 5 should be listed and the total value of category-5 items as a percentage of the total value of the aircraft must be specified. The definitions of Category 1 to 5 items and the ToT requirements of each category are enumerated in DPP 2016**.**

8. **Configuration Control.** The OEM would be required to provide the current version of Configuration Control Document to the Indian Production Agency(ies)/Strategic Partner having detailed breakdown of the product structure (helicopter, sensors, sub-systems and support equipment) in terms of the lower level sub-systems/assemblies/sub-assemblies/modules/detail parts/PCBs/wiring diagrams etc with latest modification status. The OEM should provide the data (i.e appropriate procurement identification or nomenclature information) necessary to procure all the components including appropriate sub-vendors identification. All updates during the term of the agreement should be provided as and when issued. Considered list of updates during the year should also be provided during the first quarter of the subsequent year.

9. Design data would have to include the details that the Indian Production Agencies/strategic Indian partners would need to analyse, carryout trouble shooting, give design disposition during the production and exploitation (i.e operational use) of the helicopter, its engine, sensors, system/ sub-systems and accessories on account of snags, deviations, concessions, modification, up-gradation of the product and substitute parts and systems of the product as required by the Indian certifying agency and the Indian Production Agency/Strategic Indian Partner.

10. **Government Approvals**. The OEM would also provide an assurance in the proposal that it would seek all necessary Government export approvals in respect of ToT required for design/development, manufacture, repair/overhaul, upgrade for the helicopter, engines, weapon and sensors, systems and all the components. The OEM would also provide an assurance that all the subsequent governmental approvals needed to allow the OEM to enter into negotiation, sign and execute contracts with the Government of India related to the product would be carried out in a timely manner as and when required. Final export approval should be obtained when contract negotiations are completed, the exact specifications of the product to be supplied have been agreed and Inter-Government Agreement (IGA)/Contract have been signed. At the time of IGA/contract signature, the OEM will present required documents for GoI signature/approval allowing for the implementation of the ToT agreed upon in the IGA/Contract.

11. **Infrastructure Setup.** The OEM would have to include the overall requirement and specifications for the infrastructure set-up required for the satisfactory implementation of the envisaged development, production, tests and maintenance, as applicable. The GSE/GHE, with quantities and all other necessary requirements with specifications, required for implementation of the envisaged development, production, test and maintenance, as applicable, should also be provided to the Indian Production Agency/ Strategic Indian Partner.

12. **Support**. The OEMs would have to provide and support complete ToT for the envisaged development, production, test and maintenance as applicable to the Indian Production Agency/Strategic Partner for the helicopter, sensors and its sub-systems, modules, assemblies and detailed parts/components, including those from sub-vendors. OEM will also be responsible for providing lifetime support for all proprietary items. Availability of support is desirable for a long term with a goal of achieving minimum period of 30 years, beginning after the last helicopter is produced. The OEM would be expected to provide support, and facilitate ToT of the

sub-systems from his sub-vendors/OEMs. The OEM should resolve any design deficiency revealed during the operational utilisation of the helicopter in India by the user, which impact stipulated performance.

13. **Sub-assembly Details**. It is likely that some of the assemblies/sub-assemblies/ sensors/ sub-systems and systems are manufactured by OEM's vendors/sub-contractors either based on Engineering documentation provided by the OEM or developed by the OEM's vendors/sub-contractors which are based on procurement specifications provided by OEM. Detailed list (including procurement information) of such items would have to be provided by OEM.

14. **Proprietary Items**. Certain components/processes specifically developed by the OEMs for use in the manufacture of the helicopter, sensors, its sub-systems and support equipment may be classified 'Proprietary' and not included within the scope of ToT offered to the Indian Production Agency(s). The OEM shall make every effort to minimize proprietary items and if such items are necessary, shall provide details of the nature and scope of the specific items excluded. Further, no item in the product structure which is critical either from the technology point of view or from the point of view of significant value addition or which constitutes a significant relative percentage of the product cost, should be included under the head 'Proprietary items'.

15. **Strategy for Future Capabilities.** The OEM should provide a strategy which describes how the transferred capabilities can be future developed, enhanced and used for other existing and future helicopter programs in India.

16. **Assistance to Indian Production Agency(s)**. OEM shall assist the Indian Production Agency(s)/ Strategic Indian Partner and ensure that maintenance ToT is provided to the maximum extent possible, as required, from his vendor/ sub contractors for items not being provided under ToT.

17. The OEM should permit the Indian Production Agency(s)/ Strategic Partner to sub contract components/ assemblies to its sub contractors. The arrangement of ToT shall be such that the Indian Production Agency(s)/ Strategic Partner are able to procure components/ sub-assemblies/ raw material/ test equipment directly from OEM's sub contractors/ vendors. Exhaustive lists of the OEM sub vendors and the part Numbers of equipment shall be provided by the OEM to the Indian Production Agency/ SP.

18. The option to produce helicopter/ engines/ sensors/ sub systems/ spares for the Indian Armed Forces use, beyond the quantity indicated in the RFI shall rest with the Government of India. The option to export to third country, beyond the Indian requirement, would be subject to agreements with the Government of India and Government of OEM.

19. **Manufacturing Quality Standard Parameters**. The OEM shall provide Manufacturing Quality Standard Parameters (MQSP) details such as Rejection Rate, Rework Rate, Concession Rate, Defect Rate, Quality Escape Rate, MTBF and Failure Rate.

20. **Product Upgrades**. The helicopter OEM would extend full support for technology insertion/ up-gradation/ modification of the helicopter to meet user requirements over the life span of the entire fleet in the Armed Forces inventory. The guidelines would be as follows:-

(a) **OEM Process/ History of Upgrades**. OEM shall describe the process for research and development of future technology insertion and how the Indian Armed Forces can benefit/ influence this process.

(b) **Technical Data Provided for Upgrades.** Technical data, including relevant documentation update, in respect any modifications/ improvements/ upgrades undertaken by OEM in the licensed product during the entire life cycle of the product/ license Agreement, shall be provided to the Indian Production Agency/ SP along with manufacturing data for the same.

(c) **Indigenous Upgrade Capability**. It should be possible to integrate indigenous torpedo, sensors and avionics of Indian/ western/Russian origins. The ToT must include complete design/data/ knowledge to undertake above integration.

21. **Technical Assistance**. As part of ToT, OEM shall provide requisite technical assistance to the Indian software engineers and technicians during the manufacturing program and also during support, repair, overhaul and upgrade of the product.

Appendix D
(Refers to Para 19 of RFI)

INFORMATION PROFORMA

1. **Name, Address and Unique ID (if any) of the Vendor/Company/Firm**.

_____

(Company profile, in brief, to be attached. In the eventuality of the firm emerging as L1, contract will be concluded in the **name and address** of the firm, as indicated here). Vendors are to submit an undertaking that any subsequent proposal for change in name of firm or address, will be intimated to IHQ MoD (Navy) at the first available opportunity and supporting documents be furnished within five working days of approval by relevant competent authority.

2. **Type (Tick the relevant category)**.

Original Equipment Manufacturer (OEM) Yes/No

Government sponsored Export Agency Yes/No (Details of registration to be provided)

Authorised Vendor of OEM Yes/No (attach details)

Others (give specific details) _____

3. **Contact Details**.

Postal Address:

_____

City: _____ Province: _____

Country: _____ Pin/Zip Code: _____

Tele: _____ Fax: _____

URL/Web Site: _____

4. **Local Branch/Laison Office/ Authorised Representative, in India (if any)**.

Name & Address: _____

City: _____ Province: _____

Pin code: _____Tele: _____ Fax: _____

5. **Financial Details**.

(a) Annual Turnover: _____ USD

(b) Number of Employees in firm _____.

(c) Details of manufacturing infrastructure available _____.

(d) Earlier contracts with Indian Ministry of Defence/ Government agencies:

Agency	Contract Number	Equipment	Quantity	Cost

6. **Certification Quality Assurance Organisation (If Applicable)**.

Name of Agency	Certification	Applicable from (date& year)	Valid till (date & year)

7. Equipment/Product Profile (to be submitted for each product separately):-

(a) Name of Product: _____
(Should be given category wise for e.g. all products under night vision devices to be mentioned together)

(b) Description (attach technical literature): _____

(c) Whether OEM or Integrator: _____

(d) Status (in service /design & development stage): _____

(e) Production capacity per annum: _____

(f) Countries where equipment is in service: _____

(g) Whether export clearance is required from respective Government: ___

(h) Any collaboration/joint venture/ co production/ authorized dealer with Indian Industry (give details):

Name & Address: _____

Tel: _____ Fax: _____

(j) ROM price in the following format (not restricted):-

Sr	**Item**	**Unit Cost (Rs Crore)**	**Norms Followed for discovery of Price**
(i)	Helicopter		
(ii)	Spare Engine		
(iii)	Packing & Transportation		
(iv)	Training & Deputation		
(v)	Performance Based Logistics for 10 years		
(vi)	GSE / GHE		
(vii)	Additional Support Eqpt SAR Kits		
(viii)	Torpedo and associated system		
(ix)	Chaff and Flares		
(x)	Simulator		
(xi)	ToT/ MToT		
(xii)	MRO		
(xiii)	AMC for Simulators		
	Any other		
	Total Cost of Project		

8. Alternatives for meeting the objectives of the equipment set forth in the RFI.

9. Any other relevant information. _____

10. **Declaration**. It is certified that:-

(a) The above information is true and any changes will be intimated within five (05) working days of occurrence.

(b) The _____ (name of firm) has never been banned/de-barred for doing business with MoD/GoI/any other government organisation and that there is no inquiry going on by CBI/ED/ any other government agency against the firm.

Note: *- Para 44 and Appendix F of Chapter II of DPP 16 may be referred*

(**Authorised Signatory**)