REQUEST FOR INFORMATION (RFI)  
FOR PROCUREMENT OF SOFTWARE DEFINED RADIO (SDR)

1. The Ministry of Defence, Government of India, solicits information from Indian vendors on Software Defined Radios (SDR) along with its applications and associated equipment for airborne and ground platforms of IAF.

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

(a) Part I  The first part of the RFI incorporates important operational characteristics and features of the proposed equipment

(b) Part II  The second part of the RFI states the methodology of seeking response of vendors.

PART-I

3. The Intended Use of SDR Equipment in Network Centric Environment.  IAF is intending to procure Software Defined Radios along with its applications and associated equipment for its airborne and ground platforms in order to develop an Aerospace Planning and Execution System (APEX) in a Network Centric Operational (NCO) environment.

4. Important Operational and Technical Parameters. The required operational and technical parameters are placed as Appendix- A. The Vendors are requested to provide para-wise information on aspects listed at Appendix A. Non – availability of information on any of the paragraphs at Appendix A may be commented specifically. The vendor is requested to clearly indicate the following in their response:-

(a) Cost Estimate. Approximate cost estimate for 3500 quantity of the equipment. The estimated cost should make consideration for all aspects of supply, installation, integration, warranty, training and life cycle support. The indicative cost should also cater to Comprehensive Annual Maintenance Contract (CAMC). The suggested methodology for AMC should be indicated. Other aspects (if any), may be mentioned specifically. Vendors are requested to provide details that go into determining the cost of the scheme, including factors such as product support package etc.

(b) Category of Procurement. The procurement is planned under either of the three procurement categories as per DPP 2016 namely, Buy Indian (IDDM) or Buy and Make (Indian) or Buy (Indian), Buy Indian (IDDM) as per DPP 2016 being the highest category. The Indian vendors are requested to intimate their capability to offer the product under one of these categories. They are also requested to clearly
state their ability to indigenously design and develop the required equipment and associated Network Centric Operations (NCO) applications.

(c) Vendor is requested to mention applicable key technologies and materials required for manufacturing of the equipment and the extent of their availability or accessibility in case these are not available in India.

(d) Vendor is requested to mention availability of the equipment in the Indian market, level of indigenization, delivery capability and timeline, maintenance support, life time support etc.

(e) Vendor is requested to mention if same or similar equipment has been supplied to any other customer and whether similar equipment is in use in any other Air Force.

(f) Vendor is requested to confirm their willingness undertaking for full integration of SDR along with its applications and its associated equipment with the airborne and ground platforms of IAF. Vendor is also requested to confirm a full life-cycle product support for the system and indicate the time period for the same. It may include aircraft and ground integration issues, spares and maintenance tools/jigs/fixtures for field and component level repairs.

(g) **Tentative Delivery Schedule.** The vendors are requested to indicate the tentative delivery schedule as follows:-

   (i) Time needed to commence installation of equipment after signing of contract.

   (ii) Overall timeframe for production and delivery of entire system post conclusion of contract along with stage wise break up.

(h) The vendors are requested to indicate their willingness for “Option Clause” in accordance with DPP-2016. The duration for which such an option clause would be valid is to be indicated.

5. **Additional Information.** The vendors are requested to provide following additional information:-

   (a) Details of Technical Support for maintenance of the equipment during service life.

   (b) **Warranty.** The vendors are requested to furnish the duration of warranty for the equipment.
Modalities for CAMC including spares, post warranty period.

**Obsolescence Management Plan.** The vendors(s) are requested to present a phased obsolescence management plan. The plan should offer adequate assurance for lifetime product support. Whether the vendors provide modifications required in the equipment for the sake of obsolescence management or due to other safety considerations for its service life, may be clarified.

Any other relevant information on equipment capability, performance, maintenance, as well as restrictions (if any) may also be specified.

6. **Tentative time schedule for the issue of RFP.** The RFP is likely to be issued in Mid-2019.

**PART-II**

7. **Procedure for Response.**

(a) Vendors are to furnish information sequentially, as per Para numbers for information requested in Part I of this document. Additional information, if any, is to be attached at the end of the respective Appendix/Annexure with appropriate cross-reference to serial number in this RFI. Additional literature on the product can also be attached with the response form.

(b) Vendors must fill the form of response as given in Appendix B to Chapter II of DPP-2016. Apart from filling details about company, details about the exact product meeting other technical specifications should also be carefully filled.

(c) The response to this RFI should be clearly labelled as “RFI RESPONSE – SDR”. The filled form should be dispatched to the under mentioned address:-

```
Air Commodore C^4ISR
Room No 421
Air HQ (Vayu Bhawan)
Rafi Marg, New Delhi-110106
Tele: 011-23010231-5824/7421
Fax: 011-23014514
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(d) Last date of acceptance of filled form is **four weeks** from the date of hosting of RFI on e-procurement website of GoI/IAF. The vendors short listed for issue of RFP would be intimated at appropriate stage. A presentation on the subject may also be
sought in case it is felt that certain parameters mentioned in replies to this RFI need further clarification.

8. The Government of India invites responses to this request only from Indian vendors/ DPSUs/ Authorised Indian Vendors. The end user of the equipment is the Indian Air Force.

9. Vendor is to state clearly if the system is already in use or under development. Necessary Government clearances would need to be obtained, where applicable, by the vendor for supply of the equipment to Government of India.

10. This information 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. The acquisition process would be carried out under the provisions of DPP-2016.
Appendix- A
(Refers to Para 4 of RFI)

1. Vendor is requested to provide detailed information of their Software Defined Radio (SDR) along with its applications and associated equipment in the form of a detailed description of system on following Operational and Technical parameters.

2. SDR, along with its application software and associated equipment, needs to be based on scalable, modular and open system architecture to support multiple airborne and ground platforms and assist/enable IAF in in-house development and integration of application software modules. The system design should be based on an open architecture.

3. Following Networking functionalities are envisaged:-

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<th>S No.</th>
<th>Parameters</th>
<th>Description</th>
<th>Information Required</th>
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| 1.    | Physical Parameters   | - Specify the least possible dimensions of SDRs chassis in terms of standard ATR dimensions and confirm the number of RF heads in the system. Also specify the power amplifier parameters and dimensions. Confirm whether the SDR is housed within 2 x ½ ATR or lesser (total being 1 ATR or lesser).  

   - Specify the weight of the chassis(es) of your SDR including power amplifier(s). Confirm whether each of the chassis is 10Kg or less.  

   - Give details about ability of SDRs to host various waveforms.  

   - Specify the details of waveform generation capability and the NCO applications that will be offered.  

   - Specify details of the commonality and interchangeability of modules/assemblies/sub-assemblies amongst various form factors of SDRs offered.  

   - Confirm whether the SDR can support aircraft integration with the standard interfaces such as MIL 1553B, ARINC 429, GOST, Digi Bus, Ethernet, discrete signals and NTP servers & RS 422. Also specify the number of such interfaces available in your SDRs. | Detailed description of implementation may be specified. |
- Confirm whether the SDR system is based on an open system architecture and conforms to Software Communication Architecture version 2.2.2 or later version. Also confirm whether system is based on open system military COTS hardware architecture. Specify the details for both hardware and software.

- Specify details of self-contained cooling system of LRUs.

- Specify the VSWR at which transmission is inhibited in your system for each RF head offered.

- Confirm whether the equipment offered meets relevant military certification standards, like Mil STD 810 G or latest, Mil STD 461 E or latest and Mil STD 704D/E or latest, for installation in airborne platforms.

- Specify the processing power/capability of the on-board processors. Also specify their loading and spare processing & memory capacity available for future upgrade/enhancement requirements.

- Specify the power source for airborne & ground systems.

- Confirm whether the environmental qualification requirements are as per MIL-Std-810F.

- Specify all the video formats supported by the system like SATNAG 3350 B, CVBS, RGB/YPbPr, DVI/ HDMI etc.

- Confirm that installation of SDR and associated equipment in the IAF aircraft inventory WILL NOT impose any restriction to their flight envelope in any manner.

- Confirm whether aircraft integration of equipment will be through well defined hardware modification schemes. Specify and provide details.

- Specify the dimensions and weight of form
| 2. Operational Parameters | - Specify the number of simultaneous RF channels offered and in which bands (V/UHF, L Band, Satcom etc). Indicate if there is a growth potential to add on more channel(s), (like S band) to your equipment. Bring out clearly whether the equipment supports conventional AM/FM legacy voice communication alongside data communication.

- Specify the robustness of the RF channels for uninterrupted operation and without any distortion.

- Indicate the features of TRANSEC and COMSEC offered.

- Adaptability of indigenous encryption system to be specified.

- Specify the maximum and minimum frequency hop rate supported. Also clearly indicate the implication of higher or lower hop-rates on range & data rate.

- Confirm half and full duplex mode of operation in digital communication.

- Confirm whether the system has a feature to extend ranges through relays. If so, specify the number of hops of relay that are possible and what are the trade-offs, if any, on other parameters.

- Specify the minimum and maximum user data rates for each of the channels/RF heads, including SATCOM.

- Specify the ranges in (KM or NM) for each RF channel for air-to-air, air-to-gnd and grd-to-air communication, along with the variations caused due to relay of data. Max voice & data range with/without relay hops with corresponding variation in data rates may be specified.

- Ranges for conventional AM/FM (Voice) operations may be specified. | Detailed description of implementation may be specified. |
- Availability of Immunity to Doppler shift caused due to supersonic speeds of aircraft may be indicated at the specified data rates.

- Comment on interoperability of the offered SDR with those already with IAF and the methodology of achieving the same.

- Specify features of mobile adhoc network (MANET) capability.

- Confirm the data communication protocol used in the system, like IPV-4 or IPV-6 etc and for which purposes.

- In the network architecture, specify as to how many simultaneous/orthogonal networks can be fielded, with how many aircraft/members and with what update rate. Also specify whether data can be exchanged between these networks as per a pre-defined/programmable scheme.

- Specify the update rates for the members of the MANET and also indicate the feasibility of programmable update rates based on specific applications. In this context, also indicate the feasibility of an adaptive/dynamic bandwidth allocation for a specific application or network member(s).

- Explain the network algorithms used in the system with built-in QoS provisions as per the requirement of application and its priority.

- Specify the time synchronisation mechanism for the network(s). Indicate which system(s) can be used for this, like GPS, Ground based, external clock sources like rubidium clocks, clocks extracted from STM-16/ STM-4 Signals, routers, NTP server, etc.

- Indicate which system will be the master time sync source and specify whether the system can integrate with other satellite systems like GAGAN, IRNSS or GLONASS

- Specify the control and configuration methodology of the SDR offered like network management, status/health monitoring, on-the-
fly change of configuration details etc.

- Specify the system for real-time data recording, its extraction and further utilisation for training, debrief, debugging, health monitoring etc.

3. **Maintenance**

- Specify the system self checks such as PBIT, IBIT, CBIT etc.

- Confirm whether the system design is modular from the perspective of maintenance and bring out features that facilitate quick recovery to operational readiness after a repair/maintenance activity.

- Specify the maintenance philosophy followed in your system, (O, I & D level and so on).

- Mean Time to Repair (MTTR) for O level and I level may be specified.

- Specify the reliability and MTBF for the offered equipment.

4. **Applications**

SDRs offer an immense potential for a quantum jump in op capability through ready availability of Battle Field Status through the network features of the system. However, to realise this potential complex applications (referred to as NCO Applications(Network Centric Operations)) are required to be offered. In this context, specify as to what op enhancing modules are being offered. A few examples could be the following features and more:-

(a) Network Management and Optimisation using appropriate routing protocols based on priority, network load and op requirements

(b) Situational Awareness to create a Common Operations Picture (COP) at each member using all available sensor data of the network. The multi-sensor fusion methodology may be explained

(c) Data Transfer features based on unicast, multi-cast or broadcast

(d) Dynamic Targeting using target data of all sensors of the network

(e) Onboard Inventory Status updates.

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| 5. | Application Development and Integration Rig. | (f) Flight Safety, Navigation and Recovery features  
(g) Training and Debrief features (including a “What-If” function)  
(h) Electronic Warfare features  
(j) Mission Planning features  
(k) Flight Refuelling management feature  
(l) Any other Op enabling feature available may be specified  
- Specify the equipment offered for setting up a lab, for in-house development of complex applications and modification in existing SDR applications to enable future upgrades. Towards this, specify the necessary tools, rig(s), Software Development Environment (SDE), source code of application software programs, infrastructure with associated documentation and training that would be offered.  
- Confirm whether all software and hardware tools/ testers / jigs will have life time licenses.  
Detailed description of the SDE and their utilisation may be specified. |
| 6. | Command and Control (C2) features | Specify features that would enhance the Commander’s ability to plan, execute and assess theatre wide aerospace forces. It may include the following functionalities and more:-  
(a) Command and Control Functions.  
(b) Battlefield visualisation Function.  
(c) Planning Function.  
(d) Decision enabling Function.  
(e) Air Interdiction Planning and Execution function.  
(f) Air Space de-confliction functions.  
(g) Integration of ISR information through various sensors with the SDR system through IAF’s Command & Control system.  
Detailed description of op features and their implementation may be specified. |
| 7. | Hardware to run SDR Applications | Hardware for SDR Applications  
- Specify the location, hardware and other equipment which are fielded to house and run the NCO applications referred above. This is to be specified for both airborne and ground SDRs.  
- Specify the hardware details, their technical parameters & safety standards complied with, including power supply sources and equipment.  
- In addition, specify various hardware  
Detailed description of methodology and equipment to run NCO applications in the air and in ground C2 center, and their |
| Interfaces that will be provided such as Ethernet, Mil 1553B, ARINC, GOST, Discrete Lines, Video interfaces and whatever more is available in the offered system. For these hardware, specify the vintage of technology used, reliability standards/parameters and MTBF. | Implementation may be specified. |

**Note.** Vendor to provide detailed description of all the parameters mentioned above along with description of additional capabilities/parameters/functionalities of their equipment being offered as response to this RFI.
INFORMATION PROFORMA (INDIAN VENDORS)

1. **Name 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 undertake that any subsequent proposal for change in name of firm or address, will be intimated to IHQ MoD(IAF) at the first available opportunity and supporting documents be furnished accordingly within five working days of their approval by the competent authority.

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. **Address/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: ______________________
(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>Applicability from (date &amp; year)</th>
<th>Valid till (Date &amp; year)</th>
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7. **Details of Registration.**

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<th>Agency</th>
<th>Registration Number</th>
<th>Validity(date)</th>
<th>Equipment</th>
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<td>DGS &amp; D</td>
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<td>DGQA/DGAQA/DGNAI</td>
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<td>Any other Government agency</td>
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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: ______________________

(IDDM Capability be indicated against the product)
(Should be given category wise as per DPP-2016)

(b) Description (attach technical literature): ______________________

(c) Whether OEM or Integrator: ______________________

(d) Name and address of Foreign collaborator (if any): _______
(e) Industrial License 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. Vendor to provide details of IPR documentation/patents/design registration copyrights etc registered with authorized agency with regard to the equipment

12. You are to submit the following information to substantiate your claim under the acquisition category of ‘Buy (Indian-IDDM)’ of DPP 2016 as an Indian Vendor.

   (a) The entity is public limited company, private limited company, partnership firms, limited liability partnership, one person company, sole proprietorship registered as per applicable Indian laws. In addition, such entity shall also possess or be in the process of acquiring a license/development of product if the product under project requires license as per DIPP’s licensing policy.

   (b) The company is owned and controlled by resident Indian citizens.

   (c) The company is registered for minimum five years, three years in the case of MSMEs.

   (d) The company should have a minimum credit rating equivalent to B++, issued by recognized Indian credit rating such as CRISIL / ICRA.

   (e) The company needs to be profitable for at least three years out of the last five years, in case of MSMEs, it needs to be profitable for at least one out of the last three years.

12. Any other relevant information_____________________________


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

   (b) It is certified that the design and development is indigenous and belong to the _________ (vendor) and /or _________ (its Indian Sub Vendor). The Indigenous
Content in the said equipment is _____ % as on date and is likely to be raised to _____ % by _____ (date). The certification for the same is enclosed.

(c) It is certified that the complete set of design and production drawings are available and source code for all software applications/programmes are also available with the _____ (vendor) and that these would be produced for verification when required.

**Note**: Certification for 12 (b) and (c) is required if vendor is claiming the IDDM category.

(d) It is certified that in the past that ________ (name of the firm) has never been banned /debarred for doing business dealings with MoD/GoI/any other Government organization and that there is no enquiry going on by CBI/ED/any other Government agency against the firm.

**Note**: Para 44 and Appendix F to Chapter II of DPP 2016 may be referred.

_(Authorised Signatory)_