

# **Request for Proposal**

**Supply, Installation and Commissioning of  
3.8 meter VSAT Earth Station Antennae  
(Extended C Band)**

**For**

**Dedicated VSAT Satellite Communication Link**

**between**

**CREST Campus, IIA, Hoskote, Bangalore Rural,  
Karnataka**

**&**

**Indian Astronomical Observatory, IIA, Hanle,  
Ladakh (J&K)**

# INDIAN INSTITUTE OF ASTROPHYSICS, KORAMANGALA, BANGALORE-560034

## Request for Proposal for Supply, Installation and Commissioning of 3.8 meter VSAT Earth Station Antennae (Extended C Band) for dedicated VSAT Satellite Communication Link between CREST Campus, IIA, Hoskote, Bangalore Rural, Karnataka & Indian Astronomical Observatory, IIA, Hanle, Ladakh (J&K)

The Director, Indian Institute of Astrophysics invites proposals from the Original Equipment Manufacturer (OEM) or an authorized distributor in India for OEM or System Integrator of VSAT network, having its office and service support in India. Bidder must be a reputed and experienced Firm and should meet eligibility criteria as mentioned in this document. Bidders are expected to make their own assessment and satisfy themselves fully with all aspects of the Institute's structure, Project needs, Site conditions, local environment, functional and statutory requirements for development of the various components of such a campuses/sites and accordingly make proposals.

Bidders are required to submit their proposals strictly according to the terms and conditions and in the form and manner as specified in this document.

If bidder is not able to offer 3.8m antenna and have 4.5m antenna as alternative, Bidder may quote for 4.5m Antenna along with an signed certificate on Company letterhead stating that they are not dealing with 3.8m antennas specifying the reasons whatsoever.

If the bidder is able to offer both 3.8m and 4.5m antennae, the bidder may quote for both.

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## **1. Introduction/Background**

Indian Institute of Astrophysics (IIA) is a premier national Institute in the country dedicated to research in the field of Astronomy, Astrophysics and Allied Sciences and Technology. Indian Astronomical Observatory (IAO), Hanle, Leh, situated at a height of 15000 ft, is being operated by IIA . IIA's 2 meter Himalayan Chandra Telescope is remotely operated from CREST Campus, Hoskote, through the 2 dedicated point-to-point extended C band satellite links (GSAT 16 and GSAT 18) between CREST Campus, IIA, Hoskote, Bangalore Rural, Karnataka & Indian Astronomical Observatory (IAO), IIA, Hanle, Ladakh (J&K), since 2002.

IIA is using latest RF equipment in existing RF chain with COMTECH make equipment such as CDM-625 Satellite Modem, (ODU) LPOD C-Band (6.725 – 7.025 GHz, 5760 LO) BUC 60 Watt Psat / 50 Watt P1dB and LNB C-Band(Model NJS8488EN). All 4 antennae used for communications are of 3.8 meter diameter and were manufactured by ECIL, Hyderabad.

Now we are looking for New Technology 3.8m Antennae as replacement of these antennae with our existing RF chain equipment as stated above. **[Please refer Annexure A for location/site details].**

## 2. Technical Specifications and Requirements

Item	Specifications	Qty
<b>2.1 Antenna</b>		<b>4</b>
Antenna Size	3.8 meter	
Antenna Type	Cassegrain	
Compliances	ITU-R	
Regulatory Standard	DOT/NOCC Standard	
Operating Frequency	Extended C Band (INSAT)	
Withstand Wind Support	for extended strength	
Motorized Feed Horn Polarization Travel	0 - 360 degrees	
Motor Drive System Travel	Az 0 - 360 degrees & El 10 - 90 degrees	
Antenna Gain	52.0 dBi(TX), 50.5 dBi(RX)	
TX/RX Isolation	> 30 dB on axis	
VSWR	1.3:1 or better	
Mount Type	Elevation Over Azimuth	
Antenna Installation	Depending on site conditions, antenna shall be installed on the rooftop or on the ground with permanent civil foundations as per the recommendations of the antenna manufacturer.	
Lifetime of Antenna System	15 Years	
Item	Specifications	Qty
<b>2.2 Antenna Control Unit (ATU)</b>		<b>2</b>
Axes supported	Azimuth, elevation, Polarization	
Axes Driving	Azimuth Clockwise, Azimuth Counter Clockwise, Elevation up, Elevation down, Polarization clockwise, Polarization counter clockwise	
Limit switch inputs	AZCW, AZCCW, EL UP, EL DOWN, POL CW, POL CCW	
DISPLAY	AZ position, EL position, Polarization Position, mode selected, signal level and alarm	
Jog Keys	Four keys for CW, CCW, UP and DOWN Commands in manual mode and manual jog for Azimuth and elevation and two keys for Polarization CW and CCW	
Handheld Controller	System should have a Handheld controller device to control antenna movements directly from near the antenna control panel. Required device, cable, interface etc. is to be provided.	
Tracking modes	Auto/Manual/Program/Step tracking with Orbit Prediction tracking in case of satellite beacon unavailability	

Item	Specifications	Qty
Tracking accuracy	RMS tracking accuracy better than 1/10 of 3 dB beam width in winds up to 75 kmph	
Accessibility	All monitor and control functions should be accessible from the front panel	
Remote interface	RS 485/Ethernet or similar	
Beacon Tracking	YES	
Alarms & Indicators	Limit switches, system interlock, MCU interlock, low beacon signal etc. All alarms and controls should be on the front panel.	
Mounting	To be neatly mounted on the RF Rack	
Portable Spectrum Analyzer	Extended C band compatible supporting IF & L band with hard carrying case along with required software and cables and other accessories for providing System (PC) interface support so that graphs/plots/images can be viewed/stored on systems, so that graphs/plots/images can be viewed/stored on systems.	

Item	Specifications	Qty
<b>2.3 Mounting for RF equipment</b>		<b>4</b>
Feed Horn	Feed Horn to N Type Adapter (TX) with hardware kit	
LNA Installation	Mounting Waveguide for existing LNA (RX) (Model NJS8488EN)	
OMT	OMT with transmit reject filter for Extended C Band with hardware kit	
Mounting Kit ODU	For existing 50 Watt ODU(BUC)	

Item	Specifications	Qty
<b>2.4 Tool Kits</b>		<b>2</b>
Meter	Digital Multi-Meter	
Tool kit	50 Pc tool kits with spanner sets suitable for 3.8m Antenna,	
Other tools	Compass & Inclinator for Az & El measurements	
Connector tools	Crimping tool(N type	
	Gold plated N type Connectors(20 Nos)	

## 2.5 Regulatory Standard Support

Antenna radiation pattern should be always as per conformity to ITU-R standard. It shall be the prospective vendor's responsibility to get the antenna cleared from NOCC/DoT before the actual transmission. During the lifetime of Antennae i.e. During the Warranty and Post Warranty Support period, in case of requirement of any such testing to meet regulatory requirement or IIA's own requirement (such as satellite migration etc.), the prospective vendor

would carry out the necessary action as IIA's direction free of cost. Relevant fees payable to regulatory authorities (NOCC/DoT etc.) for MPVT/pattern or any other testing will be either directly paid by IIA or will be reimbursed to prospective vendor as per actual.

## **2.6 Foundation with Withstand Wind Support design**

The foundation of this antenna should be provided as per antenna manufacturer recommendation, depending upon suitability of local soil condition of the site. The foundation should support the antenna in wind up to 200 Kmph (in stow position) without damage of overturning. Prospective vendor should furnish the foundation loads and interface dimensions. Proper foundation anchor bolt templates should be provided to ensure proper alignment of the pedestal and foundation interface. Depending on site conditions, antenna shall be installed on the rooftop and on the ground with permanent civil foundations as per the recommendations of the antenna manufacturer. **Bidder may do site-survey/collect site information for getting the idea of Antenna Installation place and quote accordingly.**

## **2.7 Design & Quality**

- 2.7.1 The design and selection of equipment shall be consistent with the requirements of long-term trouble free operation with highest degree of reliability and maintainability.
- 2.7.2 All equipment shall be supplied to operate safely without undue heating, vibration, wear, corrosion, electromagnetic interference or similar problems.
- 2.7.3 All Antenna components/equipment/devices are to be installed/mounted/fitted neatly with proper tagged cables and connectors. Prospective vendor needs to provide Reliable over voltage and over current protection circuits in the power supply units. The power supply shall be self-protecting and protect connected equipment against conducted interference, noise, voltage dips, surges and impulses.
- 2.7.4 The system shall be designed for continuous operation (24 hours x 365 days basis). The design life of the equipment shall be a minimum of 15 years. This life shall be achievable through normal and regular maintenance and without major dismantling or overhauling. All types of spares and spare modules shall be made available during lifetime of the equipment for maintenance, repair and up keep of the equipment.
- 2.7.5 During the lifetime of Antennae i.e. During the Warranty and Post Warranty Support period, the prospective vendor will carry out Preventive Maintenance (PM) of equipment as per OEM recommended procedure.
- 2.7.6 To ensure high reliability, the equipment offered shall be of field proven design and using dependable components.
- 2.7.7 The equipment shall be constructed on a modular basis throughout, using plug-in type components to the maximum practical extent. Parts subject to failure, wear, corrosion

or other deterioration or requiring occasional inspection, adjustment or replacement shall be made accessible and capable of convenient removal.

- 2.7.8 The equipment shall operate without any deviation in quality or degradation of system performance over the following environmental conditions such as Protection against Dust, Corrosion, possible Hazards including EM Radiation.

### **3. Scope of work**

- 3.1 The items meeting above Technical Specifications should be Supplied, Installed and Commissioned at both the sites. **[Please refer Annexure A for location/site details].**
- 3.2 Most important, Antenna radiation pattern should be always as per conformity to ITU-R standard. It shall be the prospective vendor's responsibility to get the antenna cleared from NOCC/DoT before the actual transmission post installation. **Further, during the Warranty and Post Warranty Support Period (section 3.6), if IIA feels the need to change RF chain configuration, such as satellite changes requiring Antenna re-orientation, Pattern testing etc., it shall be the prospective vendor's responsibility to carry out the activity free of cost. Charges (if any) payable by IIA to Regulatory authorities (for pattern testing etc.) will be paid by IIA.**
- 3.3 Prospective vendor would liaison between IIA and Regulatory authorities for all regulatory requirements, and on behalf of IIA, would prepare and submit all required documents, such as link budget preparation and submission, Documentation and submission for License amendments, Preparation of various reports as required by regulatory authorities (DoT/WPC) and submission, obtaining Clearances for VSAT antenna.
- 3.4 Prospective vendor would Carry out pattern testing (MPVT) of all Antenna(s) as required by Regulatory authorities (DoT/NOCC/WPC etc.). All charges payable by IIA to regulatory authorities will be paid directly by IIA or will be reimbursed to prospective vendor as the case may be.
- 3.5 **Warranty Period of 4 Years:** The comprehensive on-site warranty services to be provided for a period of Four years shall be taken into account for different orders of VSAT and equipments, from the date of its successful commissioning and acceptance by IIA/user. To clarify further, if in a single order multiple VSAT sites are ordered, warranty start date would be the date of successful commissioning of last site.
- 3.6 **Post Warranty Support Period: Prospective vendor shall provide site support for the lifetime of Antenna whenever required on call basis.** It includes Motors, electronics, Mechanical structure, Antenna re-orientation, Pattern testing, NOCC tests. **It shall be prospective vendor 's responsibility to carry out the activity free of cost. Charges (if any) payable by IIA to Regulatory authorities (for pattern testing etc.) will be paid by IIA.**
- 3.7 **Site-inspection is recommended for location and environmental factors.**

## **4. Eligibility Criteria**

4.1 The bidder should be either the Original Equipment Manufacturers (OEM) or System Integrator/Distributor of VSAT Antennae which can operate on Extended C Band.

4.2 If the products quoted for Section 2 are of a foreign manufacturer, then the bidder (if not OEM) should be an authorized distributor of the OEM for quoting their products in India and OEM should authorize bidder to quote their product in the present tender of IIA. In that case, bidder should attach a letter of authorization from the original manufacturer for quoting on their behalf in the present IIA tender.

4.3 The bidder (if not OEM) should have a back-to-back support agreement with OEM for support of offered product. A letter from OEM/Principal Manufacturer also needs to be furnished along with the tender document ensuring the availability of service support for at least 7 years from the date of delivery of systems.

4.4 OEM / Bidder should be an ISO 9001:2008 or any other internationally acceptable quality certificate holder. The bidder should enclose a copy of quality certificate from a recognized institution for their manufacturing / assembly / system integration/Service support facilities, located in INDIA or abroad. This certification should be from any globally recognized institution. It may be noted that the quality certificate enclosed should be valid on the date of submission of bids and bidder should possess valid quality certificate during the period of empanelment. In case the quality certificate is under process of renewal, a copy of previous years (immediately preceding year) quality certificate along with supporting document showing renewal process of quality certificate should be enclosed.

4.5 The bidder should have expertise and “hands-on” experience in India in the field of satellite communication, including Wide Area Network design involving VSATs, system integration, supply, installation and commissioning, comprehensive maintenance etc. The bidder should have supplied and/or maintained at least 100 VSAT Antennae during in past two years (from the date of publication of tender). Requisite document to support this should be furnished. The document should clearly show the number of Antennae supplied and/or maintained along with date of supply/maintenance order/contract.

4.6 The bidder’s turnover in India should be Rs.500 Lakhs or more during any of the last 3 financial years (2014-15, 2015-16, 2016-17). Supporting documents needs to be submitted.

4.8 The bidder must have countrywide support in form of direct service centers or franchisees in at least all two regions (North, South). The bidders must provide the details for their infrastructure with reference to locations, technical manpower. Bidders should also indicate their business model for providing installation and warranty support for all the equipment. For the aforementioned, IIA reserves the right to disqualify a bidder based on their past



maintenance performance as experienced by IIA, during the last five consecutive years. IIA reserves the right to verify the coverage of tech-support base as indicated by bidder. In case of false or un-true claims found for any bidder, such bidder could be accordingly disqualified from further evaluation & processing of their bids for this tender.

4.9 The registration number of the firm along with the GSTIN allotted by the Central Board of Excise and Custom (CBEC), as well as PAN number of the firm allotted by the income tax department should be submitted, failing which bidder's bid would become invalid & same shall be rejected.

4.10 Bidder shall enclose copies for substantiation of the following:

- a) Registration number of the company
- b) PAN Number of the company
- c) GSTIN (Scanned copy of the Goods and Service Tax (GST) registration Certificate).
- d) Submission of IT returns for last 3 financial year (2014-15, 2015-16, 2016-17)

4.11 A self-certificate stating that the bidder is not presently blacklisted and hasn't been black listed by any institution of the Central/State government in the past three years may be submitted.

4.12 The bidder should possess valid DPL (Dealers Possession License) required to sell/supply VSAT equipments as on date of submission of bids as well as during the entire period of empanelment. In case of the DPL under renewal, copy of previous years (immediately preceding year) DPL along with supporting document showing that DPL is under renewal process should be enclosed.

4.13 The Bidders are requested to furnish documents to establish their eligibility for each of the above clauses. Relevant portions, in the documents submitted in pursuance of eligibility criterion mentioned above, should be highlighted. If tender were not accompanied by all the above documents mentioned, the same would be rejected. Undertaking for subsequent submission of any of the above document will not be entertained. However, IIA reserves the right to seek fresh set of documents or seek clarifications on the already submitted documents.

**If in case any information furnished by the Bidder is found to be false / incorrect, their bid shall be summarily rejected and no correspondence on the same shall be entertained.**

**4.14 THE BID SUBMITTED BY ANY BIDDER NOT FULFILLING THE ELIGIBILITY CONDITIONS / CRITERIA STIPULTED ABOVE, WILL NOT BE CONSIDERED.**

## 5. Deliverables

- 5.1 All items meeting the technical specifications and regulatory standard (Section 2).
- 5.2 Required waveguides, cables, connectors, accessories etc. to install, commission and integrate the antenna with the RF systems shall be included.
- 5.3 Bill of Material.
- 5.4 Training to IIA's staff for Installations and Antenna Control System.
- 5.5 **Bidder shall provide quality documentation as deliverables as given below:**
  - Project implementation plan/schedule (within 2 weeks of receiving the PO).
  - As-Built documentation for prospective vendor supplied systems along with technical data sheets of all the Antenna equipment including motors, encoders and respective resolutions used in Antenna Control unit.
  - System design document.
  - Document listing Total weight of equipment.
  - System Acceptance Test Plan (ATP) document.
  - Operation & maintenance manual for Antenna.
  - Operating manuals with procedures for remote trouble shooting.
  - Complaint Escalation Procedures/Matrix.
  - All necessary documentation as needed by the Indian regulatory authorities for using antennae over VSAT network in India.

## 6. Inspection, test and acceptance criteria

### **Pre-Delivery Inspection and Acceptance Testing Process**

- 6.1 The systems must be offered in full as per ordered configuration for testing and acceptance.
- 6.2 No item with short supply or with different technical specifications shall be accepted for conduct of acceptance testing under any circumstances.
- 6.3 The delivered items, in addition to meeting the performance results should also contain the same subsystem (Brand/Manufacturer) as were given at the time of initial evaluation tests.
- 6.4 In case any of the empanelled items becomes obsolete and if the prospective vendor wants to offer a new item/model of same make and same or higher specifications, which was not offered for evaluation, the same should be offered to IIA for evaluation with full configuration at least one month prior to the acceptance testing date. The prospective vendor should provide detailed technical documents and technical man power support so as to enable IIA to carry out the evaluation process again on the new item. The decision arrived at by IIA will be final and binding on the prospective vendor.

- 6.5 IIA reserves the exclusive right to decide to inspect the equipment at prospective vendor's premises and conduct factory acceptance test prior to shipment. The scope of such tests shall be mutually agreed upon between IIA and the prospective vendor. The prospective vendor shall provide all necessary facilities for conducting tests at no extra cost to IIA. IIA shall depute its specialists/engineers or its representatives to the prospective vendor's premises at its own cost. The prospective vendor shall provide necessary facilities for carrying out inspection. In the event of non-conformance to any of the specifications, the prospective vendor shall replace or make alterations, necessary to meet the specifications at no extra cost and in the shortest possible time.
- 6.6 The testing of items must be generally completed as specified in the purchase order before the delivery date.
- 6.7 IIA reserves the right to reject any item, if found unsuitable and / or not conforming to the approved specifications. The rejected items, if any, shall have to be taken back and replaced by good items forthwith at the cost of the prospective vendor . No payment will be made for rejected items.
- 6.8 Notwithstanding pre-supply inspections by IIA representative, the prospective vendor, at no extra cost to IIA, shall immediately replace any defective equipment found during installation. However if IIA finds that prospective vendor 's replacement is taking undue long time or if the quality of replacement is found to be below standard in IIA's judgment, then IIA may at its discretion arrange to replace the goods at prospective vendor 's cost. In all such cases, costs shall be recovered from the defaulting prospective vendor .
- 6.9 All Equipment will be directly supplied at the site where it will be tested as per ordered specifications. All expenses involved in shipping the equipment to the site will be borne by the prospective vendor . All aspects of safe delivery shall be the exclusive responsibility of the prospective vendor . During installation at site if any item is found to be defective or broken, it will be replaced with the new one by the prospective vendor at their cost and risk.
- 6.10 A sticker mentioning the Service Support Call Centre Number of the prospective vendor should be pasted on each system.
- 6.11 Upon successful installation & commissioning of equipments at the site, System performance acceptance tests (as per ATP) shall be conducted.
- 6.12 Failure to fulfill any of the above-mentioned conditions will entail cancellation of the Purchase Order along with forfeiture of the EMD/Security Deposit. The prospective vendor must ensure before acceptance of purchase order that enough number of ordered items are available in LOM.

## **7. Delivery Process**

- 7.1 All aspects of safe delivery shall be the exclusive responsibility of the Prospective vendor . At the destination Site, the cartons will be opened only in the presence of IIA/User representative and Prospective vendor's representative and the intact position of the Seal for not being tampered with, shall form the basis for certifying the receipt in good condition.
- 7.2 Delivery schedule as stipulated in the purchase order which shall not be more than 14 weeks from the date of purchase order in J&K & 12 weeks from the date of purchase order in Karnataka.
- 7.3 Prospective vendor must apply to the respective authority for issue of road permit in time.
- 7.4 Delivery Challan needs to be signed and stamped on completion of delivery of items, and submitted along with bills. In case any discrepancy with regard to sign, stamp or date etc. on above delivery challan, a mail from concern user/IIA Coordinator may be treated as delivery challan.
- 7.5 Purchase Section of IIA will provide all the necessary documents for ensuring smooth delivery of goods at the respective destinations, it is the responsibility of the prospective vendor to deliver the goods in time. If any taxes are required to be paid, the same will be reimbursed on actual basis.
- 7.6 Prospective vendor is liable to pay Liquidated Damages for the uncompleted portion of supplies at the rate of 0.5% of the supplies per week of delay subject to a maximum of 10% of the total contract value.
- 7.7 If the delivery, of whole or in part, is delayed beyond 30 days from last date of delivery as given in the purchase order, IIA will have option to cancel the purchase order to the extent of unfulfilled part of the purchase order. IIA will be free to procure the remaining items from alternate sources at the cost and risk of the defaulting prospective vendor , by forfeiting the EMD/Security Deposit of such vendor . In addition, IIA will impose a cancellation charge of 8.5% of the value of unsupplied items, which will be recovered from the pending bills or EMD/Security Deposit or by raising claims.
- 7.8 Proof of Delivery duly signed by the user /IIA Project Coordinator, with his name, date of delivery, designation and office seal, legibly recorded, should reach IIA Head Quarters, Bangalore within four (4) weeks of the delivery except for delivery J&K .Delivery note of J&K should reach within six (6) weeks of delivery date.
- 7.9 On the receipt of the purchase order, the prospective vendor within Eight (8)Days shall initiate the process of obtaining all the necessary documents directly from the user for the State Entry Permit in respective States wherever required for complete and safe delivery of the ordered products. However, for cases where copy of invoice and GR (Goods Receipt)

from the transporter is required for applying for road permit, the process should be so initiated by the prospective vendor that the delivery schedule is met. Proof for the communication sent and duly received by the user and/or IIA project coordinator with signature, name, designation, telephone number and preferably with office seal should be submitted to IIA. If after such proper communication, there is any delay in delivery of equipments which may be attributable to non-receipt of State Entry Permit / Octroi / Way Bill shall qualify for extension of delivery period on pro-rata basis provided prospective vendor submits documentary proof for doing so.

7.10 The prospective vendor shall provide System manual and User manual (soft or hard copy) along with each item, irrespective of the fact that more than one item may be meant for any location. The maintenance manual should contain detailed sub- system specifications, functional description and layout diagrams of the VSAT Antenna and trouble shooting of the VSAT Antenna.

## **8. Installation Process**

8.1 On receipt of purchase order prospective vendor is required to undertake a site survey of the designated location where the VSAT is to be installed and advise the user regarding the pre-requisites such as platform specifications for antenna installation whether on ground / roof, clear line of site, electrical, E/N voltage and room temperature requirement etc for site readiness of the VSAT Antenna installation.

8.2 Installation schedule as stipulated in the purchase order which shall not be more than 30 days from the date of last delivery and the same shall be strictly adhered to. If the scheduled date of installation falls on holiday / non working day (at the delivery location), the next working day shall be treated as due date of installation.

8.3 If the installation, of whole or in part, is delayed beyond 30 days from last date of prescribed schedule of installation, IIA holds the option to complete the installation work through alternate sources at the risk and cost of the defaulting vendor.

8.4 During installation at site if any item is found to be defective or broken, it will be replaced with new one by the Prospective vendor at their own cost and risk.

8.5 Upon successful installation & commissioning of VSAT Antenna and existing RF equipment (Extended C Band) by the prospective vendor at the site, System performance acceptance tests (ATP) shall be conducted.

8.6 Onsite Training of IIA officials as mentioned in the Scope of work shall be carried out after the completion of ATP or prior to ATP with mutually suitable dates.

- 8.7 Upon successful installation & commissioning of Remote VSATs, various performance tests shall be carried out (such as ping response, speed test, FTP, Browsing etc.) in co-ordination with VSAT sites and same shall be demonstrated to VSAT User. Basic Training on VSAT operation and maintenance is to be imparted to VSAT user as mentioned.
- 8.8 On completion of these tests and training an installation certificate must be obtained from IIA officer in charge/Project Co-ordinator/ user as the case may be.
- 8.9 Installation Certificate copies duly signed by the user should reach respective IIA Headquarters along with the bills. Original installation certificate(s) must accompany the 1st copy of original bill, rest of bill copies could be with copies of relevant installation certificates.

## **9. Safety Requirements**

- 9.1 Safety and protection of personnel during normal operation and maintenance or during malfunctioning of any equipment shall be provided as integrated feature of design, manufacture and installation.
- 9.2 Adequate protection shall be included for ensuring safety of personnel from any possible hazards, including Electromagnetic (EM) radiation, high voltages etc.
- 9.3 The Antenna system must be provided with proper lightning arrestor and earthing.
- 9.4 Appropriate protection against bird nesting (Bird deterrent Kit) must also be provided.
- 9.5 Prospective vendor will ensure that there is no cross-pol / co-pol interference from the VSAT at the time installation / commissioning. Prospective vendor will send engineer to rectify the cross pol / co pol interference from the VSAT any time during the warranty period at no cost to IIA / user.

## **10. Environment Conditions**

- 10.1 Wind Loading Operational 70 kmph typical, Survival 200 kmph minimum.
- 10.2 Temperature Range Operational -30 to + 50 Degrees Centigrade
- 10.3 Rain Up to 4 inches (10 cm) per hour

# Annexure A

## Site Information & Climatic Conditions

### HANLE (LADAKH), J&K

ADDRESS :

IIA-KHALDO

INDIAN ASTRONOMICAL OBSERVATORY, INDIAN INSTITUTE OF ASTROPHYSICS, HANLE, LEH, LADAKH,  
JAMMU & KASHMIR

Longitude: 78°57'51.00" E

Latitude: 78°57'51.00" N

HASL: 4500 meters above msl

Outdoor Temp: -26 deg C to +26 deg C

Wind Speed: 0 – 35 m/s (range) 5 m/s Median at day, 4 m/s Median at night

Humidity: 0-95%

No of Antenna: 2

Location of Installation: Ground

### CREST HOSKOTE, Banaglore rural, Karnataka

ADDRESS:

IIA-CHIKKAHALLUR

CREST CAMPUS, INDIAN INSTITUTE OF ASTROPHYSICS,  
SHIDLAGHATTA ROAD, HOSKOTE, BANGALORE RURAL, KARNATAKA 562114

Longitude: 77°48'40.77" E

Latitude: 13°06'46.65" N

HASL: 921 meters above msl

No of Antenna: 2

Location of Installation: Roof Top