REQUEST FOR INFORMATION : CREATION OF SPECIALIZED TEST FACILITIES FOR MANAGEMENT OF SPECTRUM (COSMOS)

Introduction

1. The Ministry of Defence, Government of India, is interested in creating infrastructure for EMI/EMC testing of large size equipment to be inducted in the Army as per MIL STD 461F on a turnkey basis, at Army Centre for Electromagnetics (ACE), Mhow.

2. All Communication Electronic (CE) and Non CE equipment that are proposed for induction into the Indian Army are to be evaluated for compliance to Electromagnetic Compatibility (EMC) as per laid down Military Standards (MIL-STD) and commercial standards. The tests are conducted as per MIL-STDs and commercial standards inside an anechoic chamber which provides attenuation required as per standards from the external electromagnetic (EM) emissions. This chamber is required to house the EMC test system which is required to accurately capture and analyse the emissions only from the Equipment under Test (EUT). Details of such test and evaluation setup to be constructed under Project COSMOS is given in succeeding paras. All the test equipments and various elements of the project under procurement will be of latest design, latest technology and current year manufacture to overcome technology obsolescence and other related issues.

3. The project will involve the following:-

   (a) Large Anechoic Chamber (Size 25m(L) x 25m(W) x 15m(H)) including turntable of diameter 1 m.

   (b) Shielded Amplifier Room (Size 6m(L) x 4m(W) x 3m(H)).

   (c) Shielded Control Room (Size 7m(L) x 4m(W) x 3m(H)).

   (d) Technical infrastructure i.e. Construction of the parent building of size 43m(L) x 34m(W) x 17m(H) to house all the above with small office, toilets, generator room etc.

   (e) Construction of open area ground plane (OAGP) of size 25m(L) x 25m(W) x 1 m (H) outside, including turntable of diameter 10 m and weight carrying capacity upto 80 tons..

   (f) Procurement and installation of associated test and measurement systems for conduct of EMI/EMC tests as per the latest Mil Stds and Commercial Stds.

   (g) Other accessories and infrastructure viz control AC, power supply, earthing, lighting etc.

(Note :- L : Length, W : Width, H : Height, m : meter)
**Aim**

4. To invite responses from the prospective firms who are interested in participating in the execution of the proposed system.

**Scope**

5. Indicative scope of the project is given at Appendix A.

**Objective**

6. Directorate General of Signals (Sigs 6) Integrated HQ of MoD (Army), will evaluate responses to RFI so as to shortlist eligible Firms to issue Request for Proposal (RFP) for Project COSMOS. Firms should furnish all details, as applicable, sought in Appendix B and C to enable the user to achieve following objectives:-

   (a) Assess the financial capability of the Firm to handle this project.

   (b) Examine Firm’s experience and track record in implementation of similar projects.

   (c) Assess ability of Firms to provide maintenance support insitu.

**Eligibility Requirements of the Firm**

7. Details of technical requirement are given in Appendix D. Compliance to all technical criteria is required to be individually endorsed in the RFI responses as given in Appendix E. Documents validating compliance have been indicated in the eligibility criteria. Non availability of documents in responses will indicate non compliance.

   (a) Guarantee that all software patches / upgrades, spares and consumables will be provided for a period of ten years including three years warranty irrespective of availability of OEM support.

   (b) Firms shortlisted for issue of RFP will be required to sign “Non-Disclosure Agreement” with “Government of India before issue of tender papers as well as before award of contract”.

**Evaluation Process**

8. Short listing of Firms, for issue of RFP, will be carried out based on vendor responses to the compliance of eligibility criterion. Compliance is required to be submitted in the exact format given at Appendix E. Firm submitting compliance in any other format or non-submission of any documents or incomplete information shall automatically disqualify and will not be considered for the selection process. Firms may be asked to give a presentation on capability and experience to undertake the said project to the committee if required.
Miscellaneous Issues

9. Right to suspend the RFI process or part of the process to accept or reject any or all applications at any stage of the process and / or to modify the process or any part thereof at any time without assigning any reason is reserved with the user without any obligation or liability whatsoever.

Procedure for Response

10. Firms are requested to forward their response to the proposal of COSMOS as per requirement listed in the preceding paragraphs along with introductory brief of their companies as per proforma given at Appendix B and C.

11. The response to this RFI may be forwarded through registered post / courier by 1000hrs on 06 Jun 15 to the under mentioned address :-

Dte Gen of Sigs (Sigs-6), General Staff Branch,
Room No 605, A Wing, Integrated HQ of MoD (Army)
Sena Bhawan, Defence HQ – PO
New Delhi – 110011
Tele : 011-23018931 Fax : 23018930
SCOPE OF THE PROJECT

1. The project will involve construction of the following:
   
   (f) Large Anechoic Chamber (Size 25m (L) x 25m (W) x 15m (H)) including turntable of diameter 1 m.
   
   (g) Shielded Amplifier Room (Size 6m (L) x 4m (W) x 3m (H)).
   
   (h) Shielded Control Room (Size 7m (L) x 4m (W) x 3m (H)).
   
   (i) Construction of the parent building of size 43m(L) x 34m(W) x 17m(H) to house the following enclosures within it:

       (i) Large Anechoic chamber.
       
       (ii) Shielded Control room.
       
       (iii) Shielded Amplifier room.
       
       (iv) Shielded Equipment room.
       
       (v) Conducted Susceptibility Room.
       
       (vi) Diagnostics Chamber.
       
       (vii) Network Analysis lab.
       
       (viii) Prediction and modelling lab.
       
       (ix) Interference test lab.
       
       (x) Preparation Area.
       
       (xi) 2 x Offices.
       
       (xii) Store room for keeping antennas and accessories.
       
       (xiii) 2 x Toilets.
       
       (xiv) 1 x Ladies toilet.
       
       (xv) Associated furniture.
       
   (j) Construction of open area ground plane (OAGP) of size 25m(L) x 25m(W) x 1 m (H) outside, including turntable of diameter 10 m and weight carrying capacity upto 80 tons.
2. Procurement and installation of associated test and measurement systems for conduct of EMI/EMC tests as per MIL-STD 461 F or better required to be installed in the large anechoic chamber being constructed at Army Centre for Electromagnetics (ACE) as follows:

(a) CE101, Conducted Emissions, Power Leads, 30 Hz to 10 KHz.
(b) CE102, Conducted Emissions, Power Leads, 10 KHz to 10 MHz.
(c) CE106, Conducted Emissions, Antenna Terminal, 10 KHz to 40 GHz for EUT output power between 200 W and 3.5 KW depending on frequency.
(d) CS101, Conducted Susceptibility, Power Leads, 30 Hz to 150 KHz.
(e) CS103, Conducted Susceptibility, Antenna Port, Intermodulation, 15 KHz to 10 GHz.
(f) CS104, Conducted Susceptibility, Antenna Port, Rejection of Undesired Signals, 30 Hz to 20 GHz.
(g) CS105, Conducted Susceptibility, Antenna Port, Cross-Modulation, 30 Hz to 20 GHz.
(h) CS106, Conducted Susceptibility, Transients, Power Leads, 30 Hz to 20 GHz.
(j) CS109, Conducted Susceptibility, Structure Current, 60 Hz to 100 KHz.
(k) CS114, Conducted Susceptibility, Bulk Cable Injection, 4 KHz to 400 MHz.
(l) CS115, Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation.
(m) CS116, Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads, 10 KHz to 100 MHz.
(n) RE – 101 Radiated Emissions, Magnetic Field, 30 Hz to 100 KHz.
(o) RE – 102 Radiated Emissions, Electric Field, 10 KHz to 40 GHz.
(p) RE – 103 Radiated Emissions, Antenna Spurious and Harmonic Outputs, 10 KHz to 40 GHz.
(q) RS – 101 Radiated Susceptibility, Magnetic Field, 30 Hz to 100 KHz.
(r) RS – 103 Radiated Susceptibility, Electric Field, 10 KHz to 40 GHz.
(s) RS – 105 Radiated Susceptibility, Transient Electro-Magnetic Field for testing EMP.
3. Procurement and installation of associated test and measurement systems for conduct of EMI/EMC tests as latest commercial standards as follows:

   (a) Complete ESD Set up (as per IEC 61000-4-2).

   (b) Burst, Surge & Voltage Dip Test.

   (c) CISPR 11 / 22 test.

   (d) Hand Held Spectrum Analyser with Vector Spectrum Analyser and Sniffer.

4. Other accessories and infrastructure viz control AC, power supply, earthing, lighting etc.

5. **Important Note.** A large number of details may not find mention in the document. All essentials should be included in the RFI response.
INFORMATION PROFORMA
(INDIAN VENDORS)

1. **Name of the Vendor/Company/Firm.**
   
   ________________________________________________________________
   (Company profile, in brief, to be attached)

2. **Type (Tick the relevant category).**
   Original Equipment Manufacturer (OEM) Yes/No
   Authorised Vendor of foreign Firm Yes/No (attach details, if yes)
   Others (give specific details) ______________________________________

3. **Contact Details.**
   Postal Address:
   ________________________________________________________________
   ________________________________________________________________
   City : ______________________ State : ______________________________
   Pin Code : _______________ Tele : ________________________________
   Fax : _______________ URL/Web Site: ______________________________

4. **Local Branch/Liaison Office in Delhi (if any).**
   Name & Address: __________________________________________________
   ________________________________________________________________
   Pin code : _______________ Tel : _______________ Fax : _______________

5. **Financial Details.**
   (a) Category of Industry (Large/medium/small Scale)
       :______________________________
   (b) Annual turnover : ________________________ (in INR)
   (c) Number of employees in firm:
       ______________________________________

Appendix B
(Refer Para 6 of RFI)
(d) Details of manufacturing infrastructure:

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

<table>
<thead>
<tr>
<th>Contract Number</th>
<th>Equipment</th>
<th>Quantity</th>
<th>Cost</th>
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6. **Certification by Quality Assurance Organisation.**

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<th>Name of Agency</th>
<th>Certification</th>
<th>Applicable from (date &amp; Year)</th>
<th>Valid till (date &amp; year)</th>
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7. **Details of Registration.**

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<tr>
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<td>DRDO</td>
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<tr>
<td>Any other Government Agency</td>
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</tbody>
</table>

8. **Membership of FICCI/ASSOCHAM/CII or other Industrial Associations.**

Name of Organisation: [ ]
Membership Number: [ ]

9. **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) Name and address of Foreign collaborator (if any):
____________________________________________

(e) Industrial Licence Number: ________________________________

(f) Indigenous component of the product (in percentage):

(g) Status (in service/design & development stage):

____________________________________________

____________________________________________

____________________________________________

(h) Production capacity per annum:
____________________________________________

(i) Countries/agencies where equipment supplied earlier (give details of quantity supplied):
____________________________________________

____________________________________________

(j) Estimated price of the equipment: ____________________________

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

11. Any other relevant information: ______________________________

12. **Declaration.** It is certified that the above information is true and any changes will be intimated within five (05) working days of occurrence.

(Authorised Signatory)
INFORMATION PROFORMA
(FOREIGN VENDORS)

1. **Name of the Vendor/Company/Firm.**
   __________________________________________________________
   (Company profile, in brief, to be attached)

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/Liaison Office/Authorised Representatives, in India (if any).**
   Name & Address: __________________________________________________
   City : ___________________________ Province : ______________________
   Pin code : ______________ Tel : ______________ 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:
6. **Certification by Quality Assurance Organisation (If Applicable).**

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   (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/ authorised dealer with Indian Industry (give details):
   Name & Address: _____________________________________________
   Tel : ________________________ Fax : ____________________________

   (j) Estimated price of the equipment.

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

    (Authorised Signatory)
6. The project will involve the following:-

(a) Large Anechoic Chamber (AC) (Size 25m(L) x 25m(W) x 15m(H)).

(b) Shielded Amplifier Room (Size 6m(L) x 4m(W) x 3m(H)).

(c) Shielded Control Room (Size 7m(L) x 4m(W) x 3m(H)).

(d) Technical infrastructure i.e. Construction of the parent building of size 43m(L) x 34m(W) x 17m(H) to house all the above with small office, toilets, generator room etc.

(e) Construction of open area ground plane (OAGP) of size 25m(L) x 25m(W) outside.

(f) Procurement and installation of associated test and measurement systems conduct of EMI/EMC tests as per Mil Stds and Commercial Stds.

(g) Other accessories and infrastructure viz control AC, power supply, earthing, lighting etc.

7. The detailed specifications of technical infrastructure, Anechoic Chamber, OAGP and associated test and measurement equipment to be procured are given in succeeding paragraphs as mentioned below:-

(a) **Part – I (a).** Parent Building enclosing the large Anechoic Chamber, Control room, Shielded Amplifier room, Diagnostic enclosure and other Administrative facilities.

(b) **Part – I (b).** Large Anechoic Chamber (AC).

(c) **Part – I (c).** Open Area Ground Plane (OAGP).

(d) **Part – I (d).** EMC test and Measurement Equipment.

(e) **Part- II.** Operation and Maintenance
PART-I (A) : PARENT BUILDING ENCLOSING
THE LARGE ANECHOIC CHAMBER

3. The technical infrastructure will encompass the following enclosures within it :-

(b) Large Anechoic chamber.
(c) Shielded Control room.
(d) Shielded Amplifier room.
(e) Shielded Equipment room.
(f) Conducted Susceptibility Room.
(g) Diagnostics Chamber.
(h) Network Analysis lab.
(i) Prediction and modelling lab.
(j) Interference test lab.
(k) Preparation Area.
(l) 2 x Offices.
(m) Store room for keeping antennas and accessories.
(n) 2 x Toilets.
(o) 1 x Ladies toilet.
(p) Associated furniture.
(q) The minimum shielding effectiveness of the Large Anechoic Chamber, Shielded Control Room, Shielded Amplifier Room and Shielded Equipment Room should conform to the levels required as per Military and commercial standards.

4. The ground on which this chamber is planned should be free from capillary rise in water, moisture, fungus, white ants, rodents, etc. CCTV network for video surveillance of entire facility from manufacturer of reputed brand, latest models, high end items and of standard quality. The entire facility will be designed keeping the seismic zone requirements in mind and tests connected with the Earthquake Engineering Sectional Committee, CED 39 of Indian Standards on Earthquake Engineering.

5. The parent building will be designed to house the EMC chamber and the support facility for making EMC measurements on vehicles, vehicle mounted products and sub systems used by the Indian Defense Forces. The facility will also provide offices and support facility for operators and managers of the test facility. Electrical, HVAC and telecommunication requirements to support the use of the facility will be part of the parent building project. The design dimensions of the parent building can be varied upto 10% by the vendor so as to optimize cost and efficiency. The parent building will be designed using prefabricated structural material to meet the requirements of a light Industrial building.
PART – I (B): LARGE ANECOIC CHAMBER

6. **Large Anechoic Chamber Details.** The chamber shall be divided into the following segments. All dimensions are the approximate internal dimensions:-

   (a) Anechoic Chamber (25m x 25m x 15m) (Absorber to Absorber).

   (b) Shielded Control Room (7m x 4m x 3m).

   (c) Shielded Amplifier Room (6m x 4m x 3m).

   (d) Shielded Equipment Room (4m x 4m x 3m).

   (e) Conducted Susceptibility Room (9m x 4m x 3m).

   (f) Diagnostic Chamber (7m x 4m x 3m).

7. The dimensions are approximate. The vendor has the flexibility to optimize the dimensions by 10% such that cost of shielded rooms and performance requirements are optimized.

8. **Large Anechoic Chamber (AC).** The test chamber will provide ambient which is at least 6 dB below the most stringent Radiated Emission (RE 102) limit line as applicable for Ground Army. The inner dimensions with pyramidal absorbers will be 25m x 25m x 15m. In order to withstand the load of vehicle under test, the floor will be of continuously welded steel panel of minimum (3/4") extending up the walls with minimum 12 gauge welded steel. Proposed scope of work are:-

   (a) Digging of a concrete pit in host building floor.

   (b) Shielding of the pit, using copper foil, creating a copper basin.

   (c) Pouring reinforced concrete slab into the copper basin forming a concrete slab.

   (d) Installation of metallic ground plane on top of concrete slab.

   (e) Minimum 12mm thick continuously welded steel panel floor construction extending 1520mm up the walls (skirting) with minimum 12 guage welded steel suitable dielectric underlay and vapour barrier installed below the steel panel floor.

   (f) Epoxy resin coating on top of the steel panels on the floor.

   (g) High strength removable neoprene rubber matting in the area between the door and test position to protect floor coating from tracked vehicles.

   (h) Shielded tunnels must be catered for layout of cables from the floor connection panels to the penetration panels.

   (j) Anechoic Chamber to have an automatically operated main door (pneumatic) of size not less than 12m (W) x 10m (H) in two parts.

   (k) Anechoic Chamber to have two more semi automatic doors of size not less than 1.2m (W) x 2.1m (H) for entrance to shielded control room and shielded equipment room.
9. **Personnel Access Entrance Door.** The entrance door would be a semi automatic single wing edge door pneumatic latching with a clear opening dimension of not less than 1.2m (W) x 2.1m (H). The threshold would be situated at 150mm height with an indication of “Test in progress” mark.

10. **Shielded Control Room (CR).** The size of this portion of the shielded control room will be 7m x 4m x 3m. The details of the building are given below:-

   (a) Shielded Control Room will have a semi automatic main door of size not less than 1.2m (W) x 2.1m (H).

   (b) Shielded Control Room will have another door of size not less than 1.2m (W) x 2.1m (H) (Common door between Anechoic chamber and Control Room).

   (c) Honeycomb wave guide air vents located in the enclosure ceiling and enclosure side walls near the floor. The size and number of vents will ensure adequate ventilation and balancing air pressure.

   (d) Dual line 50Hz power line filters.

11. **Shielded Equipment Room (ER).** The size of this portion will be 4m x 4m x 3m. This is required to place equipment which is not integral to the system being tested eg:- dc motor, switch mode power supplies etc. There will be a patch panel of size 1m x 1m with filters for connection of cables.

12. **Shielded Amplifier Room (AR).** The size of this portion of the building will be 6m x 4m x 3m. The details of the building are given below:-

   (a) The Shielded Amplifier Room will have a semi automatic main door to enable laden self propelled fork lift to enter and exit. The minimum dimensions shall be 2.5m (W) x 3.0m (H).

   (b) The Shielded Amplifier Room will have other semi automatic door of size not less than 1.2m (W) x 2.1m (H) (Common door between AC and AR). In case the room is provided below the Anechoic Chamber, access via a hatch to the Anechoic Chamber must be provided. Ingress and egress for heavy equipment through a vehicle should also be provided to the Amplifier room for its maintainence.

13. **Conducted Susceptibility Room (CSR).** The internal dimensions of this room for will be 9m x 4m x 3m. The conducted enclosure in conjunction with the AC must be able to simultaneously perform the following tests:-

   (a) Conducted Susceptibility with Radiated Emissions.

   (b) Conducted emissions with Radiated Susceptibility.

14. **Power Control & Distribution Room.** There is a requirement of a room of dimension 6m x 6m x 5m for housing 2 x 150 KVA, 3 phase generators. The facility will be such that the generators will automatically switch on, in case of power failure and switch off when the power supply/ mains is restored. A UPS of appropriate rating will be provided to power the indicators and emergency lighting for a duration of two hours to ensure that testing personnel exit the facility in case of a power failure/ if time to switch over to generator power is not automatic due to maintenance/repair. This UPS would be powered by a bank of Sealed Maintenance Free (SMF) batteries.
15. **Earthing.** Earthing will be implemented using a dual earthing grid system around the building and by taking tapping at all corners inside the building.

16. **Power.** The power to the lab will be through an isolation transformer and will be a balanced power supply. Suitable equipment will be installed that the power supply conforms to the requirements of the Bureau of Indian Standards (BIS) document : SP : 30, 2011. The power supply will be stabilized to an output which is within 10% of 220V, AC. Any fluctuation beyond 10% should result in change over to UPS / Generator.

17. **Protection against Lightning.** Suitable lightning protection infrastructure to cater for umbrella coverage of 100meter diameter area at 20 meter centre height will be provided for with response time of the order of picoseconds.

18. **Requirement of Fire Fighting Equipment.** There is a requirement of providing an automatic fire detection and alarm system with provision of adequate number of fire fighting points. The fire fighting points should incorporate hoses for fire fighting to cover each enclosure. There will be dedicated plumbing to the fire fighting points from a water tank with an electric motor capable of being switched on from any fire fighting point.

19. **Requirement of Internal Cabling for Internet, LAN and Cable TV.** There is a requirement of providing fiber optic cabling for extending internet services to all administrative offices and 2 x LAN ports to the Control Room, Conducted Susceptibility Room, Equipment Room, Shielded Amplifier Room and Anechoic Chamber of the specialised building. In addition provision of DVI / HDMI cabling for viewing the EUT inside the anechoic chamber from the control room must also be provided. Lighting with LED technology should be homogeneous with 300 Lux on the floor at a distance of 1m. For this adequate number of light points with electrical lifting (up/ down) system should be made available.

20. **Antenna Mast System.** The vendor has to provide a semi automated Antenna Mast capable of RF painting an EUT of size upto 10m x 10m x 08m on all four sides and top.

21. **Turntable.** A fully automatic turntable which can be switched ON / OFF during testing and able to meet the requirements of EMI/ EMC testing of subsystems as per 461F or better. The turntable should be capable of testing equipment of size upto 1cubicmetre.

22. **Strip Line Antenna.** A roof hung strip line E field generator of minimum dimensions of 350cms x 250 cms (WxL) in the frequency range 10 KHz to 100 MHz should be provided for doing RS 103 test at 200 V/m. The antenna should also have the capability to be put on a stand on the ground for RS 103 test.

23. **Crane / Hoist.** There should a system to move an EUT from the entrance of the main anechoic chamber to the test site using a crane / hoist with a capacity of 2000 Kgs. There should be adequate no of straps and fastenings provided in the crane / hoist to hold EUT of different size and shapes.

24. **Electrical Components.** All electrical components required should be provided.

25. **Control System of the Operating Terminal.** An operating unit should be installed in the control room for operation of the turntable.
26. **Remote Control.** A handheld operating unit with a 10m cable located in a box below the turntable covering must be provided.

27. **CCTV Systems.** Colour CCTV systems capable of functioning in a RF field of 200 V/m must be provided.

28. **Intercom System.** Audio intercom system capable of functioning in a RF field of 200 V/m must be provided to be installed between Control room and Anechoic Chamber.

29. **Fire Detection System.** A centralised fire detection unit common to the chambers and offices must be installed.

30. **Tests to be conducted inside the AC.** MIL-STD 461 F edition 10 Dec 2007 or better level tests are to be performed inside the AC.

PART - I (C): OPEN AREA GROUND PLANE

31. **Open Area Test Ground Plane.** The Open Area Ground Plane (OAGP) is required for the conduct of tests in actual EM environment. An open area of 25m x 25m with a ground plane elevated 1m from the surrounding area will be required to establish the facility. The area around the ground plane will have cemented water drains to drain out rain water.

PART – I(D): TEST AND MEASUREMENT EQUIPMENT

**Military Standard 461 F or better, Compliance Testing Equipment**

32. **System Specifications.** Test and measurement equipment for conduct of following tests as per MIL-STD 461 F or better are required to be installed in the large anechoic chamber being constructed at Army Centre for Electromagnetics (ACE).

   (i) CE101, Conducted Emissions, Power Leads, 30 Hz to 10 KHz.
   (j) CE102, Conducted Emissions, Power Leads, 10 KHz to 10 MHz.
   (k) CE106, Conducted Emissions, Antenna Terminal, 10 KHz to 40 GHz for EUT output power between 200 W and 3.5 KW depending on frequency.
   (l) CS101, Conducted Susceptibility, Power Leads, 30 Hz to 150 KHz.
   (m) CS103, Conducted Susceptibility, Antenna Port, Intermodulation, 15 KHz to 10 GHz.
   (n) CS104, Conducted Susceptibility, Antenna Port, Rejection of Undesired Signals, 30 Hz to 20 GHz.
   (o) CS105, Conducted Susceptibility, Antenna Port, Cross-Modulation, 30 Hz to 20 GHz.
   (p) CS106, Conducted Susceptibility, Transients, Power Leads, 30 Hz to 20 GHz.
   (t) CS109, Conducted Susceptibility, Structure Current, 60 Hz to 100 KHz.
   (u) CS114, Conducted Susceptibility, Bulk Cable Injection, 4 KHz to 400 MHz.
   (v) CS115, Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation.
CS116, Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads, 10 KHz to 100 MHz.

RE – 101 Radiated Emissions, Magnetic Field, 30 Hz to 100 KHz.
RE – 102 Radiated Emissions, Electric Field, 10 KHz to 40 GHz.
RE – 103 Radiated Emissions, Antenna Spurious and Harmonic Outputs, 10 KHz to 40 GHz.
RS – 101 Radiated Susceptibility, Magnetic Field, 30 Hz to 100 KHz.
RS – 103 Radiated Susceptibility, Electric Field, 10 KHz to 40 GHz.

Sub System/vehicle level Testing with stripline antenna and high power amplifiers for a field strength of 200 Volts/m at a distance of 1m Test distance. Stripline antenna height adjustable from 4 to 8 m along with all accessories for conduct of the test as per MIL-STD 461F.

RS – 105 Radiated Susceptibility, Transient Electromagnetic Field for testing EMP.

EMI / EMC Test System as per MIL-STD 461F

33. **System Set up And Layout**. Entire Test Set up for MIL-Std 461F or better will consist of following independent Test Racks. Each Rack will have Equipments/Accessories to carry out their respective tests independently without disturbing the other set up / Test Rack. However, the final rack configuration may be changed by the user during installation.

(a) **CE / RE Test Rack (Rack -1): Automatic Setup**

(i) CE 101 Conducted Emissions, Power leads 30 Hz to 10 KHz.
(ii) CE 102 Conducted Emissions, Power leads 10 KHz to 10 MHz.
(iii) CE 106 Conducted Emissions, Antenna terminals, 10 KHz to 40 GHz.
(iv) RE 101 Radiated Emissions, Magnetic field 30 Hz to 100 KHz.
(v) RE 102 Radiated Emissions, Electric field 10 KHz to 40 GHz.

(b) **Mobile RE 103 Test Rack (Rack -2): Automatic Setup**. Taking into consideration that RE 103 test for transmitters is to be conducted outside anechoic chamber on OAGP, this test rack should be mobile and compact in nature. This rack should be mounted on a scissor ramp with wheels.

(c) **CS / RS Test Rack (Rack -3): Automatic Setup**

(i) RS 101 Radiated Susceptibility, Magnetic field 30 Hz to 100 KHz.
(ii) CS 101 Conducted Susceptibility, Power leads 30 Hz to 150 KHz.
(iii) CS 109 Conducted Susceptibility, Structure current 60 Hz to 100 KHz.

(d) **Conducted Transient Immunity Test Rack (Rack -4): Automatic Setup**

(i) CS 106 Conducted Susceptibility, Transients power leads.
(ii) CS 115 Conducted susceptibility, Bulk cable injection Impulse Emissions.

(iii) CS 116 Conducted Susceptibility, Damped sinusoid transients cables and power leads 10 KHz to 100 MHz.

(e) CS 114 Test Rack (Rack -5): Automatic Setup. The rack must contain separate amplifier and signal generator to carry out test independently. The Test Rack for CS 114 must be able to carry out test in the new frequency range as per MIL-STD 461F and 461E (i.e. between 4 KHz to 400 MHz)

(f) CS Antenna port Test Rack (Rack -6): Automatic set up (Antenna tests)

   (i) CS 103 Conducted Susceptibility, Antenna port, Inter modulation 15 KHz to 10 GHz.

   (ii) CS 104 Conducted Susceptibility, Antenna port, Rejection of undesired signals 30 Hz to 20 GHz.

   (iii) CS 105 Conducted Susceptibility, Antenna port Cross Modulation 30 Hz to 20 GHz.

(g) RS 103 Test Set up Radiated Susceptibility (Rack 7) (10 kHz- 40GHz): Automatic Setup

   (i) RS 103 Test Set Up(10K-1GHz) ..... (Rack - 7(a))

   (ii) RS 103 Test Set Up(1GHz -18GHz) .... (Rack – 7(b))

   (iii) RS 103 Test Set Up(18GHz-40GHz) .... (Rack – 7(c))

34. Salient Features.

(a) RS 103 test set up.

   (i) The power amplifier should have suppression of minimum, -15 dBc @ 80% of maximum power output.

   (ii) Attempts to be made to achieve 200 V/m field strength at 1 m distance using the above mentioned amplifiers. However, at certain frequencies between (2 MHz – 80 MHz ), 200 V/m field strength can be demonstrated between 0.6 to 0.8 m, if not from 1m distance.

   (iii) Scissor lift with supports (non reflecting) to be designed to lift mobile amplifiers racks (1-18 GHz, 18-40 GHz) up to the height of EUT. Amplifier racks should be very securely mounted and lifted by scissor lift upto height of the EUT.

(b) RE 103 test set up

   (i) RE 103 test for RADAR / intentional transmitters will be conducted in Open Air Test Site. A separate mobile test rack with EMI Receiver (up to 40 GHz) and other accessories will be used for this test.

   (ii) Separate set of antennas (10 KHz-40 GHz) with antenna switching unit to be provided for RE 103 test.
(iii) Antenna mast with adjustable height up to 8 meter will be provided.

(iv) Rejection network (10 KHz - 1.0 GHz) : 6 spot frequencies would be provided using Lumped networks.

(v) Cavity rejection networks for ( 1 GHz – 10 GHz ) frequency.

(c) External preamplifier / LNA (10 kHz – 40 GHz) to be provided at the base of the antenna for RE102 tests. The preamplifier must have gain commensurate to the requirement of EMI test Receiver.

(d) **CS 103,104,105 automatic test set up.**

   (i) Filters ( 2 set) covering freq range 10 kHz – 20 GHz

   (ii) Spectrum Analyzer ( 20 Hz – 20 GHz)

   (iii) Signal Generator ( 100 kHz – 20 GHz) : Qty x 2.

   (iv) Power Combiners (DC to 40 GHz) : Qty 3.

(e) CS 101, RS 101, CS 109 Automatic Test Setup: Phase shift network should be included.

(f) CS 114 test set up will be an independent set up in a separate rack as per MIL-STD 461F starting from 4 KHz to 200 MHz and Mil Std 461D starting from 10KHz to 400MHz. Equipment configuration will cover the frequency range 4 KHz to 400 MHz.

(g) CS 116 test Manual Setup: Damped sinusoidal transient generator with variable frequency modules (10 KHz – 100 MHz).

(h) Each group of Test System will be rack mounted with storage space for Accessories.

35. **ESD Test Setup.**

(a) ESD Simulator ( up to 300 KV).

(b) Measurement target.

(c) Vertical & Horizontal coupling plane, coupling clamp.

(d) Test Table.

(e) Ground plane (horizontal and vertical).

(f) Verification Target.
36. **EMI and EMS Measurement Software.** It should be capable of Automated testing as per the requirement of Mil std 461F and have database for limit lines of MIL, EN, CISPR 11, CISPR 22, FCC and IEC standards. EMI software should be capable of giving the value of the Margin of the recorded Emission above or below the limit line at selected frequencies. EMS Measurement Software should be capable of user's selection of MIL or other Regulation test limits or EUT susceptibility threshold levels. It should also be capable of determining the ‘Threshold of Susceptibility’ in accordance with the procedure outlined in Para 4.3.10.4.3 of Mil Std 461F or better.

37. **Items For Commercial EMI test:**
   (b) Complete ESD Set up (as per IEC 61000-4-2)
   (c) Burst, Surge & Voltage Dip Test
   (c) CISPR 11 / 22 test
   (d) **Hand Held Spectrum Analyser with Vector Spectrum Analyser and Sniffer.** A handheld spectrum analyzer connected to an omnidirectional sniffer / directional antenna capable of picking up E and H fields is required. It should be sensitive enough to pick up fields in the range of µV/µT.

38. **Miscellaneous Requirements.**
   (a) The Warranty period should be for a period of three (3) years for all LRUs of the system and system as such whether the items are COTS, MOTS, Industrial, Semi-Rugged or Rugged.
   (b) AMC for seven years after expiry of warranty to be taken from the respective OEMs for calibration and maintenance of all these test equipments and for all LRUs of the system, accessories, carried spares, all types of Test Equipments, SMTs, STEs, MRLS items.
   (c) All cabling should be treated with overall shielding.
   (d) Functioning of the system should be easy, simple and user friendly.
   (e) Literatures for all LRUs of the system and the system itself both in hard and soft copies of UHB, TMs, BoM, TS, all drawings with technical data for all LRUs Design Specifications (as per JSS – 0251 : 2002), Carried Spares, Tools, DO’s & DON’T’s Operating Instructions, Station List, etc. be provided by the vendor.
   (f) It should be easy to train newly inducted personnel on the functioning and routine maintenance of the system.
   (g) 02 x Heavy duty Colour inkjet printer.
   (h) **Voltage Probe for CE 102 test.** For equipment which require high input current a voltage probe as specified in ANSI C 63.4 will be provided. The construction should be in accordance with figure A-1 in Appendix A of Mil Std 461F or better.
   (j) **5µH LISN.** For CE 102 and CE 102 5µA LISN, 200A qty x 04 will be supplied.
(k) **Test Table.** The test table mentioned in Rack 1 to 7 will be of dimension of 3m x 2m and 80cms – 90cms height meeting all specification of surface resistance and DC resistance mentioned in Mil Std 461F.

(l) **Scissors / Telescopic Lift.** For regular maintenance of the Semi-Anechoic chamber it is recommended to have 2 x Scissor Lift or Telescopic Lift (Cherry Picker type) capable of carrying one or two personnel with some minimal material, with an ability to reach the roof and top corners of the Chamber. It should also be mobile with easy controls.

(m) **DC Power Supply.** A DC Power Supply with atleast 100 A Current and 350 V voltage ratings will be provided. Further, it should be of Non-Switching type and also should meet the Ambient Requirements of CE 101 & CE 102 when loaded with a Resistive Load. The Power Supply Unit will be placed in the Shielded Equipment Room whereas the Voltage & Current Controls and Displays can be situated in the Control Room with appropriate care taken at the Points of Entry so as to not compromise the Shielding Integrity of the Anechoic Chamber.

(n) **Aluminum Panels.** Modular Aluminum panels covering the Shielding Panels for better ergonomics. It should be kept in mind that the Shielding Integrity of the Chambers is not adversely affected because of these panels.

(o) **Tolerances.** Tolerances for all parameters such as applied voltages, currents, temperatures, frequencies should to be specified.

39. **Important Note.** A large number of details for test and measurement equipments including cables probes and other accessories may not find mention in the document. All essential for testing should be included in the RFI response.

**PART II – OPERATION AND MAINTENANCE**

40. **Operating Staff Training.** It should be possible to train operating personnel to the required level in a period of ten working days or less. The personnel should not be required to have any previous knowledge or experience of working in this field. A suitable training package should be provided by the vendor to train the operating staff. The following would be included:-

   (a) Training to be imparted with all materials (hard and soft copies) for all trainees.

   (b) Computer Based Training (CBT) Package, WEB based Training shall be incorporated for each of the network element of the system and for the system itself for better understanding and knowledge transfer.

41. **Fault Indication.** There should be adequate arrangements to indicate faults in the anechoic chamber, OATS or associated test and measurement equipment. Sufficient alarm indications in terms of audio and visual alarms must be put in place for notice to the operating staff.

42. **Design and Construction.** The latest available technology / state of the art technology will be used for design of the anechoic chamber, OATS. Also latest state of the art test and measurement equipment would be supplied by the vendor.
43. **Reliability.** The reliability of the anechoic chamber shall be certified in terms of its shielding effectiveness. The reliability of the test and measurement equipment would be certified in terms of their MTBF.

44. **Product Support and Upgradeability.** The anechoic chamber, OATS and associated test and measurement equipment should be upgradeable in hardware/software by the manufacturer, if required, for enhanced performance features or due to modifications required to obviate recurring defects/faults. Upgrades to include hardware and software should be provided for the entire life (operational life 10 years and storage life 15 years) of the anechoic chamber/ OAGS/ associated test and measurement equipment by the manufacturer. These upgrades will include free software updates and hardware upgrades decided on case to case basis.

45. **Maintainability.** The vendor will render a certificate stating that the hardware and software does not contain any feature which limits functions/applications on the number of HITS/Executions. The anechoic chamber/ OATS/ associated test and measurement equipment shall operate in a logistic support environment based on the following maintenance concept:-

(a) **Calibration.** The entire Test and Instrumentation system will be calibrated annually by the manufacturer for 10 years from the date of Site Acceptance.

(b) **Maintenance Parameters.** The module wise system performance specifications in terms of MTBF and MTTR will be laid down by the vendor while formulating detailed technical specifications.

(c) **Design.** The chamber design will be modular to the extent possible. The design of other associated test and measurement equipment would be as per latest norms.

(d) **Warranty.** There will be a 3 year warranty on the entire facility including technical infrastructure, parent building, test enclosures, Shielding Effectiveness of enclosures, flooring, earthing test and measurement equipment and SMF batteries.

(e) **AMC.** The system integrator will provide 7 years AMC for the entire facility covering civic infrastructure, shielded chambers, all test and measurement equipment, SMF batteries, electric generators, detection systems and testing software.

(f) **Engineering Support Facilities.** Close support for electronic systems, which can be undertaken through replacement of modules/PCBs facilitated using BITE will be under taken by in house maintenance agency i.e service engineer stationed at site. All repairs beyond the immediate close support include complete maintenance of the electrical sys, infrastructure etc will be carried out by vendor on AMC. The vendor shall include the ESP (Engg support package) proposal of spares (MRLS), Test equipment / Jigs, literature and trg required for enabling the close support by the in-house maintenance agency in their offer. During the testing phase an evaluation of the scope of field repairs and adequacy of the ESP offered will be undertaken:-

(i) **Spares.** The required Modules/PCBs Spares for fd repair/maint for four years shall be indicated sub-system wise for complete system simultaneously details of OEM, Make/Model, technical specifications, cost of repairs alongwith details of service network in India and world wide will also be provided.
(ii) **SMTs / STEs / TJs.** Details SMTs/STE, TJs required for field quick / immediate repairs will be provided with cost, make / model / OEM and so on.

(iii) **Technical Literature** Technical literature must adhere to JSS – 251 -01 to the extent possible for its format and contents, for operators and maintenance personnel.

(iv) **Training.** Training on operation and maintenance covering all sub-systems / equipment and accessories including as per scope for field repairs including usage of SMTs/STEs/TJs. Training shall be provided in English language.

(v) Safety and precautionary measures will be screen printed displays on the equipment / modules and adequately covered in operator and maintenance manuals.

(g) **Maintenance.** The maintenance of items like lights door closings, electrical accessories will be maintained by the Service Engineer drawing his quarterly visit to the facility and will be covered under AMC.

(j) **Technical Documents and Publications.** The following documents will be provided at the time of user trials/ maintenance evaluation:-

(i) **User.** User Handbook covering design diagram, electrical layout diagram, cabling diagram, test equipment setup and other technical details as required.

(ii) **Maintenance Evaluation.**

(aa) User Handbook as mentioned above.


(k) The vendor will indicate the supplier name, address and reference alongwith the name and address of the manufacturer of all items in the respective schematic.

46. **Spare Parts.** Fast moving spares/ cables/ fibers/ filters, etc, must be available in the supply system at the time of delivery of the chamber to the users. Complete Equipment Schedule (CES) should specify the in-situ spares and all items must be made available at the same time.

47. Special tools, gauges, test equipments or user handbook/ manuals developed must be ready for issue at the same time as the installation testing.
### COMPLIANCE MATRIX

<table>
<thead>
<tr>
<th>SER NO</th>
<th>CRITERIA</th>
<th>COMPLIANCE STATUS (YES/NO)</th>
<th>DOCUMENTARY EVIDENCE IN SUPPORT OF COMPLIANCE STATUS</th>
<th>DOCUMENTS SUBMITTED (YES/NO)</th>
<th>REFERENCE FROM THE DOCUMENTS SUBMITTED BY FIRM</th>
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</table>

#### I. INTRODUCTION

1. **SI.** Responses to the RFI for this project will be submitted by a System Integrator (SI) responsible for execution of the project and cannot participate in more than one bid.

2. **OEM for various processes of the Project.** The various test and measurement equipment, anechoic chamber, technical infrastructure and other deliverables and services required for the project should be tested, certified and from reputed OEMs.

3. **OEM for Software Applications** The software applications shall specify the arrangement with software application vendor and/or with software customization vendor. Software applications have to be from reputed OEMs.

#### II. GENERAL CRITERIA

1. Is the Firm an Indian registered company under Company Act 1956 having Indian Management and control with Resident Indian Nationals (Firm should be in existence in India for at least three years) or a Foreign Firm registered in its respective country?

   - (a) Certificate of incorporation from Registrar of companies having clearance from RBI wherever applicable (Applicability to be specified by the SI).
   - (b) Articles and Memorandum of Association.
   - (c) Latest valid TIN, PAN and Excise & Sales Tax Registration number.
   - (d) Details of the firm along with List of Directors on the Board of the Company with their address(es), contact telephone numbers, PIN etc.
   - (e) Documentary evidence for registration with proof for Management and Control of Company with Resident Indian Nationals in the form of Form 32 pursuant to sections 303(2), 264(2) or 266(1)(a) and 266(1)(b)(iii) of Company Act 1956. The Management and Control with Resident Indian Nationals implies majority of Board of Directors of the Company should comprise individuals who are:-
<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>(i) Indian citizens as per the Indian Citizenship Act 1955.</td>
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<td>(e) Certificate of Registration of foreign firm issued from respective country.</td>
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<td>(f) Export Clearance certificate from respective Government, where applicable.</td>
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<td>2.</td>
<td>Will the System Integrator be able to quote for 100% of the quantities?</td>
<td>Certificate from the Firm</td>
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<td>3.</td>
<td>Will there be an agreement between System Integrator, OEMs for test and measurement equipment and software application OEMs to ensure traceability and accountability with respect to entire scope of this project from hardware, software and services perspective on project life cycle basis.</td>
<td>Agreement between SI and various OEMs</td>
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<td>4.</td>
<td>What are the details of backend arrangement for third party solution providers?</td>
<td>Copies of relevant backend agreements</td>
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<td>5.</td>
<td>The Firm should not be blacklisted or involved in corrupt and fraudulent practices with any central/state government ministries / affiliates or PSUs for telecom related projects in India and abroad during last three years.</td>
<td>Company Secretary certified documents to this effect.</td>
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III. FINANCIAL CRITERIA

1. Is the Firm profit-making for each of the last three years and have Cumulative turnover (last three fiscal years) of at least Rs 2000 Cr ?

   Documentary proofs including audited and certified financial reports (including Balance sheet, P & L statement) are required to be submitted for each of the financial years reporting turnover and net profit.
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<tr>
<td>2.</td>
<td>Is the firm capable of undertaking a project of such scale and cost?</td>
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<td>Bankers Solvency Certificate for at least Rs 200 Cr.</td>
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<tr>
<td>3.</td>
<td>Is the Firm profit-making for each of the last three years?</td>
<td></td>
<td>Documentary proofs including audited and certified financial reports (including Balance sheet, P &amp; L statement) are required to be submitted for each of the financial years reporting turnover and net profit.</td>
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**IV. TECHNICAL CRITERIA**

| 1.     | The SI must have strong System Integration and Project Management (SIPM) portfolio for delivery of required services |  | Performance certificate from customers having a similar Pan Indian Network. |  |  |
| 2.     | Is the Firm an ISO 9001:2000 or equivalent certified for Quality management standards? |  | Current and valid certificate |  |  |
| 3.     | The bidder shall provide list of names of main technology partners, platforms and hardware/software solutions proposed in the bid. |  | (a) The proposed implementation plan to be provided.  
(b) List of names of main technology partners, platforms and hardware/software solutions proposed. |  |  |
<p>| 4.     | Will the Firm provide an undertaking to share with the user, the source codes of all exclusively developed software / customizations done for the project? |  | Commitment letter from Firm |  |  |
| 5.     | Does the Firm guarantee to provide all hardware upgrades and software patches/upgrades for a period of ten years. |  | Commitment letter from Firm |  |  |
| 6.     | Does the Firm confirm that there are no infringements of any Patent rights and the transfer of IPRs for the customized part of the software as per the laws of the country? |  | Commitment letter from Firm |  |  |</p>
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<tr>
<td>7.</td>
<td>The bidder should be able to support in situ repairs at users’ premises and have support centres in India.</td>
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<td>Details of support centres to be furnished</td>
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<td>The compliance is required to be given for following technical parameters as given in detail in Appendix D of RFI:-</td>
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<td>8.</td>
<td>Capability of Construction of Parent Building enclosing the large Anechoic chamber.</td>
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<td>Details including Photos of earlier executed projects of similar nature</td>
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<td>9.</td>
<td>Construction of Large Anechoic Chamber</td>
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<td>10.</td>
<td>Construction of Shielded Control Room</td>
<td>-do-</td>
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<td>11.</td>
<td>Construction of Shielded Amplifier Room</td>
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<td>12.</td>
<td>Construction of Shielded Equipment Room</td>
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<td>13.</td>
<td>Construction of Conducted Susceptibility Room</td>
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<td>14.</td>
<td>Construction of Power Control and Distribution Room</td>
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<td>15.</td>
<td>Walls and Ceiling Construction inside the parent building and other rooms</td>
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<td>Document containing details of type of construction to be provided</td>
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<tr>
<td>16.</td>
<td>Absorbers inside the chambers</td>
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<td>Document containing details of type of absorbers to be provided</td>
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<tr>
<td>17.</td>
<td>Doors to be provided in the parent building and chambers</td>
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<td>Document containing details of type of doors to be provided</td>
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<td>18.</td>
<td>Air conditioning arrangement inside the facility</td>
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<td>Document containing details of Air conditioning arrangement to be provided</td>
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<tr>
<td>19.</td>
<td>Exhaust Gas Extraction System</td>
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<td>Document containing details of Exhaust Gas Extraction System to be provided</td>
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<td>20.</td>
<td>Ventilation to include honeycomb vents inside the chambers</td>
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<td>Document containing details of Ventilation to be provided</td>
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<td>21.</td>
<td>Power Line Filters</td>
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<td>Document containing details of Power Line Filters to be provided</td>
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<td>22.</td>
<td>Electrical Installation in the facility</td>
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<td>Document containing details of Electrical Installation to be provided</td>
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<td>23.</td>
<td>Lighting Arrangement</td>
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<td>Document containing details of Lighting Arrangement to be provided</td>
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<td>24.</td>
<td>Penetration Panels (PP) in walls</td>
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<td>Document containing details of Penetration Panels (PP) in walls to be provided</td>
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<td>25.</td>
<td>Connection Panels (CP) on the floor</td>
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<td>Document containing details of Connection Panels (CP) on the floor to be provided</td>
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<td>26.</td>
<td>Semi Automated Antenna Mast</td>
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<td>Document containing details of Semi Automated Antenna Mast to be provided</td>
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<td>27.</td>
<td>Turntable inside the chamber and in Open Area Ground Plane</td>
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<td>Document containing details of Turntable to be provided</td>
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<tr>
<td>28.</td>
<td>Electrical Components to include Power and Control Cabinet</td>
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<td>Document containing details of Electrical Components to include Power and Control Cabinet Filters to be provided</td>
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<tr>
<td>29.</td>
<td>Control System of the Operating Terminal</td>
<td></td>
<td>Document containing details of Control System of the Operating Terminal to be provided</td>
<td></td>
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</tr>
<tr>
<td>30.</td>
<td>Remote Control for the turntable</td>
<td></td>
<td>Document containing details of Remote Control for the turntable to be provided</td>
<td></td>
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</tr>
<tr>
<td>31.</td>
<td>CCTV Systems</td>
<td></td>
<td>Document containing details CCTV Systems to be provided</td>
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<tr>
<td>32.</td>
<td>Intercom System</td>
<td></td>
<td>Document containing details of Intercom System to be provided</td>
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<tr>
<td>SER NO</td>
<td>CRITERIA</td>
<td>COMPLIANCE STATUS (YES/NO)</td>
<td>DOCUMENTARY EVIDENCE IN SUPPORT OF COMPLIANCE STATUS</td>
<td>DOCUMENTS SUBMITTED (YES/NO)</td>
<td>REFERENCE FROM THE DOCUMENTS SUBMITTED BY FIRM</td>
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<tr>
<td>33.</td>
<td>Fire Detection System Inside Anechoic Chamber and shielded Rooms</td>
<td></td>
<td>Document containing details of Fire Detection System Inside Anechoic Chamber and shielded Rooms to be provided</td>
<td></td>
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<tr>
<td>34.</td>
<td>Open Area Ground Plane (OAGP)</td>
<td></td>
<td>Details including Photos of earlier executed projects of similar nature involving construction of OAGP</td>
<td></td>
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</tr>
<tr>
<td>35.</td>
<td>Floor construction to withstand load upto 80 tons in Anechoic Chamber</td>
<td></td>
<td>Document containing details of Floor construction to be provided</td>
<td></td>
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</tr>
<tr>
<td>36.</td>
<td>Military Standard 461 F Compliance Testing Equipment</td>
<td></td>
<td>Document containing details of all Military Standard 461 F Compliance Testing Equipment along with their OEMs/suppliers to be provided</td>
<td></td>
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<tr>
<td>37.</td>
<td>EMI Measurement Software in accordance to Mil STD 461 F or better</td>
<td></td>
<td>Document containing details of EMI Measurement Software along with their OEMs/suppliers to be provided</td>
<td></td>
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<tr>
<td>38.</td>
<td>EMS Measurement Software in accordance to Mil STD 461 F or better</td>
<td></td>
<td>Document containing details of EMS Measurement Software along with their OEMs/suppliers to be provided</td>
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<tr>
<td>39.</td>
<td>Items for Commercial EMI Testing</td>
<td></td>
<td>Document containing details of Items for Commercial EMI Testing along with their OEMs/suppliers to be provided</td>
<td></td>
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<tr>
<td>40.</td>
<td>ESD Test Setup</td>
<td></td>
<td>Document containing details of ESD Test Setup to be provided</td>
<td></td>
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<tr>
<td>41.</td>
<td>Handheld Spectrum Analyser with Vector Spectrum Analyser and Sniffer</td>
<td></td>
<td>Document containing details of Handheld Spectrum Analyser with Vector Spectrum Analyser and Sniffer to be provided</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>System Design, Engineering, Manufacturing, Project Management</td>
<td></td>
<td>Details to be provided</td>
<td></td>
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</tr>
<tr>
<td>43.</td>
<td>Special tools, gauges, test equipments or user handbook/ manuals</td>
<td></td>
<td>Details to be provided</td>
<td></td>
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<tr>
<td>44.</td>
<td>Is Shielding Effectiveness (SE) of anechoic chamber be tested for ANSI C 63.4 or better and Field Uniformity test based on IEC Standards whichever is in vogue?</td>
<td></td>
<td>Details to be provided</td>
<td></td>
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<tr>
<td>SER NO</td>
<td>CRITERIA</td>
<td>COMPLIANCE STATUS (YES/NO)</td>
<td>DOCUMENTARY EVIDENCE IN SUPPORT OF COMPLIANCE STATUS</td>
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<td>45.</td>
<td>Can third party inspection be converted to accreditation such as NABL/ILAC?</td>
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</tbody>
</table>

V. CAPABILITY AND EXPERIENCE CRITERIA

1. Has the Firm successfully completed at least one or more projects of such a large scale as a System Integrator in last five years? Details of such projects along with performance certificate from the customer in this regard to include maintenance aspects.

2. Is the Firm capable of providing maintenance support for minimum of ten years? It will include facilities and spares backup for on-site maintenance support to include resident engineer.
   Existing establishment in India for on-site maintenance, technical support, repair and training along with address and contact numbers.

3. The OEMs should be able to support the system for seven years after the warranty period.
   A letter from OEM signed by authorized signatory (who is legally competent to sign the agreement on behalf of the OEM) to be enclosed.

Note: Criteria mentioned above are broad criteria for selection of vendors. Responses to the RFI will form basis for short listing vendors for participating in the project. Conditional/partial compliance may not be sole criteria for rejection.