REQUEST FOR PROPOSAL FOR 7.2MTR AND 3.8MTR EXT-C BAND ANTENNA TERMINAL & 2.4MTR C-BAND ANTENNA TERMINAL REFURBISHMENT

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5. MCF accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.

6. The bidder shall be Original Equipment Manufacturer (OEM) or System Integrator (SI) or any Authorized Agent/Vendor for OEM/SI.

7. MCF reserves the right to change/ modify/ amend/ cancel any or all provisions of this RFP document

1. Introduction

Master Control facility (MCF) as one of the Indian Space Research Organisation (ISRO) unit, Monitor & control GEO Communication & navigation Satellites. MCF being an operational center having the responsibility of controlling all GEO and GSO satellites of India right from its launch upto its end of life, MCF has to have connectivity with various other ISRO centers as well as other space agencies for smooth operations. Satellite communication links plays a vital role in providing reliable and secure communication. As a part of this, MCF is planning refurbishment of two of its Ext-C band terminals(7.2mtr and 3.8mtr terminal) at MCF Hassan for the purpose of VSAT connectivity. The scope of the tender also include the integration of 1:1 SSPA with BUC for uplink chain and 1:1 LNBC downlink system for 2.4 mtr Offset feed C-band terminal at MCF Hassan. The entire work involving Supply, Installation, Testing and Commissioning of the proposed system is envisaged to be completed on **TURN KEY** basis, in about **8 months** from the Effective Date of Contract (EDC).

2. Scope of Tender

The work to be carried out under this tender specification shall consist of the supply, delivery to site, installation, integration, testing, commissioning and handover of terminals in the proposed configuration (Ready to use configuration) at MCF, Hassan in accordance with the specifications and tender conditions.

2.1. End-to-end/turn-key solution for supply, Installation, integration, testing and commissioning of the terminal as per the tendered specification.

2.2. Refurbishment of 3.8mtr Ext-C band from existing 2-port terminal (Rx/Tx) to a 4 port (2 orthogonal uplink and 2 orthogonal downlink feed) terminal along with associated RF system (uplink chain of 2:1 redundant BUC system, downlink chain of LNBC connected on each downlink ports and its associated RF cables and accessories) and baseband connectivity (RFoF units, L band switch matrix integration, Fibre cable etc) as per tendered specification and configuration. The present antenna is prime focus 2 port feed terminal which needs to be changed with a 4 port prime focus feed.

2.3. Refurbishment of 7.2 mtr Ext-C band 4-port terminal with associated RF system (uplink chain of SSPA with BUC in 2:1 redundant configuration, downlink chain of 2:1 LNBC complex and associated RF cables and accessories) and baseband connectivity (RFoF units, L band switch matrix integration, Fibre cable etc) as per tendered specification and configuration.

2.4. Supply and integration of 1:1 outdoor 80W/100W C-band SSPA with BUC and 1:1 LNBC configuration for 2.4mtr antenna terminal and its associated cabling. 2.4 mtr terminal is an offset feed antenna, hence the RF elements has to be selected accordingly.

2.5. Installation & interfacing of the ground terminal subsystems and equipment etc. are to be carried out with professional craftsmanship and high-quality accessories.

2.6. Mechanical system for the housing of SSPA with BUCalong with its switching systems, downlink LNBC complex integration etc are responsibilities of the vendor.

2.7. Submission of installation report, operation and maintenance manuals, test certificates given by manufacturer, manufacturer's catalogues, original DVD/CD/Pendrive of the software etc.

2.8. Any application software as required for completion of the project shall be within the scope of this tender. The vendor has to provide OEM certification that the software doesnot contain any Malicious content.

2.9. Monitoring & Control (M&C) hardware & interface elements to be provided for all the systems/ subsystems for M&C purpose.

2.10. The M&C software is NOT in the scope of this tender. However, the successful bidder shall demonstrate proper functioning of remote-control interface of all the equipment. Also, ICDs and related dependent files & drivers to be provided for M&C development.

2.11. Comprehensive on-site Warranty of oneyear to be provided. Terms and conditions are provided in section 3.21.

3. General Instruction

3.1. Pre Bid Meeting:

I. Bidder shall give his consent to participate in pre-bid meeting along with bid clarifications through e-procurement portal.

II. Bidder may refer tender schedule for pre-bid meeting.

III. The bidder must identify a contact person, phone number and mail ID to which any future correspondence may be addressed during the RFP stage of this solicitation.

IV. Pre-bid meeting shall be mandatorily attended in physical or virtual mode by the Techno-commercial team from bidder. If site visit is required during pre-bid meeting, Bidder shall intimate about the same to MCF. The finalized document after pre-bid meeting shall be the base-line document for the entire contract and will be binding on the bidder.

V. Bidder can request for site survey during pre bid period to have better clarity on the tender requirement.

3.2. Once Bid is accepted based on the price quoted, the successful bidder has to complete the entire Scope of the work without any extra cost. Any claim for extra payment on the grounds that scope of work was not understood at the time of bidding shall not be accepted.

3.3. One set of installation, operation, service manual and Interface control document (ICD) to be provided with each supplied unit. The Successful bidder shall provide support (Hardware/equipment wise) /co-ordinate with MCF team for the development of M&C.

3.4. **Proposal instructions**: The proposal must consist of two parts, each to be separately bound.

3.4.1. **Part I: Techno commercial Proposal (not limited to)**

3.4.1.1. Un-priced bill of offered equipment

3.4.1.2. Data sheet/ catalogue of the offered equipment

3.4.1.3. Configuration diagram for the offered solution

3.4.1.4. Compliance statement for all the specifications

3.4.1.5. Commercial terms like taxes, delivery schedule, payment terms, warranty, Security deposit, performance bank guarantee etc.

3.4.1.6. No price details shall be disclosed in Part–I. If disclosed, such offers shall be summarily rejected.

3.4.2. **Part II: Price Proposal.** Price proposal shall consist of prices as per the tender. Non-compliance to two-part instruction amount to disqualification of the bid

3.5. Bidder shall mandatorily quote for the complete scope of tender as mentioned in this RFP (section 2) inclusive of additional items/accessories/add-on in order to meet RFP specifications and T&C.

3.6. Proposal Validity: The bidder shall indicate the period of validity of this proposal, which shall be for six (06) months from the date of Bid opening.

3.7. Proposal preparation cost: The cost of preparing proposals in response to the RFP shall be borne solely by the Bidder. The issue of the RFP does not create any financial or other obligations whatsoever on the part of MCF.The information contained herein is proprietary to Master Control Facility (MCF)/Purchaser, and may not be used or reproduced, except for te purpose of responding to this RFP.

3.8. Purchaser reserves the right to order for the whole system or for a part of the system given in the RFP and also has the right to adopt or reject the offer without giving justifications or reasons whatsoever.

3.9. Purchaser reserves the right to reject any offer for any non-compliance to any specification/requirement or lack of documents/proofs to substantiate the performance as per the specification/requirement.

3.10. Bidder, while submitting price bid, shall consider all domestic taxes & duties applicable, and other costs, if any, to arrive at total landed cost. While working out taxes & duties bidder shall consider following exemption:

3.10.1 MCF shall provide Custom Duty Exemption Certification (CDEC) under Notification No 51/96 for imported components. The applicable Basic CD as of now is 5%+10% social welfare charges i.e. 5.5%. Quote on High Sea Sales (HSS) basis shall not be accepted,

since this is a turn-key Contract and all the responsibility lies with the Contractor until completion of Installation, Testing and Commissioning at site.

3.11. The bidder shall provide breakup cost of all deliverables in the price bid making use of narration column of "other costs" field and values of the same should not be reflected in the "value" column. Other costs, if any, shall only be mentioned in the value column and the narration shall be distinctly mentioned in the narration column i.e. "other costs". The bidder shall provide breakup of foreign currency portion & local currency portion of the total cost. If requested, bidder shall submit the price details of BOM in separate sealed cover indicating import components.

3.12. Bidder shall submit the complete list of deliverables along with their technical quote. In technical bid bidder shall provide the un-priced list of all the deliverables and quantity of each item to be supplied. Bidder to ensure that Price is not mentioned in the technical bid. Bidder shall also note that wherever item quantity quoted in "lot/set", breakup of item with quantity (if applicable) shall be provided. The bidder shall provide the list of all the deliverables with individual/split prices, whenever asked for after price bid opening.

3.13. **Safety**: - The contractor shall observe all the safety precautions for the safety of the labour and employees of purchaser while executing works. Bidder shall be responsible for the safety of the persons employed by them.

3.14. The contractor shall be responsible for injury to persons or equipment things and damages to the property which may arise from omission or neglect of the contractor and their employees whether such injury or damages arises from carelessness, accident or any other cause whatsoever, in any way connected with the carrying out of work. Bidder shall adhere to Department safety manual.

3.15. The contactor shall not employ any person who is prohibited by law from being employed for fulfilling obligations under this contract

3.16. In case the bidder does not adhere to the terms of the contract, MCF reserves the right to terminate the contract.

3.17. MCF reserves the right to check the progress of the work and adherence to the technical specifications etc. at any time/ stage during the progress of work.

3.18. **Delivery/Completion Schedule**: - The Scope of Work is to be completed within 8 months (desirable: 6 months or less) from the Effective Date of Contract (EDC). Bidder shall provide the firm delivery schedule being proposed along with milestones (like supply of hardware/software, installation, testing & acceptance etc.) in the technical bid.

3.19. **Documents**: The successful bidder shall provide hard and soft copy of Installation, operational and maintenance document in duplicate to MCF during installation. All necessary

literature giving complete details of the system shall be provided. Successful bidder shall also provide the test certificates given by manufacturer for all major equipment.

3.20. **Test and evaluation**: Test Matrix shall be provided by vendor for testing the whole system after installation. Test Matrix shall include all features of the equipment mentioned in the technical specifications and system as a whole. The vendor is solely responsible for the installation, commissioning and making the system operational at MCF.

3.21. **Warranty**: Bidder shall provide one year onsite comprehensive warranty support on all equipment's, accessories, software as a whole system, from the date of commissioning. This period shall include maintenance, repair and replacement of parts free of cost. Bidder should ensure that the defects in the system reported during warranty period on any working day are attended to within 48 hours from the date of reporting and rectified within 15 days. In case, the system or any equipment cannot be repaired at the installed site within the stipulated period, the bidder should provide the identical replacement till the system/equipment is returned duly repaired and take the defective unit to service center. In case the manufacturer discontinues any model, bidder shall supply equipment with equivalent/higher model meeting required specifications at no extra cost and ensure that it gets integrated with the system seamlessly. The vendor has to respond within 48 hours from the time of fault reporting, any failure in this part the vendor will be penalized with 0.1% of the equipment unit cost on per day basis from the PBG amount.

3.22. **Indemnity**: Successful bidder shall indemnify, protect and save MCF against all claims, losses, costs, damage, expenses, action suits, and other proceedings resulting from infringement of any patent, trademark, copyright etc. or any such other statutory infringements in respect of all the equipment/software supplied by it

3.23. **Payment Term**: 80% of supply on pro-rata basis (restricted to maximum five invoices) against delivery. Remaining 20% of supply and 100% of installation payment after successful installation, commissioning and acceptance of complete system.

3.24. Successful Bidder shall also be responsible for all logistic arrangements like Custom clearance, boarding/lodging for the installation-team/ operational person of the bidder, etc. No Cost shall be borne by the Purchaser except the Customer furnished items.

3.25. **Security Deposit**: 3% of the total order value excluding CAMC to be deposited as security deposit within 15 days of EDC/PO date to ensure faithful execution of work. If Successful bidder fails to execute the order, this amount will be forfeited for non-adherence to contractual terms. This shall be valid till the date of acceptance with a claim period of two months. The validity shall be extended in case the delivery period is extended.

3.26. **Performance Guarantee**: - The successful bidder shall guarantee satisfactory performance/ operation of the commissioned system under the conditions and for the services specified during warranty period. As a performance security, the successful bidder shall furnish Performance Bank Guarantee (PBG) for an amount of Three percent (3%) of the total

order/contract value from a Scheduled Bank, valid till the end of warranty period with a claim period of two months.

4. Bidder eligibility criteria

System Integrators or Original Equipment Manufacturers (OEMs) or their authorized representatives with following eligibility criteria are invited to bid for the project. The bids submitted by the System Integrators (SI) or OEMs or SI/OEM through authorized agent not meeting these eligibility criteria shall not be considered.

4.1. Bidder shall give his consent to participate in pre-bid meeting using clarifications tab under ISRO EGPS Portal. The bidder must identify a contact person, phone number and mail ID to which any future correspondence may be addressed during the RFP stage of this solicitation. Bidder may refer tender schedule for pre-bid meeting. Participation in pre-bid meeting is mandatory and the offers from the participated bidders will be considered for technical evaluation.

4.2. The bidder shall be System Integrator (SI) / OEM / any Authorized Agent/Vendor for OEM/SI or an organization/ a limited company, private company or any agency capable of taking up works of such nature and magnitude and shall produce an undertaking from OEM that the bidder is an authorized entity to quote for this tender and will provide support and spares directly to purchaser, if required, for the offered system (major items) and also that the offered system (major items) will be supported by the OEM for the period of minimum 5 years. The authorization shall be tender specific and addressed to the tender issuing authority.

4.3. The Bidder (SI) shall have at least 3 years of experience in installation and commissioning of ground station (of similar nature) for satellite communication. Bidder shall provide the details of purchase orders, completion certificates and completion schedule with relevant references/ contact details that are executed by them to prove that the bidder has executed the project involving supply, installation and commissioning of the ground station. Submission of purchase order is not adequate to substantiate the experience. Satisfactory completion certificate from the customer is a must to substantiate the experience indicating the scope of work, duration of completion of work against the order, etc.

4.4. For this procurement, bids from Class-I and Class-II local suppliers are admissible and hence provisions contained in Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DIPP), Ministry of Commerce & Industries vide letter No. P-45021/2/2017-PP(BE-II) dated 04.06.2020 (Refer Annexure-1) and subsequent amendment & directives shall be followed. Accordingly, offer will be evaluated & processed in conformation with above referred GOI order. The bidder shall provide compliance and undertaking as per order and hereafter amendments:

- ‘Class-I local supplier’ means a supplier or service provider, whose goods, service or works offered for procurement, has local content equal to or more than 50%, as defined in the above mentioned order.
- ‘Class-II local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less that 50%, as defined under this Order

Verification of local content:

- The ‘Class– I local supplier’/’Class- II local supplier’ at the time to tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for ‘Class-I local supplier’ / ‘Class II local supplier’ as the case may be. They shall also give details of the location(s) at which the local value addition is made. The OEM shall certify the details giving the percentage of local content and the location(s) at which the local value addition is made.
- In case bid value is in excess of Rs. 10 Cr., ‘Class–I local supplier’/ ’Class-II local supplier’ shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
- False declarations will be in breach of the code of Integrity under Rule 175(1)(i)(h) of the General Financial rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the general Financial Rules along with such other actions as may be permissible under Law.

5. Bid evaluation criteria

The technical bids will be evaluated based on the following parameters:

5.1. The bid evaluation/selection, both technical and commercial, is based on the consolidated items on which purchaser choose to place the purchase order. Bidder quote shall include the optional items/accessories/add-on in order to meet the specifications& requirements.

5.2. Bid must address the entire requirement inclusive of all options/accessories. The bid evaluation/selection, both technical and commercial, is based on consolidated offer. Award of the contract is on technically suitable lowest offer& other mentioned condition in RFP. Partial bid will not be considered.

5.3. Bidder shall meet all the tender specifications. Bidder shall mandatorily provide point-wise compliance to all the sections/ paragraphs of the RFP and any deviation & comments clearly brought out with illustration. Bids without compliance statement will be rejected.

5.4. To substantiate the compliance, bidder needs to provide supporting document/catalogue without which bid will be considered non-compliant. Catalogue/ document must contain the

relevant information/specification as required. If required specification is not mentioned in catalogue/datasheet, then OEM certification for such specification shall be submitted.

5.5. Bidder shall furnish the country of origin for major Item/ equipment/ system. While at the time of submission of the quote or post contract, if Indian government bars/regulate any country for import/manufacturing of items in/ from any particular country, then technically suitable similar product from a different source shall be provided without any cost implication. In case of non-compliance to this, offer will be rejected/terminated.

5.6. The successful bidder shall not be allowed to sub-contract works to any contractor from a country, which shares a land border with India unless such contractor is registered with the Competent Authority in terms of order mentioned in above order.

5.7. Bidder shall quote minimum 3 years Satcom industry field proven systems/Heritage. Declaration from OEM in writing to be obtained for the same.

5.8. Bidder to offer only standard product for antenna and feed. Catalogued and proven products shall be offered for all other major components of the system. If the offered items/ systems/ equipment is under development/ to be developed the bid may not be considered. With regard to this, the bidder needs to mandatory fill up the following Table 5-1 with relevant information failing which the bid will be rejected. Duly filled able:1 to be submitted along with the technical bid. This list is not exhaustive, other proposed elements/equipment to be added.

Sl No	Item Description	Make	Model No	Country of origin	Quantity
1	4 port Prime Focus antenna feed				
2	2:1 Ext-C band outdoor SSPA with BUC 100W				
3	2:1 Ext-C band LNBC configuration				
4	Ext- C band LNB				
4	RFoF unit				
5	8x8 Distributive Switch Matrix				
6	8x8 Combining Switch matrix				
7	1:1 Outdoor C-band SSPA with BUC				
8	1:1 C-band LNBC				
9	Dummy Load-100W				
10	Any other equipment not included in the list				

Table 1:- Major Item list

5.9. The technical bids will be evaluated based on the compliance to the RFP including technical specifications and experience & profile of the bidder in executing similar works. Bidder shall mandatorily provide point-wise compliance to all the sections/ paragraphs of the RFP. In case of any non-compliance or partial compliance, the bids may be rejected. Order will be placed on overall L1 vendor. L1 calculation will be based on overall quote (i.e the sum of all the three line items mentioned in the tender) submitted by the vendors.

5.10. Post bid, bidder shall participate in technical discussion of the offered system at MCF Hassan, whenever called for.

5.11. For a single item, multiple 'Makes' shall not be offered. Make and model numbers shall not be changed once the bid is submitted

6. Technical Requirements

6.1. Routers (MCF scope) will be connected to the Satellite Modem (MCF scope) through LAN for data transfer through satellite communication. The satellite modem L-band input/output will be connected to distributive/combining switch matrix (Bidder scope). Satellite modem and Combining and Distributive Switch Matrix will be positioned in Data Room.

6.2. In the uplink chain the output of the combining switch matrix will be extended to 7.2mtr and 3.8mtr terminal at Earth Station through RFoF link. The uplink chain consist of 2:1 SSPA with BUC where two SSPA with BUC will be online connected each of the uplink port and one will be standby.

6.3. For 7.2mtr antenna terminal in the downlink chain, the antenna shall receive the Ext C Band downlink, amplify this RF signal using 2:1 LNBC with prime LNBC's connected each of the downlink ports. The output L-band signal is extended to Dataroom Distributive switch matrix through RFoF link. The distributive switch matrix outputs are interfaced with the corresponding Satellite Modem Receiver.

6.4. For 3.8mtr antenna terminal in the downlink chain after refurbishment with 4 port feed terminal, LNB's will be connected each of the downlink port and the output of LNB will be extended to Dataroom through RFoF chain and through the switch matrix it will be connected to corresponding satellite modem.

6.5. For the C-band terminal, 100W/80W SPPA with BUC and 1:1 LNB has to be assembled for 2.4 mtr antenna terminal. Suitable mechanical arrangement for the mounting of SSPA with BUC and LNB is in the scope of the successful bidder.

6.6. Bidder has to provide and lay two 12 core Single mode OFC cable from data room to the Earth station where 7.2mtr and 3.8mtr antenna terminal is situated. Associated cable termination is also in the scope of the vendor.

6.7. Bidder shall quote the standard/ off the shelf items only for the entire supply and shall not quote units under development. The offered products shall be a catalogued product.

6.8. Make & Model No. of the all the offered items to be provided.

6.9. All the systems shall be field proven for 24/7 & 365 days of continuous operation without any deviation in the performance. OEM certification in this regard has to be provided by vendor for all the major equipments.

6.10. All units having frequency conversions shall have internal reference along with provision of external reference with auto-selection. All such units to be connected to external reference. Since the satellite modems support extension of 10Mhz reference signal being multiplexed with L-band signal, the system in the distribution shall be compatible.

6.11. Catalogue / Data sheet copies of the all offered items to be provided.

6.12. All the remote-controlled system/subsystem/units shall have Ethernet LAN interface with TCP/SNMP/SCPI protocol for the development of M&C and the same remote interface protocols shall be provided by the successful bidder.

6.13. All the interface/control cables of various units like RF, base band, power system etc. for the M&C to be laid by the Successful bidder.

6.14. Individual unit test data shall be provided along with the equipment at the time of supply.

6.15. All the offered optional items for meeting the tendered technical specifications shall be clearly indicated in the technical bid. Part/model number of the optional items shall be provided. All the required optional modules shall be included in the pricing of the concerted equipment.

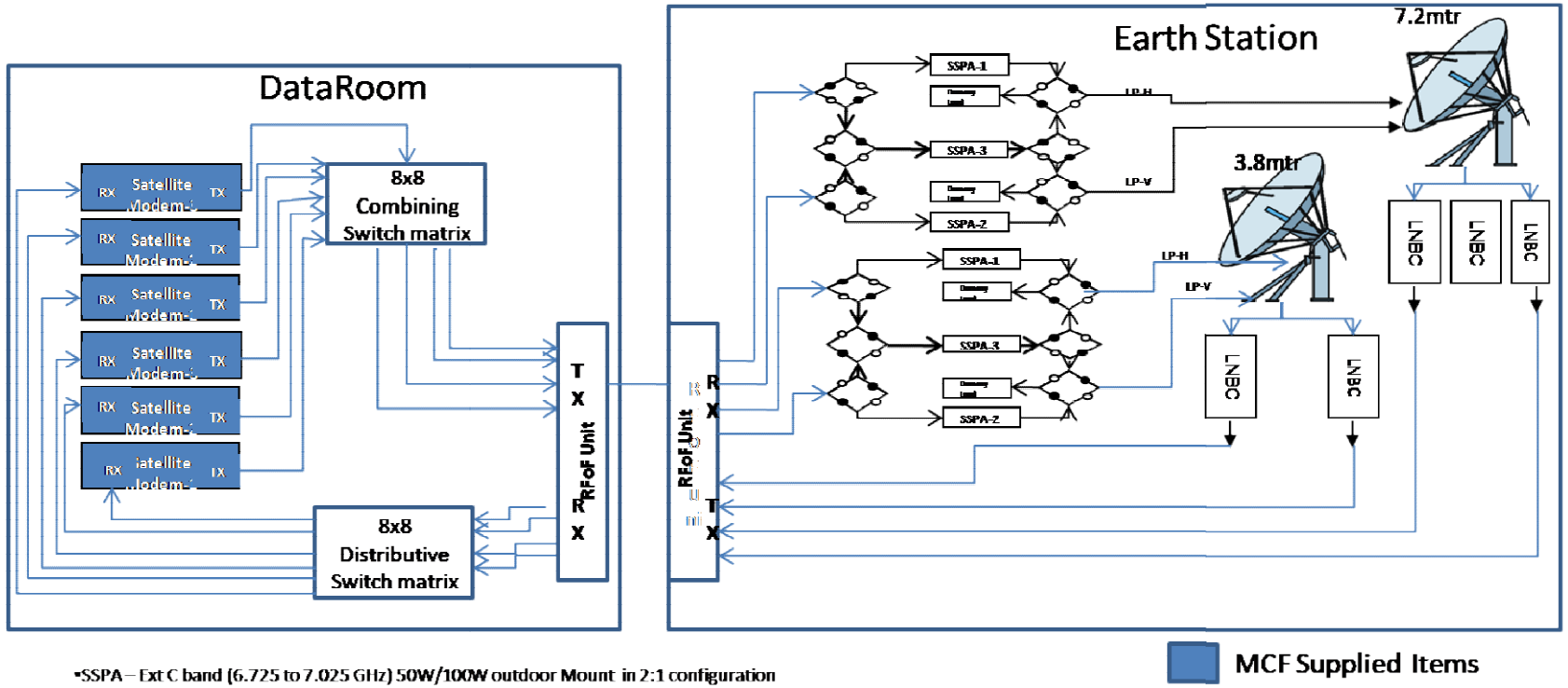
6.16. Extremely low loss cable to be provided from L band up converter outputs (to SSPA with BUC (at Antenna Hub) so that the EIRP performance is not compromised.

6.17. All power sockets & power chords shall be compatible to Indian standard.

6.18. Distance between Dataroom and Earth station is approximately 200mtrs.

6.19. Distance between Earth station equipment rack and the terminals are approximately 60mtrs. The proposed tentative configuration of 7.2mtr and 3.8mtr configuration is given in fig 1.

6.20. For the 2.4mtr antenna Satellite modem will be provided by MCF Hassan. Satellite modem will be housed at Dataroom. Cabling from dataroom to 2.4mtr antenna terminal is responsibility of vendor. The proposed tentative configuration of 2.4mtr antenna is given in fig 2:



- SSPA – Ext C band (6.725 to 7.025 GHz) 50W/100W outdoor Mount in 2:1 configuration
- LNBC Complex Ext C-band (4.5 to 4.8 GHz) with LNA/LNBC controller in 2:1 configuration.
- Antenna (Existing) – 7.2mtr 4 port LP feed Ext C band antenna
  - 3.8mtr is 2-port antenna to be changed to 4-port LP antenna
- Cabling has to be carried out by the vendor from the RF room to antenna.
- Distance between Dataroom and SCES#1 is approx 200mtr.
- Distance between SCES#1 Equipment Room and Antenna terminals(7.2mtr and 3.8mtr) is approx 60 mtr.

Figure 1 :- 7.2mtr and 3.8mtr Terminal

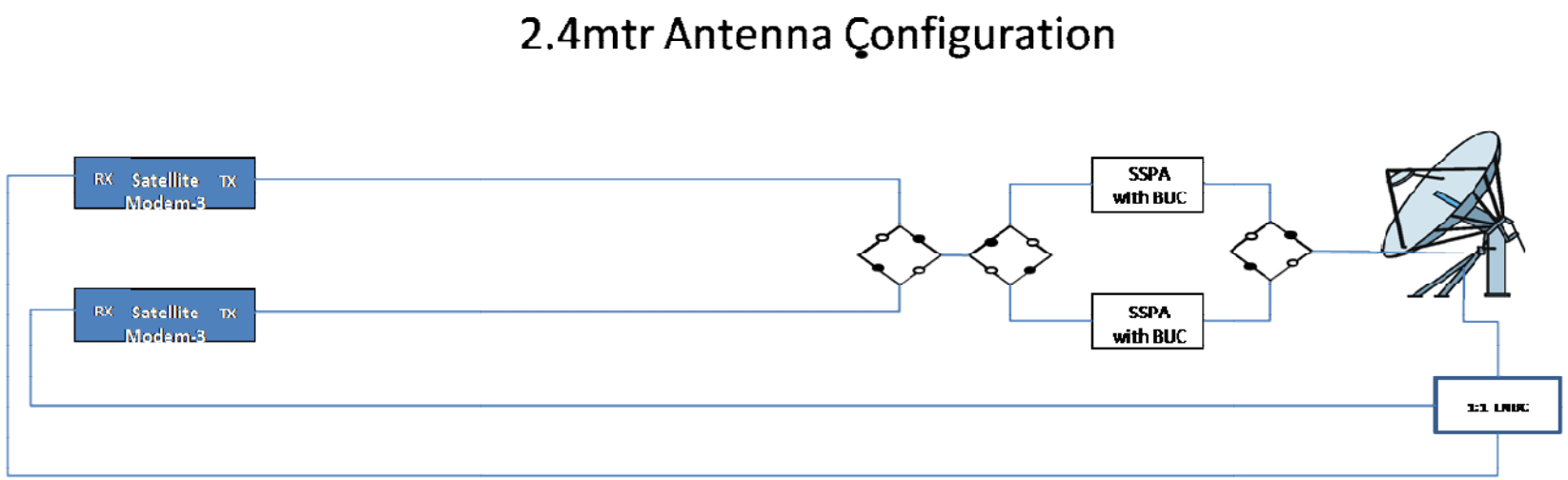


Figure 2 :- 2.4mtr Antenna Configuration

7. Customer (MCF) Furnished Items

On the part of Purchaser, the following support / facilities shall be made available to the successful bidder.

7.1. Single point 3 phase, four Wire (3P+N) AC power supply for the antenna station. AC power supply point of 415V ±5%, three phase, 4 Wire, 50Hz±5% will be provided.

7.2. The feeder point will be about 80mtrs from the proposed location of installation. Supply & laying of power cable from feeder panel to the terminal (as per local standard enforced) is in the scope of bidder. Bidder shall be responsible for tapping the power from the feeder point.

7.3. Satellite Modem will be provided by the purchaser.

7.4. Space segment for carrying out the Required RF Testing.

8. Technical Specification

Specification for 100W Ext-C band Outdoor SSPA with BUC

Sl No	Parameter	Specification
1	Output RF Frequency	6.725 to 7.025 GHz
2	Input Frequency	L band having 300MHz bandwidth or better
3	Output Power	Psat: 100W Plinear: 50W or better
4	Gain	70dB or better
5	IMD3(two tones)	-27dBc or better
6	Spurious	-60dBc or better
7	External Reference	Provision to be available and auto changeover in case of external reference absent. Ref signal level- -5dBm to +5dBm
8	Gain stability	+/-0.5 dB or better over 36 MHz +/-2 dB or better over full band
9	Gain stability over temp range	+/-2dB or better
10	Input/Output VSWR	1.5:1 or better
11	Phase Noise	-54 dBc/Hz max. @10 Hz -79 dBc/Hz max. @100 Hz -89 dBc/Hz max. @1 KHz -94 dBc/Hz max. @10 KHz -100 dBc/Hz max. @100 KHz -110 dBc/Hz max. @1 MHz
12	Input Connector	N-type
13	Output Connector	CPR 137G
14	M&C Interface	Ethernet (HTTP, SNMP)
15	Power	AC:- 230V, 50Hz or suitable adaptor
16	Operating temperature	Operating: 0^{o}C to +55^{o}C
17	Outdoor Ingress protection	Units shall be IP65 compliant

18	BUC Controller	• BUC controller supporting 2:1 configuration to be provided. • Monitors and control BUC operations • Local and Remote mode of operation to be supported. • Interface cable between system controller and BUC to be provided. • System controller shall have dual redundant power supply. • Remote control through LAN interface and the remote control unit shall support web interface and SNMPV2 or better protocols.

Specification for 80W C band Outdoor SSPA with BUC

Sl No	Parameter	Specification
1	Output RF Frequency	5.850 to6.425 GHz
2	Input Frequency	L band having 300MHz bandwidth or better
3	Output Power	Psat: 80W or more Plinear: 40W or more
4	Gain	70dB or better
5	IMD3(two tones)	-27dBc or better
6	Sputious	-60dBc or better
7	External Reference	Provision to be available and auto changeover in case of external reference absent. Ref signal level- -5dBm to +5dBm
8	Gain stability	+/-1.5 dB or better over 36 MHz +/-2 dB or better over full band
9	Gain stability over temp range	+/-2dB or better
10	Input/Output VSWR	1.5:1 or better
11	Operating Temperature	Operating: 0^{o}C to +55^{o}C
12	Phase Noise	-54 dBc/Hz max. @10 Hz -79 dBc/Hz max. @100 Hz -89 dBc/Hz max. @1 KHz -94 dBc/Hz max. @10 KHz -100 dBc/Hz max. @100 KHz -110 dBc/Hz max. @1 MHz
13	Input Connector	N-type
14	Output Connector	CPR 137G / N-type connector
15	M&C Interface	Ethernet (HTTP, SNMP)
16	Power	AC:- 230V, 50Hz or suitable adaptor
17	Outdoor Ingress protection	Unit shall be IP65 compliant
18	BUC Controller	• BUC controller supporting 1:1 configuration to be provided. • Monitors and control BUC operations • Local and Remote mode of operation to be supported.

		• Interface cable between system controller and BUC to be provided. • System controller shall have dual redundant power supply. • Remote control through LAN interface and the remote control unit shall support web interface and SNMPv2 or better protocols.

Specification of 8x8 combining Switch Matrix

Sl No	Parameter	Specification
1	Capacity	8 inputs x 8 outputs
2	Routing	Combining, Full Fan-in Matrix (or fully combining matrix): any input can be routed to any output. Many inputs can be routed to each output. Each input can only be routed to one output.
3	Frequency Range	50 to 2500MHz
4	Gain Flatness	±1.75 dB(Full band)
5	Gain	Gain:- 0 ± 2 dB Typical, mean across band Max gain:- + 3 dB Typical, mean across band Min gain:- - 3 dB Typical, mean across band Gain step:- 0.25 dB Fine monotonic gain control
6	Input Return Loss	16dB typical
7	Output Return Loss	16dB typical
8	1 dB Compression	1 dBm ± 2 typical
9	Noise Figure	25 dB typical
10	OIP3	+10dBm or better
11	Port-Port Isolation	I/P – O/P: 60 dB I/P – I/P: 70 dB O/P – O/P: 70 dB
12	Local Control	Front panel display with control switches for control and monitoring
13	Remote Control	Ethernet (RJ45), SNMP and web browser interface.
14	Operating temperature	0 to 45˚C or better
15	Humidity	20 to 90% non-condensing
16	PSU	Dual redundant
17	AC Power	Dual Input AC Sockets, 230VAc 50Hz, Indian standard
18	Power failure	In case of power failure in both AC sources, and shutting down of the matrix, on turning it back –the matrix should retain the same settings as earlier, i.e. prior to the power shutdown

19	Alarms	Continuous monitoring of amplifiers, CPU and PSUs must be possible and any faults should result in an alarm on front panel and remotely. Alarm should report the fault down to the component level.
20	Connectors and impedance	BNC-F, 50 ohms

Specification for 8x8 Distributive Switch matrix

Sl No	Parameter	Specification
1	Capacity	8 inputs x 8 outputs
2	Routing	Distributive, Non-blocking. Any input can be routed to any output. Many outputs can be connected to one input. Each output can only be routed to one input.
3	Frequency Range	50 to 2500MHz
4	Gain Flatness	±1.75 dB(Full band)
5	Gain	Gain:- 0 ± 2 dB Typical, mean across band Max gain:- + 3 dB Typical, mean across band Min gain:- - 3 dB Typical, mean across band Gain step:- 0.25 dB Fine monotonic gain control
6	Input Return Loss	16dB typical
7	Output Return Loss	16dB typical
8	1 dB Compression	1 dBm ± 2 typical
9	Noise Figure	21dB (Unity gain) 25 dB (Min Gain)
10	OIP3	+12dBm
11	Port-Port Isolation	I/P – O/P: 60 dB I/P – I/P: 75 dB O/P – O/P: 75 dB
12	Local Control	Via Front Panel LCD and push buttons
13	Remote Control	Ethernet (RJ45), SNMP and web browser interface.
14	Operating temperature	0 to 45˚C or better
15	Humidity	20 to 90% non-condensing
16	PSU	Dual redundant
17	AC Power	Dual Input AC Sockets, 230VAc 50Hz ,Indian Standard
18	Power failure	In case of power failure in both AC sources, and shutting down of the matrix, on turning it back –the matrix should retain the same settings as earlier, i.e. prior to the power shutdown
19	Alarms	Continuous monitoring of amplifiers, CPU and PSUs must be possible and any faults should result in an alarm on front panel and remotely. Alarm should report the fault down to the component level.

20	Connectors/ impedance	BNC-F, 50 ohms

Specification for Ext C band LNB with controller for 2:1 configuration

Sl No	Parameter	Specification
1	Input Frequency Band	4.5 to 4.8GHz
2	Output Frequency Band	950 to 2150 MHz
3	Waveguide Interface	WR229
4	Output Connector	50 Ohms N type female connector
5	Gain	60dB typ
6	Gain Flatness	3dB p-p max
7	Input/Output VSWR	1.5:1
8	Input Power	+12V to +24VDc
9	Operating temperature	0 to 50 deg C
10	System Controller	• For 2:1 configuration of LNBC. • Provides power for the LNBC • Monitors and control LNB operations • Local and Remote mode of operation to be supported. • Interface cable between system controller and LNB to be provided. • System controller shall have dual redundant power supply. • Remote control through LAN interface. SNMPv2/ Web Interface.

Specification for Ext C band LNB

Sl No	Parameter	Specification
1	Input Frequency Band	4.5 to 4.8GHz
2	Output Frequency Band	950 to 2150 MHz
3	Waveguide Interface	WR229
4	Output Connector	50 Ohms N type female connector
5	Gain	60dB typ
6	Gain Flatness	3dB p-p max
7	Input/Output VSWR	1.5:1
8	Input Power	+12V to +24VDc
9	Operating temperature	0 to 50 deg C

Specification for 1:1 LNB system with remote controller

Sl No	Parameter	Specification
1	Input Frequency Band	3.4 to 4.2GHz
2	Output Frequency Band	950 to 2150 MHz
3	Waveguide Interface	WR229
4	Output Connector	50 Ohms N type female connector
5	Gain	60dB typ
6	Gain Flatness	3dB p-p max
7	Input/Output VSWR	1.5:1
8	Input Power	+12V to +24VDc

9	Operating temperature	0 to 50 deg C
10	System Controller	• For 1:1 configuration of LNBC. • Provides power for the LNBC • Monitors and control LNB operations • Local and Remote mode of operation to be supported. • Interface cable between system controller and LNB to be provided. • System controller shall have dual redundant power supply. • Remote control through LAN interface.

Specification for 4-port prime focus feed for 3.8mtr antenna

Sl No	Parameter	Specification
1	Frequency	Transmit: 6.725 to 7.025GHz Receive : 4.5 to 4.8GHz
2	Gain	Transmit: 46dBi at 7.025GHz Receive:43dBi at 4.8GHZ
3	VSWR	1.5:1 typ
4	Radiation pattern	Meets ITU regulation
5	Feed System	4-port linear polarized prime focus feed(2 orthogonal uplink and 2 orthogonal downlink feed)
6	Power handling capacity	100W

Specification for RF over Fiber unit

Sl No	Parameter	Specification
1	Capacity	6 Tx modules and 6 Rx modules to be housed in a chassis with dual redundant (hot swappable) power supply modules. The chassis shall contain a remote control card for remote monitoring and controlling. All the modules shall be hot swappable.
2	Frequency range	50 to 2150MHz
3	Gain Flatness	±1.5dB
4	Gain Setting	Fixed Gain, AGC mode, Manual Gain
5	Gain Range	60dB
6	OIP3	Typical 23 dBm, Worst Case 20 dBm
7	Noise Figure	Typical 9dB
6	RF signal Range	-70 to -10dBm
9	Max RF input	16dBm total power
10	Optical power	4.5 ±2.5dB
11	Connectors	Optical :- SMF SC APC RF :- 50 ohms BNC. If any other connector suitable convertor to be provided.
12	Control and Monitoring	Local display for monitoring and control. Remote monitoring and control through ETCP/SNMP protocol.
13	Operating temperature	0 to 45 deg C
14	Power Supply	230VAC, 50Hz or suitable adaptor to be provided.
15	Optical driving distance	2Km

Specification for 12 core Single Mode Fiber

SL No	Parameter	Specification
1	Fiber Type	12 core Single Mode, OS2
2	Core/Cladding Diameter	9/125 micron
3	Armour	Corrugated Steel Tape Armour Outer Sheath (HDPE) Water Blocking Gel.
4	Attenuation	0.25 to 0.4dB per Km or less
5	Miscellaneous	Length of cable marking to be provided for every one meter.

Specification for fully loaded 12-core Rack Mountable 19"LIU

SL No	Parameter	Specification
1	Type	19" Rack mountable
2	Number of Connectors	12
3	Adaptors	SC PC Simplex Adaptors
4	Cable entry	From top and bottom at each corners
5	Features	Shall contain cable managers and splicing tray to accommodate minimum of 12 splices. Provision for cable fastening to be provided.

Specification for 1.5sqmm 3 core Screened Flexible Power Cable

SL No	Parameter	Specification
1	Cable Type	Braided/Screened Flexible Copper Cable
2	No of Core	3 cores
3	Area of cross section	1.5 sq mm
4	Colour Code	Red, Blue and Yellow
5	Conductor	Fine strand of annealed high conductivity copper wires
6	Flexibility	Class 5 to IS 8130 with latest amendment
7	Voltage grade	1.1 kVAC, 50 Hz
8	Insulation	PVC, Type D as per IS5831
9	Inner Sheath	Malinex/Mylar tape, 25% overlap before braiding
10	Screening	Annealed Tinned Copper (ATC) wire with >65% coverage
11	Outer Sheath	PVC Type ST-2 as per IS5831
12	Outer Sheath colour	Black
13	Length Marking	Every meter of cable