

1(6)/2023-SCD/RNT

PRASAR BHARATI
DIRECTORATE GENERAL: ALL INDIA RADIO
(PLANNING & DEVELOPMENT UNIT)

SPECIFICATION DOCUMENT FOR SUPPLY INSTALLATION TESTING & COMMISSIONING (SITC) OF
DIGITAL C-BAND RECEIVER RN TERMINAL

ADD. DIRECTOR GENERAL-E : ADG-E. (NZ, SZ, WZ, EZ NEZ) AIR&DD
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N.B:1. The tenderer should go through all the sections of this specification document carefully and should confirm clause-by-clause compliance of all the sections clearly. Tenders received without clause compliance are liable to be rejected.

2. The tenderer should indicate the items offered as per schedule of requirements, Section-A, without cost details in technical bid to assess the completeness of offer against AIR's requirement.

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Subject: Specification Document for Supply Installation Testing & Commissioning (SITC) of Digital C-Band Receiver RN Terminal.

INTRODUCTION:

The AIR broadcasting stations spread throughout the country are required to relay certain programmes which are originated from Delhi and from other Regional Stations in State Capitals. In order to link Delhi and Capital Stations etc. with other stations, for the purpose of these relays, AIR uses Satellite Radio networking through GSAT series of Satellites.

The RN Receive Terminals located at AIR Stations act as Ground Terminals, to receive C-Band transmissions through satellite. These programmes thus down linked, are fed to the transmitters for broadcast purposes.

Present specifications are for SITC of complete Digital C-Band Receive RNT for AIR Stations. A Representative diagram of Digital C-Band Receive RNT and DTH downlink set up are placed at Annexure-I & Annexure-II.



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12	Complete installation / integration material for all the above items (Sl. No. 1 to 10) including all accessories, inter connecting cable, connectors etc.	1 lot
13	Any other item/equipment required for completeness of SITC of RNT (to be indicated with details)	1 lot
14	Installation and Commissioning of the System at site	1 Job
15	Complete manual for installation, operation & maintenance of all the equipment and accessories of the RNT and DTH system as per clause 7(ix) of Section - A.	1 lot
16	Charges for pre-dispatch Inspection as per approved ATP at integrator's works	1 Job
17	Charges for 2 days training at each AIR site	1 Job

OPTIONAL ITEMS:

1	Spares for RNT a. C-Band LNBC b. L-BAND DVB-S/ DVB-S2 DIGITAL SATELLITE RECEIVER (IRD) c. L-BAND 1:4 POWER DIVIDER	1 No. 1 No. 1 No.
2	Other item of spares recommend by the OEM/Integrator	1 lot

2. SCOPE:

The scope of this tender covers the Design, Supply, Installation, Testing and Commissioning of Digital C-Band receive RNT complete with installation material at AIR stations. The RNT shall be capable of receiving Radio Channels in SCPC/MCPC mode. All the associated equipments and installation material should be complete in all respect and fully sourced from their respective OEM. An acceptance test shall be carried out as per approved ATP by AIR on the RNT fully integrated with all its associated equipments, sub-assemblies etc. at the integrators works before the ordered equipments are dispatched to AIR. Optional items such as spare etc. shall be tested and the installation material shall be physically inspected during the pre-dispatch acceptance test at Integrators works before the dispatch.

i) After acceptance of the tender, the tenderer shall provide detailed plans of supply of material and testing as per ATP.

ii) The indenter shall provide the necessary drawings etc. for the installation of the equipment, layout plan of the cable and location of the parabolic dish antenna.

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- iii) The complete installation of RN Terminal at designated AIR site, including ground leveling, required foundation for the PDA and construction of platform shall be carried out by the tenderer.
- iv) During the installation of the equipment supplier shall be responsible for safety and security of his material and personnel. At the same time the supplier will also ensure that no damage to AIR material and personnel is caused. There shall be no disruption of running services at the Station during installation and commissioning.
- v) The tenderer shall ensure that the equipment offered fully incorporate the standard features for safety and protection including shielding from EMI.
- vi) The supplier will have to supply the equipment, arrange for its testing as per Acceptance Test Procedure and provide facilities and equipment to carry out the testing. The installation and commissioning of the C-Band receive terminal at designated AIR site will be carried out by the supplier. A draft copy of the Acceptance Test Procedure is attached in Section 'C'.
- vii) Pre dispatch Inspection will be carried out at Supplier/Integrator's premises by the Engineers(s) of All India Radio. The supplier shall put up all the equipment for test on the test bench at supplier/integrator premises before the AIR Representative and shall provide, without any extra charges, electric energy, consumable materials, tools, testing instruments, labour and assistance of every kind for carrying out acceptance tests. All the individual factory test reports of the complete lot of the equipment shall be made available to the inspecting authority before inspection. Complete specifications and details will be checked and all parameters values will be measured. Typical details are enclosed in draft ATP. The inspection will be carried out on those lines. Prior intimation for carrying out Inspection at works is to be given by the Supplier to the Indenter at least 4 weeks in advance. Inspection charges if any are TO BE QUOTED SEPARATELY.
- viii) Supplier shall arrange two days' training at each designated AIR site to AIR Personnel on operation and maintenance of the equipment.

3. DELIVERY PERIOD:

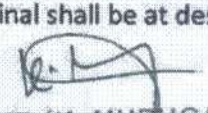
SITC for all the items shall be completed within 4 months from the date of placement of order.

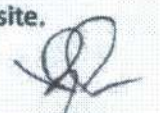
4. LOCATION FOR SITC OF DIGITAL C – BAND RECEIVE RN TERMINAL:

The location for SITC of digital C-band Receive terminal shall be at designated AIR site.


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5. ELIGIBILITY: The bidder shall have proven experience of carrying out SITC of Earth Station/ Microwave Links/Broadcast equipment's i.e. Studio, Transmitters. Bidder shall provide documentary proof (With certificate from client including contact details like Telephone no. and E-mail address) of successfully carrying out at least one work of SITC. Bids not fulfilling eligibility criterion shall be rejected without any further reference.

6. GUARANTEE & RELIABILITY:

In addition to standard guarantee and warranty clauses mentioned in the tender, the tenderer/supplier will ensure the following:

- i). The equipment offered should be capable of continuous round the clock operation.
- ii). It shall be field proven, of state of art technology and based on industry standard.

7. GENERAL CLAUSES:

- i) OEM should provide warranty and guarantee for 5 years from the Date of Commissioning.
- ii) The tenderer shall quote all the optional items.
- iii) The supplier shall be asked to demonstrate the compatibility of the L - Band digital receiver & set top box with existing system of AIR at NBH Delhi.

8. GENERAL REQUIREMENTS:

- i) The RN terminals comprising of C Band Antenna, C band LNBCs and Digital Receivers, etc. will have to be supplied as complete integrated unit including interconnection of the sub-systems, supply of accessories and other materials necessary for proper installation, operation, maintenance and trouble free service.
- ii) Tenderer are required to provide proper arrangement for repairing / maintaining LNBC and feed mounted on the Antenna.
- iii) The distance of in-door and out-door units could be around 50M. So provision should be made accordingly. The rate for the RF cable may also be quoted per meter basis so that additional length as per actual requirement may be ordered later. For ranking purposes, an average of 50m length is considered.
- iv) The technical bid of the tenderer should contain, apart from the technical compliance statement, all original data sheets of the manufacturer in support of the technical compliance statement. The tenders containing only technical compliance statement without the original data sheet/pamphlets of the equipment offered in full are likely to be rejected.

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v) A comprehensive schedule of material offered should be attached with the offer in the same format as price bid minus price.

a) Sufficient information should be furnished with the tender to assess full merits/demerits of the offer.

b) Apart from printed technical data/specs of this equipment, Block schematic of the sub-system, including the photograph etc. should be attached with the offer.

c) A complete schedule of equipment, accessories and option etc. should also be appended with the tender.

vii) List of essential spares giving quantities and cost may also be given along with the offer.

viii) Maintenance support in terms of spare units/components be ensured for at least 10 years.

ix) The supplier shall supply 05 (five) sets of equipment manuals from OEMs for installation, operation and maintenance for all the item of the Digital RN receive Equipments as per details below:-

- 2 Sets for each station
- 1 Set for each Zonal office
- 1 set for Directorate
- 1 set for Staff Training Institute (Technical), Now NABM (T).

Installation will include all the equipment's within the wired racks, hoisting of the parabolic dish antenna, routing of the wave guide/RF cable from the PDA to indoor system and providing earth pits as per AIR Specifications (earth resistance of less than one ohm or keeping in view of topography, earth resistance value should be at par with at least permissible value maintained at respective station record) at site. Racks and all the equipment must be earthed. The workmanship of the entire Installations shall be of high professional standard. PDA foundation will be done by the tenderer as per the design given by its OEM and as per soil bearing capacity, which will be conducted by the successful tenderer through authorized agencies and got certified and a copy of the report submitted for record.

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The firm shall have to arrange all the installation material required for installation and insure all the personnel associated in the installation work at their own cost. Installation schedule has to be intimated at least 3 weeks in advance.

Complete Installation at the station shall thereafter be offered for Site Acceptance Test and Inspection at site shall be conducted by the representatives of AIR.

The successful tenderer shall make good all damages to the purchaser's buildings, property, equipment, article and departmental personnel during the course of installation and throughout the guarantee period.

The successful tenderer shall indemnify and hold harmless the purchaser, against all claims in respect of damages to buildings, property, articles, situated nearby not belonging to the purchaser, and public personnel arising from the erection of the PDA during the course of such erection or mounting and throughout the guarantee period.

The successful tenderer shall indemnify and hold harmless the purchaser against claims in respect of injury to any person howsoever arising from the erection of the PDA in the course of such erection or mounting and throughout the guarantee period.

The successful tenderer shall fully discharge all obligations under the Indian Workmen's Compensation Act in so far as it affects the workmen under his employment.

The tenderer shall be responsible for safe erection of the PDA and other accessories etc. The tenderer shall take all necessary safety measures and precautions during the SITC. Installation work shall be got done at site under the supervision of qualified representative of the firm.

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SECTION -B

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION OF DIGITAL C – BAND RECEIVE RNT:

The Digital C – Band Receive RN terminal should conform to the following technical specifications as per the block schematic shown in Annexure 'B':

1. 2.4M C- BAND PDA AND FEED:

(A) Electrical Specification:

Sl No	Parameter	Specification
1	Frequency Range	3.7-4.2 GHz
2	Mid frequency gain	36db or better
3	Polarisation	Linear Orthogonal, Orientable
4	Cross Polarisation Isolation	30db or better

(B) Mechanical Specification:

Sl No	Parameter	Specification
1	Diameter	2.4Meter (nominal)
2	Tracking mode	Manual, The Antenna should have calibrated marking for Elevation & Azimuth angle indication.
3	Reflector Material	GFRP / Punch Sheet
4	Antenna Stand material	Heavy duty, Hot Dip Galvanized steel
5	Foundation	As per the recommended drawing of OEM
6	Feed mounting	Prime Focus
7	Feed Ports	Two Orthogonal (LNBC mounted on each PORT)
8	Feed Ports Flange	WR229
9	Steer ability:	
	a) Elevation	0° to 90°
	b) Azimuth	± 35°
10	Wind Load:	
	a) Operational:	80 KM/Hr
	b) Survival:	150 KM/Hr
11	Environmental :	
	a)Temperature:	-20° to +50°C
	b)Relative Humidity:	95% non-condensing

The tenderer shall provide foundation as per drawings recommended by the original manufacturer of the antenna. One number of copper earth pit will have to be provided for earthing

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the lightening arrester of the antenna. The resistance of earth pit should be 1 ohm or less or keeping in view of topography, earth resistance valve should be at par with at least permissible value maintained at respective station record.

2. (a) C- BAND L.N.B.C:

Tender shall quote for good quality, field proven C-Band LNBCs, capable of 24x7hrs operation mounted on each PORT of Feed conforming to following specification:

a)	Input frequency	3700 – 4200 MHz
b)	Input connector	WR 229 G Flange
c)	Output frequency	950 – 1450 MHz
d)	L.O. Stability	PLL, better than ± 2 PPM
e)	Noise temperature	$\leq 35^\circ\text{K}$
f)	Conversion gain	≥ 55 dB
g)	Phase Noise	
	1 KHz	-60 dBc/Hz
	100 KHz	-80 dBc/Hz
h)	Output impedance & Connector	75 Ω & F (Female)
i)	Power supply	+ 15 V to + 24 V DC

(b) C-Band 5G Band Pass Filter:

Tender shall quote for good quality and field proven C-Band Pass Filter which is capable of rejecting terrestrial interference in C-Band on 3.7-4.2 GHz and can be easily installed between the feed and an LNB. Filter should be environmentally sealed to prevent impurities like dust, dirt & condensation and should be moisture resistant.

a)	Frequency Range	3700 -4200 MHz
b)	Band	C-Band
c)	Connector Type	CPR-229G Waveguide grooved (Input) CPR-229F (Output)
d)	Operational temp ($^\circ\text{C}$)	-40 to +65

3. LOW LOSS CABLE:

Tender shall quote for good quality professional grade RF cable with suitable connectors mounted at both ends conforming to the following specification:

i)	Cable Loss (with connectors at both ends)	≤ 3.50 dB/100 feet at 1500 MHz
ii)	Impedance	75 Ω

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4. L BAND LINE AMPLIFIER:

Tender shall quote for good quality, field proven L-Band line amplifier, capable of 24x7hrs operation, suitable for wall mounting conforming to following specification:

1.	Frequency of operation	950 - 1450 MHz
2.	Input level	- 80dBm to -50dBm
3.	Input and Output Impedances	75 Ω
4.	Input/ Output return loss	8dB or better
5.	Noise figure	10 dB or better
6.	Gain	20dB or higher
7.	Gain flatness over entire frequency band	2 dB or better
8.	Operating voltage	14Vto 24 VDC (Through centre conductor of the RF cable)
9	Environmental :	
	a)Temperature:	0° to +50°C
	b) Relative Humidity:	95% non-condensing

5. L-BAND DIGITAL DVB – S / DVB – S2 DIGITAL SATELLITE RECEIVER (IRD):

The IRD should have a front panel display and one should be able to enter or edit all the parameters for a perfect reception of the signals. There should be provision for observing the BER of the signal and signal level on the front panel. It will be required for receiving Audio Signal Only.

RF Parameter Specifications:

(a)	Input Frequency Range	950-1750 MHz
(b)	No. Of Inputs	1 nos.
(c)	Tuning Step Size	1 KHz
(d)	Satellite Frequency Bank	C-& KU-Band, selectable
(e)	Input Impedance	75 Ohms
(f)	Input Connector	F-Type Female
(g)	Output Connector	XLR for analog & AES-EBU
(h)	Input Power Range	-30 to -65 dBm per carrier
(i)	De-modulation Method	DVB-S QPSK,DVB-S2 QPSK demodulation
(j)	Variable Symbol Rates	0.128 to 10 M sym/sec
(k)	Convolution Inner FEC Rates selectable	R=1/2,2/3,3/4,5/6,7/8(DVB-S,QPSK) R=1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10(DVB-S-2, QPSK)
(l)	IF filter Bandwidth	Automatic selection(Dependent on Symbol Rate


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Audio and Video Decompression Parameters

- (a) Audio Decompression Type: i) MPEG-1 Layer-II audio, i.e. Dual Mono, Stereo
ii) MPEG-4 with AAC, AAC-LC & AAC HE v1 & v2

Audio Output:-Analog/ (AES/EBU) 4 no.

Analog Audio Output Specifications

Parameter	Specification
(a) Output Impedance	600 ohm (balanced)
(b) Number of Outputs	4 Stereo, configurable as Stereo, Joint Stereo, Mono
(c) Connector Type	XLR Male Socket or with suitable Adapter
(d) Data Rate	64-256 kbps (MPEG-1, layer 2 and MPEG-4 selectable)

Each analog audio output shall be presented as a stereo pair. In the event of "Mono" transmission, the same encoder input channel will be output to both left and right connector. In other modes ("Stereo", and "Dual Mono"), the two encoder input channels will be output as left and right.

Digital (AES/EBU) Audio Output Specifications

Parameter	Specification
(a) Output Impedance	110 ohm (balanced)
(b) Number of Outputs	4 Stereo, configurable as Stereo, Joint Stereo, Mono
(c) Connector Type	XLR Male Socket or with suitable Adapter
(d) Data Rate	64-256 kbps (MPEG-1, layer 2 and MPEG-4 selectable)

Audio Performance Specifications (at 48 KHz sampling rate)

(a) Frequency Response	50 Hz to 15 KHz, ± 0.5 dB
(b) THD+N (1 KHz at max. Level)	0.1% from 50 Hz to 15 KHz
(c) Dynamic range	≥ 80 dB
(d) Cross talk at 1 KHz	≥ 80 dB
(e) Signal to noise ratio	≥ 80 dB

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Note: The IRD offered should be able to receive both SCPC and MCPC signal IRD shall be able to receive free to AIR Doordarshan's DTH radio signals. Interoperability with various models of different Makes shall be checked during technical evaluation stage. For this purpose the supplier shall be required to submit one no. IRD to AIR for checking compliance, if required.

6. FREE TO AIR (FTA) DTH SET TOP BOX:

Tender shall quote for good quality, field proven Free to Air (FTA) DTH set top box, capable of 24x7hrs operation having compatibility with the CES NBH AIR Delhi.

NB: Tenderer shall demonstrate the equipment for conforming compatibility with the CES NBH AIR DELHI as a part of Technical Evaluation.

7. WIRED RACK FOR EQUIPMENTS:

Tender shall quote for good quality, standard size (42U) wired rack with jack strip and tag blocks suitably mounted along with all the equipments.

8. STEREO AUDIO MONITORING EQUIPMENT:

The Tender shall good quality, field proven, hi-fi 5+5 Watt professional grade stereo monitoring amplifier, capable of 24x7hrs operation along with a set of two matching speakers. The equipment shall be capable to accept AES/EBU & Analog inputs. The Stereo Audio Monitoring amplifier shall be rack mountable.

9. L BAND 1:4 POWER DIVIDER:

Tender shall quote for good quality, field proven L – Band 1:4 power divider, capable of 24x7hrs operation suitably mounted in the rack.

10. LAPTOP:

The Laptop should be loaded with the latest operating system. Laptop shall be of reputed make with licensed OS and preloaded NMS of the RNT equipment and accessories, back-up CD / DVD along with proper drives etc. It shall be used for control and setting of the operational parameters of Digital Receivers and accessories of the RN receive Terminal. Laptop shall be rack mountable (sliding).

11. SITC of DTH Set-up with 1.2 meters antenna to receive DD Free Dish Program:

Tender shall quote full set up to receive DD Free Dish Programs from KU-Band having good quality, field proven Free to Air (FTA) DTH set top box with MPEG-4 compatible.


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1(6)/2023-SCD/RNT

SECTION 'C'

DRAFT ACCEPTANCE TEST PROCEDURE

1. INTRODUCTION

New C-band Digital receive terminal to be installed at designated AIR site is to be tested to ascertain the performance of the terminal before final acceptance.

2. SCOPE

This document describes the test procedure for link level measurement of C Band RN receive terminal. Details of the operating parameters and setting at which measurements are to be carried out are given in subsequent sections.

3. OBJECTIVE OF LINK LEVEL MEASUREMENTS

Digital C-Band transmit (uplink) is already operational at CES Delhi. The down link testing is to be carried out based on these parameters.

Detail measurements of the downlink receive system would consist of following:

- RF measurements
- Baseband measurements
- To test the received audio qualitatively
- Endurance test

These measurements would be carried out in real time coordination with CES, Delhi for the C-band Digital transmit system.

4. TEST EQUIPMENTS

The test equipment are required to be arranged by the supplier.

- (a) Spectrum Analyzer
- (b) Audio signal generator
- (c) Audio analyzer

5. SET-UP & PRE-CHECKING:

Following points may be checked up before the measurements are carried out:

- (i) Check for the items model / type, serial no., quantity as per order including manuals etc.
- (ii) Individual operational controls of units, settings, levels should be set up as per details given in the manual and subsequent sections. The functioning of controls and displays may be checked.
- (iii) The receive system, after installation, is to be lined up for satisfactory downlink audio reception and functioning of the system.

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II. BASE BAND MEASUREMENTS:

II. BASE BAND MEASUREMENTS:

Vary the input to the Encoder in the uplink side from -8 dBm to +8 dBm in steps and note the output on the analyzer, which is connected to the receiver. Carry out measurements for both channels and note down the results.

	Input Level	Output Level
	Left Channel	Right Channel
(a) -8 dbm		
(b) 0 dbm		
(c) +8 dbm		

Feed a 0 dbm reference signal at 1 KHz to the Encoder. Vary the frequency of the signal from 20 Hz to 20 KHz in steps and note down the output level of the signal receive end.

Sl.No	Frequency (Hz)	Left Channel	Right Channel	Remarks

Feed a +8 dBm, 1KHz test signal at the Encoder and measure output level, THD, SNR and cross talk in respect of both channels.

S.No	Channel	Output (dBm)	THD (%)	SNR (dB)	Cross Talk (dB)	Remarks
	Left					
	Right					

Listen to the received programme for satisfactory audio quality. Subjective listening comments may be given.

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Downlink Setup for 2.4 M Receive RN Terminal

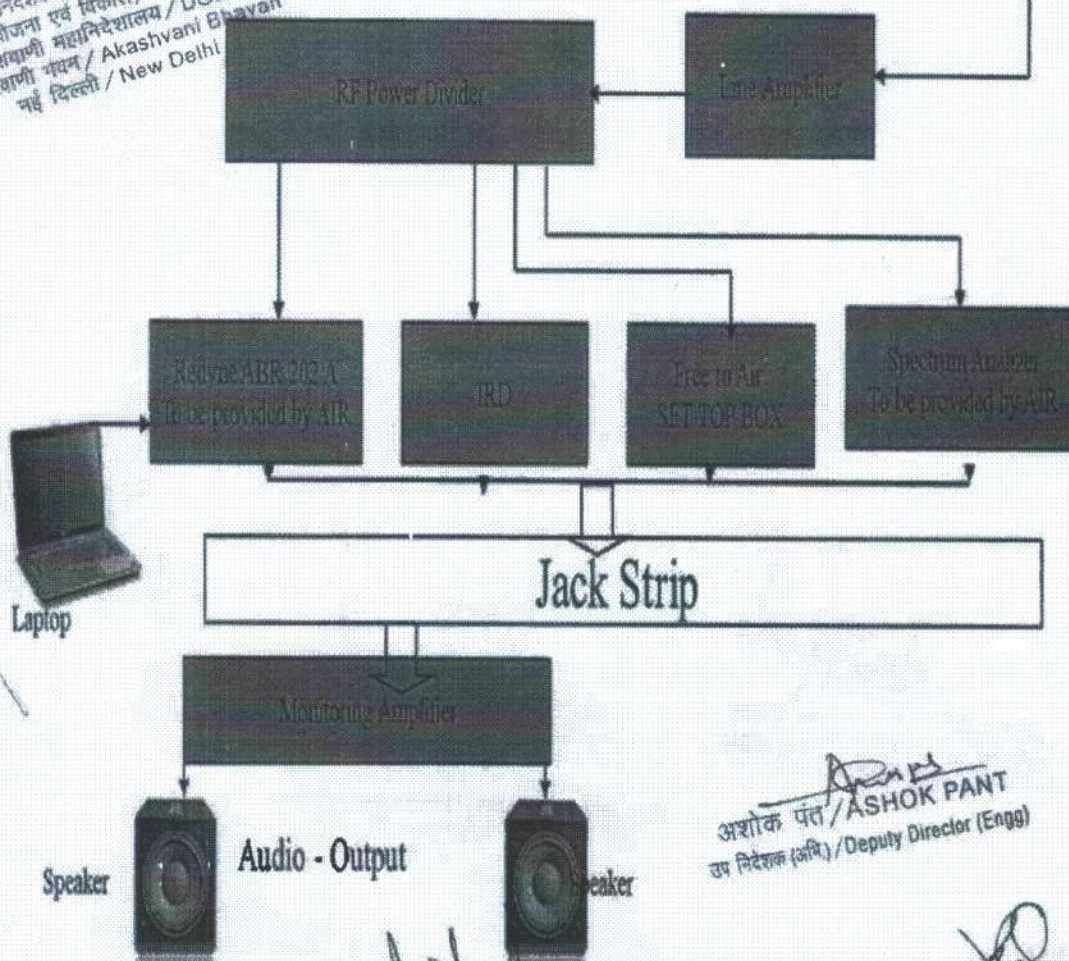
Downlink on C-Band

2.4 M Dish

LNBC



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Laptop

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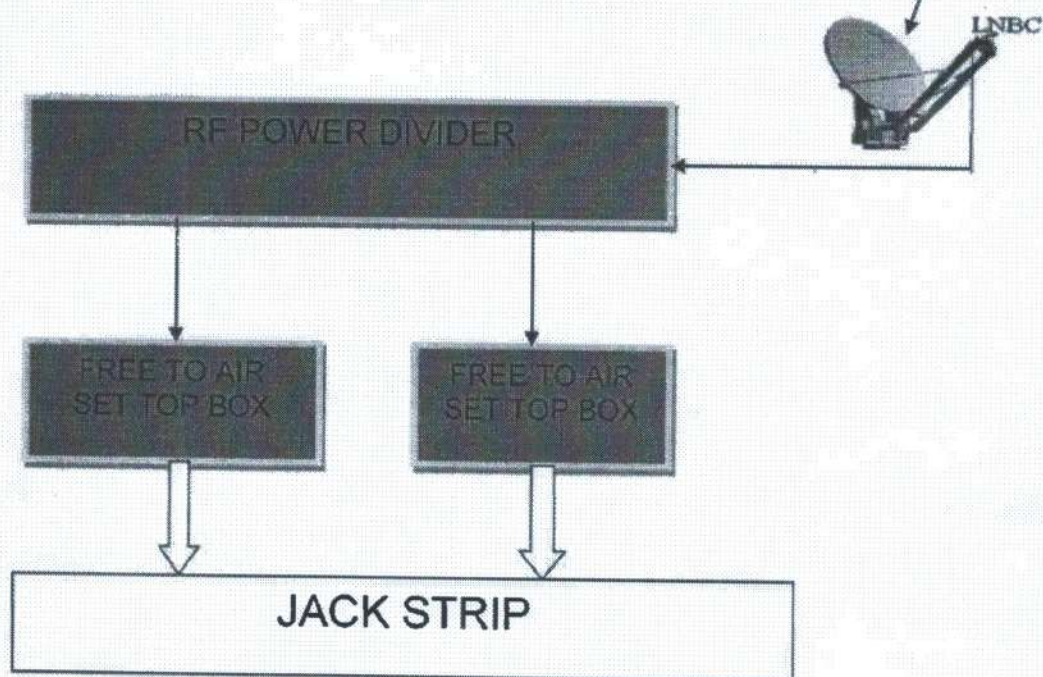
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Downlink Set up with 1.2 M PDA for receiving DD Free Dish Program

GSAT-15

Downlink on Ku-Band 1.2 M Dish




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Tender Document – Qualification Criteria

General Criteria

In this section basic guidelines / eligibility criteria are defined for the selection of the vendor.

Criteria	Description
Company Existence	Company should be registered under Companies Act, 1956 or Companies Act 2013 or a Partnership firm/LLP registered in India under Partnership Act 1932/2008 as amended and should have been in operations in India in the last 3 Years
Annual Turnover/Net Worth (CA certified documents) (Except the Covid FYs 2020-21 and 2021-22)	Average Annual turnover of 200% of estimated cost of the project in the last 03 financial years Or Cumulative Turnover of 600% of estimated cost of the project in the last 03 financial years. Or Average Annual Net Worth of minimum of 50% of estimated cost of the project in the last 03 financial years Or Cumulative Net Worth of minimum of 150% of estimated cost of the project in the last 03 financial years
Positive Net Worth/Profitability	Profitable/positive net worth in the last financial year Solvent entity
Work Experience (Self- certified with relevant documents)	One Similar work of minimum value of 80% of estimated cost of the project or Two Similar works of minimum value of 60% of the estimated cost of project or Three Similar works of minimum value of 40% of the estimated cost of project Note: Similar works will be defined based on scope of the work. Similar works may be executed with any Central and State Government agency, PSUs, Private organizations.
Non-Blacklisting Certificate	The bidder should not have been blacklisted /debarred by any Governmental/Non-Governmental Organization in India as on bid submission date
Certification if required	The Bidder should have valid ISO 9001:2008/ISO 9001:2015/ISO 27001 (relevant certification based on type of work) valid as on bid submission

- **OEM Turnover condition is exempted in this bid.**
- **These conditions are mandatory and will override already selected parameters/conditions in case any difference.**