PRASAR BHARATI
DIRECTORATE GENERAL: ALL INDIA RADIO
PLANNING AND DEVELOPMENT UNIT
NEW DELHI: 110 001

SPECIFICATIONS FOR SUPPLY, ERECTION, TESTING, AND COMMISSIONING (SETC) OF 100 W DIGITAL COMPATIBLE SOLID STATE VHF FM BROADCAST TRANSMITTER ALONG-WITH VHF FM ANTENNA, RF CABLE, AND OTHER ASSECESSORIES.

INTRODUCTION

This Specification is for Supply, Erection, Testing, and Commissioning (SETC) of 100 W DRM^{+} Compatible VHF FM Solid State Broadcast Transmitters in (1+1) configuration with associated Auxiliary Equipment, VHF FM Antenna, RF cable and other accessories to be installed at various sites in AIR network under 11th Plan.

SUMMARY OF CONTENTS

N.B.:

1. **The Tenderer should submit schedule of material /requirement of SETC without *price in the same format as given as in Section-I* of indenter Specification in the technical bid, failing which the tender shall be considered incomplete and is liable to be rejected.**

2. **Each statement of this specification has to be complied with & supported by printed technical literature , technical data sheets and technical manuals from the manufacturer of the equipment by the tenderer, to assess the merit of the offer without which tender will be considered incomplete & is liable to be rejected. The tenderer should make a detailed offer.**

3. **All the technical details, Schematic drawings must be submitted and enclosed with the tender by the tenderer failing which the tender is liable to be rejected.**

4. **The tenderer should submit the tender offer to AIR in the format given below Section wise & clauses wise in respect of all the sections of technical specifications {along with column number 5 "Ref to tender page No. by the tenderer as per the offer of the tenderer" in the format given below} in detail to assess the full merit of the offer, failing which tenderer shall be considered incomplete and is liable to be rejected.**

Sr. No. of AIR Spec. Section wise & Clause Wise (1)	Details of AIR Spec. Part/ Section wise & clause wise (2)	Make & Model No of the Equipment offered (3)	Compliance Yes/NO (4)	Ref to tender page No. by the tenderer as per the offer of the tenderer (5)	Remarks (6)
Section-I Clause wise					
Section-II Clause wise					
Section-III Clause wise					
Section-IV Clause wise					
Section-V Clause wise					
Annexure –I Inspection Details					

5. Tenderer should quote the rate / cost of individual items in the tender offer while submitting the offer for spares in commercial bid.

6. The complete Technical specification (section wise & clause wise) compliance statement along with schedule of requirements/materials (unpriced) must be signed & stamped on each page by the Original Equipment Manufacturer(OEM) of the equipment in the tender document including the clarifications, if any, asked by the Indenter. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also sign & stamp each page of the complete Technical specification (section wise & clause wise) compliance statement including the clarifications, if any, asked by the Indenter, failing which the tender shall be considered incomplete and is liable to be rejected. The OEM & tenderers should fill up their name in CAPITAL LETTERS, full address with pin code , phone number, fax number, e-mail address and with their full signatures.

7. The complete tender shall be page numbered.

8. Optional items will not be considered for ranking purposes.

9. The authorization and Guarantee must be given by Original Equipment Manufacturer(OEM) on their letter head pad duly signed & stamped on each page. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also give Guarantee on their letter head pad duly signed & stamped on each page, failing which the tender shall be considered incomplete and is liable to be rejected. The authorization and Gaurantee will be considered from Original Equipment Manufacturer(OEM) and Guarantee from tenderer Only. The authorization and Guarantee other than OEM and guarantee other than tenderer in the tender will not be considered, failing which the tender shall be considered incomplete and is liable to be rejected.

10. Any change in the AIR Technical Specification format or language or in parameters or of any other nature including the deletion of technical specification clause, words, lines in the technical compliance statement as mentioned in clause 6 as above by the Original Equipment Manufacturer/ tenderer will not be acceptable to Indenter and the tenderer is liable to be rejected.

11. Tenderers may please note that no clarifications may be asked by the Indenter regarding Indenter technical specifications, so all the tenderers may submit their tender offers accordingly.

28th May, 2010

SECTION-I

SCHEDULE OF REQUIREMENTS/MATERIALS (UNPRICED) FOR SETC OF 100 W DRM+ COMPATIBLE SOLID STATE VHF FM BROADCAST TRANSMITTER ALONG-WITH VHF FM ANTENNA, RF CABLE, AND OTHER ACCESSORIES FOR ONE SET

1.1 AIR is interested to procure on SETC basis 100 W DRM+ Compatible solid state VHF FM Transmitter in (1+1) configuration at various places. These 100 Watt DRM+ Compatible transmitter units will be as per the specifications of AIR. The transmitters should be rugged, reliable and stable in operation under Indian tropical condition.

1.2 The FM Transmitter Units are to be supplied as "complete system" including, cooling system (air cooled with built-in fan unit), Automatic Changeover Unit (ACU), UPS, PDP (Power Distribution Panel) interconnecting cables, installation materials etc. and Remote Control & Monitoring System, as per the Schedule/requirement of Material in Para 1.6, below.

1.3 It will be the responsibility of the tenderer to ensure that the system is complete in all respects.

1.4 A detailed block schematic diagram for the entire FM Transmitter system in 1+1 configuration with all its constituent items should be provided with the offer.

1.5 The layout of the various equipment in the Programme Input equipment cum Transmitter rack as per AIR Specification should be provided with the offer.

1.6 SCHEDULE OF REQUIREMENTS / MATERIALS UNPRICED)
{The tenderer must quote all items} Tenderer should quote the rate / cost of individual items/units/job in the tender offer while submitting the offer.
(FOR SETC ONE SET OF TRANSMITTER & ASSOCIATED EQUIPMENT)

S no.	Description	Qty
1.6	**SETC** :	
1.6.1	**Supply of 100 W DRM+ Compatible VHF FM Transmitter** in (1+1) configuration (including in-built Exciter containing both analogue and digital modules, Stereo Generator & Encoder Card) with Automatic changeover Unit (ACU) as per AIR specification. (Each set shall comprise of 2 nos. of independent 100 W DRM+ Compatible VHF FM transmitter Units)	1 Set Complete
(i)	Erection, Testing and Commissioning of new **100 W DRM+ Compatible VHF FM Transmitter** in (1+1) configuration as per specification in the existing building.	1 Job
1.6.2	Supply of Foam Dielectric **RF Co-axial Cable** for feeding to Antenna with suitable connectors complete as per AIR specification. (Rate per Unit length to be quoted and Exact length will be intimated at the time of placement of order) *(For ranking purpose)	70 M*
(i)	EIA flange connectors	2 numbers
(ii)	Hoisting stockings.	2 numbers
(iii)	Earthing kit (As per RF Cable manufacture's recommendations)	**As per RF Cable manufacturer's recommendations**
(iv)	Wall gland/ feed through assembly with accessories	1 number
(v)	Cable clamps with nut, bolt washer (adjustable width) and associated accessories. Actual sets will be intimated at the time of placement of order as per length of RF	70 Sets*

	cable.	
(vi)	Any other accessories offered for the completeness of the system.	1 lot
(vii)	Erection/hoisting, Testing and Commissioning of new RF Co-axial cables as per specification on the existing tower.	1 Job
1.6.3	**Supply of 250 watts Dummy Load** with suitable line section and mounted in Programme Input Equipment cum Transmitter Rack with suitable RF feeder Cable as per AIR specification.	1 set complete
1.6.3.1	Erection, Testing and Commissioning of 250 watts Dummy Load Complete as per 1.6.3 above.	1Job
1.6.4	**Supply of 2 Bay VHF FM Side Mount Antenna System** as per AIR specification with complete installation material and mounting fixtures.	1 Set complete
(I)	**Erection, Testing and Commissioning of 2 bay VHF FM side mount Antenna System** as per specification on the existing tower after unpacking, physical checking/ necessary care for the safety of the antenna system like cleaning, ingress of moisture etc. at site before erection in accordance with the Erection manual of the manufacturer along with hauling of the complete antenna system.	1 Job
1.6.5	**Supply of 1 KVA Online Uninterrupted Power Supply System {UPS} in (1+1) mode** as per AIR specification along with Maintenance free Batteries for 30 Min. Backup (at full load of 1 KVA), necessary power cables and mounted in Equipment rack.	1 Set complete
1.6.5.1	Erection, Testing and Commissioning of KVA online UPS complete as per 1.6.5 above.	1 Job
1.6.6	**Supply of Programme Input Equipment cum Transmitter Rack:** **This rack** shall house 100 W DRM$^+$ VHF FM Transmitters in 1+1 Configuration along with ACU,UPS, Dummy load and shall have two numbers of Stereo Jack Strip/ Audio patch Panel for analog mono signal, analog stereo L and R signals, SCA data and two numbers of Jack Strip/ Audio patch Panel for digital AES/EBU signal inputs and DRM$^+$ **PI Rack shall be provided with** cable trays**,** wiring, necessary modulating inputs level controls in steps, D/A converter, repeat coils, tag blocks, terminal strips, BNC connectors, facility to measure/ monitor levels at various points in the programme chain with a dual VU(PPM) meter and a selector switch and bar graph display, ampli speakers (two numbers) with mounting arrangement, distribution amplifier analogue stereo and distribution amplifier digital ,ventilation arrangement including accessories complete as per AIR specifications.	1 Set complete
1.6.6.1	Erection, Testing and Commissioning of Programme Input Equipment cum Transmitter Rack complete as per 1.6.6 above.	1 Job
1.6.7	Supply of Remote Control & Telemetry Equipment for a distant/centralized location via ISDN/Digital lines/TCP-IP / PSTN network /Dial up connection telephone lines as per specification.	
(i)	Computer system complete as required	2 Sets
(ii)	Remote Control System complete as required	1 Set
(iii)	Wiring Interface Unit	1 Set
(iv)	Dial line Suppressor	1Set

(v)	External Modems	2 Sets
(vi)	Complete software, hardware items, accessories, single/ multi core cables, RF cable connectors, Humidity/temperature transducer, 2/3 Core Shielded Teflon cable , Extension cables etc.(Items wise details of offered material including part number are to be given by the tenderer)	1 Set
(vii)	Any other accessories offered for the completeness of the system. (Items wise details of offered material including part number are to be given by the tenderer)	1 lot
1.6.7.1	Erection, Testing and Commissioning of Remote Control & Telemetry Equipment complete as per 1.6.7 above.	1 Job
1.6.8	Inspection at System Integrator's Works. Tenderer is required to clearly mention the name of place of System Integrator's Works.	1 Lot
1.6.9	Technical manuals for Installation, testing, commissioning , Operation & Maintenance, including Theory of operation and fault diagnosis printed and duly bound for 100 W DRM^{+} VHF FM transmitter (1+1), automatic change over unit, 250W Dummy Load and thru line power meter etc., UPS, 2 bay VHF FM side mount antenna, RF Coaxial foam dielectric cable, Programme Input Equipment cum Transmitter Rack & Remote Control & Monitoring System - along with one soft copy on CD & Inspection Report of the inspection carried out at Tenderer's System Integrator's Works as per distribution given below.	
1.6.9.1	For DE (Proj.) P&D Unit, DG:AIR { Within Two Months of Supply order) (irrespective of number of transmitters to be ordered)	1 set
1.6.9.2	For **Consignee** {Within Two Months of Supply order).	2 Sets
1.6.9.3	For the following officers: 8 Nos. of Technical manuals are to be supplied) { To be supplied along with the equipment}. (irrespective of number of transmitters to be ordered)	8 sets
	(i) DE (Proj.),P&D Unit, DG:AIR - 1 set	
	(ii) Zonal Offices (Project Wing) - 5 sets	
	(iii) Technical Library, - 1 set P&D Unit, DG:AIR	
	(iv) Staff Training Institute - 1 set (Technical)	
1.6.10	Any other item/accessories offered for the completeness of the system (Items wise details of offered and included material with part numbers ,if any are to be given by the tenderer)	1 Lot

SCHEDULE OF REQUIREMENTS / MATERIALS UNPRICED)(OPTIONAL)

THESE WILL NOT BE CONSIDERED FOR RANKING PURPOSE)**{ The tenderer must quote all items}** Tenderer should quote the rate / cost of individual items/unit/spares in the tender offer while submitting the offer for spares (FOR ONE SET OF TRANSMITTER & ASSOCIATED EQUIPMENT)

S NO.	Description	Qty
1.6.11	List of recommended spares and any other accessories. (Items wise details of offered material including part numbers, if any are to be given by the tenderer). In case of kits, full item wise details of kits are to be provided. The tenderer shall quote for one set of manufacturers recommended list of spares for Transmitter Unit based on the actual failure pattern. These may include following: a) PA transistors b) Low power semi conductor devices c) PCB's modules d) Switches/ Fuses/Meters e) Discrete items like resistors, capacitors and inductors and control relays. f) Spare Modules like PA, Spare power supply unit and control unit. g) Blower / Fan with motor. h) MOV's for Power supply Unit. i) Other miscellaneous items.	1 Set

1.7 The following are excluded from the scope and will be provided by AIR:

a) Construction of necessary buildings, all masonry works and materials connected therewith, masonry Foundations, Cable Trenches and under floor ducts (Dimensions for which are to be furnished by the Transmitter supplier) if any.
b) Electric supply connection for the transmitting equipment, at a single point.
c) Tower for mounting Antennae.
d) Cable tray, if required.
d) Furniture and fittings not forming a part of the transmitter equipment.

SECTION-II

GENERAL TERMS AND CONDITIONS

2.1 INFORMATION TO BE SUPPLIED:

2.1.1 LANGUAGE/ UNITS:

All information supplied by the tenderer and all markings, notes, designation on the drawings and associated write-ups including Instruction Manuals shall be in "English language" only. All dimensions and units on drawings and all references to weights and measures and quantities shall be in metric units.

2.1.2 INFORMATION TO BE SUPPLIED WITH THE TENDER :

(The tender and the associated information should be submitted in duplicate.)

a) A **Compliance Statement** to the complete specification of AIR, para wise, for each clause.
b) Complete **printed technical literature/data sheet/ detailed information** including technical manual of transmitter and associated auxiliary equipment/item as per SECTION-I from the Original Equipment Manufacturer (OEM) in support of compliance statement should be furnished for all the items of the tender, to assess the full merit of the offer, without which the tender will be considered incomplete and is liable for rejection
c) Descriptive information giving complete details of Equipment offered.
d) Detailed Schedule of Requirement/Materials offered for SETC of the Transmitter, Auxiliary Equipment & accessories for each transmitter should be in conformity with SECTION-I without any change in format without price (un-priced) failing which the tender shall be considered incomplete and will be liable for rejection. **The tenderer must quote all items.**
e) Country of origin, make, type, model number in respect of all items should be submitted along with the name & address of their vendors.
f) Layout of equipment of Transmitter including dimensions and photographs of the interior of the Transmitter.
g) Information and characteristics of all high power semiconductor devices used in the Equipment.

2.1.3 INFORMATION TO BE SUPPLIED BY THE TENDERER AFTER AWARD OF SUPPLY ORDER :

One set of Technical manuals {for Installation, testing, commissioning , Operation & Maintenance, including Theory of operation and fault diagnosis printed and duly bound for 100 W DRM^{+} VHF FM transmitter (1+1), automatic change over unit, 250W Dummy Load and thru line power meter etc., UPS, 2 bay VHF FM side mount antenna, RF Coaxial foam dielectric cable, Programme Input Equipment cum Transmitter Rack & Remote Control & Monitoring System - along with one soft copy on CD} shall be supplied to “The Director Engg. (Projects), P & D Unit, DG:AIR, New Delhi-110001”

2.1.4 INFORMATION TO PRECEDE DESPATCH OF EQUIPMENT:

Following information should be supplied to the Director Engg. (Projects), P & D Unit, DG:AIR and each of the consignee, two months prior to dispatch of Equipment:

a) Detailed list of equipment under dispatch.
b) Photograph showing location of components in the various units and sub units with item numbers marked thereon.

2.1.5 INFORMATION TO BE SUPPLIED ALONGWITH EQUIPMENT:

Technical manuals {for Installation, testing, commissioning , Operation & Maintenance, including Theory of operation and fault diagnosis printed and duly bound for 100 W DRM$^+$ VHF FM transmitter (1+1), automatic change over unit, 250W Dummy Load and thru line power meter etc., UPS, 2 bay VHF FM side mount antenna, RF Coaxial foam dielectric cable, Programme Input Equipment cum Transmitter Rack & Remote Control & Monitoring System - along with one soft copy on CD } shall be supplied as per SECTION-I.

2.2 COMPLETION OF SETC: Nine months . The tenderer shall start SETC within 4 months after placement of order and shall be completed before or up to 9 months from the date of placement of purchase order.

2.3 PACKING AND PACKING LISTS

All the equipment should be securely and properly packed to withstand transit hazards. Equipment packing shall be fit for sea freight and incorporate adequate protection against ingress of moisture. Packing slips giving details of the items contained in each package shall be placed inside the package in a water proof envelop to enable easy identification and should contain cross references to item/part numbers of installation drawings/components lists. Copies of packing slips and other details should be sent separately to respective consignee and also to The Director Engg. (Projects), P & D Unit , DG: AIR, New Delhi.

2.4 INSURANCE AND MARINE RISKS ETC.
Please refer to commercial terms.

2.5 GUARANTEE:

Tenderer shall submit with his tender an undertaking to accept the following guarantees:

2.5.1 A guarantee that the equipment supplied will be in accordance with these specifications, varied only to the extent stated in his tender and agreed to in the contract.

2.5.2 A guarantee to make good within 30 days at tenderer's expense any component which becomes defective under normal operating conditions within 18 months from the date of acceptance of Equipment at respective site or 12 months from the date of commissioning at site whichever is earlier.

2.5.3 A guarantee to supply all components for a period of ten years from the date of acceptance of Transmitter at site, at rates at which these are being supplied by him to other customers

and also should match prices of original manufactures of these components prevailing at that time.

2.5.4 If at any stage during next 10 years, the manufacturer stops production of this model of transmitter, he shall intimate All India Radio in advance to enable the latter to stock the critical items.

2.6 INSPECTION

2.6.1 Inspection/Field trial/ testing of one Sample unit shall be carried out at AIR site by representatives of DG:AIR as per details in ANNEXURE-I.

2.6.2 Detailed inspection of the balance quantity will be carried out at System Integrator's works by representatives of DG:AIR as per detail given in ANNEXURE-I.

Complete specifications and details will be checked and value of all parameter values will be measured. The acceptance to this clause ANNEXURE-I has to be clearly stated by the Tenderer.

Prior intimation for carrying out Inspection at System Integrator's works is to be given by the tenderer to the indenter at least 6 weeks in advance. Inspection period will be 12 working days. Expenses for inspection charges, if any. is to be quoted by the tenderer. The expenditure towards To and Fro journey, lodging, boarding & DA in respect of Inspector will be borne by AIR.

2.6.3 Inspection at Tenderer's **System Integrator's works** :Inspection for Transmitter and other associated equipment will be carried out by the representatives of DG:AIR at Tenderer's System Integrator's works before dispatch to site.

Before giving the call for inspection to the Indenter, the Tenderer should satisfy themselves that the offered equipment etc. are as per the AIR Specification. Tenderer should submit one set of complete performance figures of all equipment as per SECTION-I of AIR Specification to the Indenter before Inspection at Tenderer's System Integrator's works by the Indenter.

2.6.4 **The tenderer will clearly state and mention the name of place of the tenderer's System Integrator's works in the tender offer, failing which the tenderer, will be considered incomplete and is liable to be rejected.**

2.6.5 OEM test certificates duly stamped and signed by OEM in respect of all equipment as per SECTION-I are to be submitted by the tenderer to the indentor before giving call for inspection.

2.6.6 Acceptance Test Procedure (ATP) will be submitted by the Tenderer within one month of placement of order for approval of Indentor in respect of Transmitter and other equipment /items as per Section –I for the approval of Indenter. This will include all tests so as to assess the performance of the equipment as per specifications.

2.6.7 Inspection will be carried out as per approved ATP.

2.7 INSTALLATION,TESTING AND COMMISSIONING

The Transmitter and associated equipment and accessories will be installed, tested and commissioned by Tenderer in accordance with the instructions and drawings of manufacturer and as per approved ATP.

2.8 AFTER SALES SERVICE

SERVICE FACILITY: The Tenderer shall specify the repair/service facility available for the equipment in India with address, Phone/Fax nos., E-mail etc. The supply of transmitter may require after sales services. Therefore full details of facilities for carrying out after sale service may be given.

2.9 In support of Tenderer's claim an "up-to-date" list of their customers including their full address, Telephone/Fax No & E-mail address is required to be submitted along with complete set of actual performance figures i.e. Performance measurement taken on transmitter, RF cable and antenna are to be furnished along with the tender.

The offered equipment/items as per SECTION –I shall be field proven for satisfactory operation. A supply record of transmitter, RF cable and antenna year wise in the last 2 years may be enclosed by the tenderer.

2.10 POWER SUPPLY FOR ALL EQUIPMENT

(i)	Operating Line voltage	AC Single Phase : 230 Volts $\pm$ 10 %
(ii)	Frequency	50 Hz $\pm$ 4%
(iii)	Power factor	Better than 0.9.

2.11 AMBIENT CONDITIONS FOR ALL INDOOR EQUIPMENT:

	Operating temperature range	0 ºC to 45 ºC
	Relative Humidity	95% non –condensing.
	Working altitude	upto 3000 meters AMSL

2.12 The Tenderer shall make his own arrangements for providing accommodation for his workmen at site along with storage of equipment/ material including the safe custody at site.

2.13 The Tenderer should conform to all local State laws/Central laws and regulations amended up to date concerning labour and their employment as applicable. The insurance etc of the labourers shall be the responsibility of the Tenderer including any kind of pre /post action and consequences relating to above insurance etc.

2.14 The Tenderer shall indemnify and hold harmless the Indenter/purchaser, his employees and purchaser Employees from any liability that may arise out of infringements of patents and copy Rights associated with the design, fabrication, erection of any equipment etc.

2.15 The Tenderer is required to submit details of his previous experience in similar supply of such equipments i.e. the capacity of their organizational setup.

2.16 After completion of SETC work the Tenderer shall remove dust, dirt, debris and leave the building/premises in a clean condition.

2.17 Erection, testing and commissioning (ETC) of above "set-up" as per specification shall be done under the supervision of Qualified Engineer of OEM duly trained and certified by OEM of main equipment i.e. transmitter and antenna at site..

2.18 The successful tenderer should 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 ,testing & commissioning (as per SETC specification) in the course of such erection and throughout the guarantee period.

2.19. The successful tenderer should indemnify and hold harmless the purchaser against claims in respect of injury to any person howsoever arising from the erection (as per SETC specification) in the course of such erection and throughout the guarantee period.

SECTION III

DETAILED TECHNICAL SPECIFICATIONS FOR SETC OF 100 W DRM+ COMPATIBLE VHF FM SOLID STATE TRANSMITTER UNIT IN (1+1) CONFIGURATION WITH AUTOMATIC CHANGEOVER UNIT

3.0 Brief Description:

Two nos. of 100 Watts DRM+ Compatible FM transmitter units in 1+1 auto mode shall be supplied with each set of Transmitter. The operation in (1+1) mode is done by an Automatic changeover Unit (ACU), the detailed specifications for which are given in Section-V.

3.1 100 watts Transmitter Unit:

3.1.1 The FM Transmitter unit shall be consistent with the latest state-of-the- art technology using most rugged reliable components, circuit design and shall be suitable for unattended operation. It should be user friendly and simple to operate.

3.1.2 All equipment assemblies, sub assemblies, PCB's, devices and components should be of latest field proven design. All materials used in the FM Transmitter System should be of Professional Broadcast Quality.

3.1.3 The Transmitter system quoted must conform to the latest international standards of safety and EMC. The conformance to such standards (indicating Standard's Name and Number) must be stated in compliance statement.

3.1.4 The Transmitter unit shall be suitable for FM monophonic and stereophonic/ multiplex transmission and in the frequency range from 88 MHz to 108 MHz.

3.1.5 The manufacturer of the Transmitter and its ancillary Units should have at least 2 years experience in the field. The Transmitter and other ancillary units shall be characterized by high reliability, high MTBF. It should be field proven.

3.1.6 The Transmitter shall satisfy the requirement of ITU Radio Regulations. It should comply with IEC 215 Safety Standards so as to eliminate electrical hazards to the personnel.

3.1.7 Transmitter equipment shall have compact design. All metal works shall be adequately protected against rust and corrosion and shall be non-inflammable and fire retardant.

3.1.8 The transmitter should be DRM+ Compatible.(As per ETSI standard amended up to date)

3.2 Facilities:

3.2.1 100 Watt DRM+ Compatible (BAND II) VHF FM Transmitter in(1+1) configuration shall have in-built Limiter and low pass filter (30 Hz to 15 kHz) at audio input to ensure distortion free transmission irrespective of source level. The transmitter shall have in-built Exciter, Stereo Encoder card with each 100 Watt DRM+ Compatible FM transmitter along with Automatic Changeover Unit (ACU) in (1+1) automatic mode with manual override.

3.3 Circuit Design:

3.3.1 The Transmitter will consist of solid state devices. All stages i.e. Exciter, Amplifier, harmonic filters, etc. should be of Broad Band design for operating in the entire VHF frequency band of 88 to 108 MHz without need of any tuning/change of components.

3.4 Exciter :

3.4.1 The Exciter should have Digital Signal Processing (DSP). It should be compatible for mono and Stereo Broadcasting using pilot tone system conforming to ITU-R Recommendations 450 –1.

3.4.2 It shall have provision for taking analog mono signal, analog stereo L and R signals, analog stereo encoded, composite signals, SCA and digital AES/EBU signal inputs.

3.4.3 It should display various parameters like forward and reflected power, frequency deviation, input-audio level, DC voltages & currents, on its panel meters or LCD display

3.4.4 It should be Synthesized with easy channel selection of minimum 100 KHz spacing i.e. can be operated on any of the FM channels from 88 MHz to 108 MHz in VHF Band-II. The Exciter should be **"Frequency agile"** --- not requiring any tuning over its entire specified operating frequency range.

3.4.5 All the input modules mentioned in 3.4.1 & 3.4.2 must be included in the offer of Exciter i.e either inbuilt or separate input modules to be used in one or same slot (Digital stereo Input/ Output AES/EBU module & Analogue stereo Input /Output modules).

3.5 Power Amplifier (PA):

3.5.1 The Power Amplifier (PA) shall be of wide band design for operation in the entire VHF frequency band of 88 to 108 MHz without tuning / change of components. The PA shall be rugged in design and will consist of MOSFET device incorporated in a separate amplifier board. The PA shall be provided with RF monitor located on Front Panel to monitor output RF Power.

3.5.2 The PA shall have built in protection against high Forward and Reflected Power (Short and Open loads). PA shall also be protected against, over current, over temperature, overdrive and airflow failure.

3.6 Power Supply:

3.6.1 The Transmitter shall be complete in all respects. AIR shall provide power supply system at a single point. All the power supply required for the Transmitter and its auxiliary equipment should be derived from the same point.

3.6.2 The Transmitter shall have in built voltage stabilizer for taking care of specified variations in the main supply. The rectifier and filter circuits should be able to take care of voltage surges on power lines. Power supply unit shall be protected against over temperature, over current and over voltage etc.

3.7 Protection System:

3.7.1 Adequate protection system shall be provided to safe guard the transmitter from damage under fault conditions. The protection system should be fast acting to safe guard the components.

3.7.2 The transmitter should be able to protect itself if the antenna cable is cut / removed. When connection is re-made, the transmitter should work under the same parameters (frequency, power…) automatically.

3.7.3 Following are the typical requirements in this regard:

a) Over- load protection for Transmitter as well as PA.

b) Protection against over temperature on heat sinks.
c) Protection against high VSWR including open and short conditions at output.
d) Immediate power fold-back under severe/damaging fault conditions. Details of fold-back to be provided.
e) Transmitter should be protected against lightning by providing Static discharge path and details to be given in the tender.

3.8 Control and Interlocking:

3.8.1 The control and interlock circuits shall ensure protection and operational safety of the equipment and personnel. They shall allow the Transmitter to be switched in or out of service in a proper sequence only by operation of switch buttons. Switching in of the auxiliary units such as Dummy Load, reject loads, Blower/ fan etc. shall be suitably interlocked.

3.8.2 Details of control/monitoring/protection unit should be given. Stages of sequential operations of switching 'ON' and 'OFF' of the Transmitter shall be indicated. In addition, tripping and power fold back shall remain indicated until reset.

3.8.3 It shall be possible to switch off the entire Transmitter in emergency with operation of a single button.

3.9 INSTRUMENTATION AND INDICATIONS:

3.9.1 The Transmitter shall be provided with LCD display for fully monitoring the Transmitter operation. All-important parameters required for fault finding should be displayed. These are indications for VSWR, AF input level for each channel, deviation, DC voltage etc. The details of these should be enclosed with tender. Transmitter status and fault conditions shall be indicated by color coded LED's.

3.9.2 Transmitter units shall be provided with Non Volatile Random Access Memory (NV RAM) with Battery Backup to save all parameters when Transmitter is switched – OFF.

3.9.3 Following connectors /socket/ controls/ input level monitoring shall be provided, preferably on Front Panel :

a) BNC socket for RF Monitor output.
b) Input level of Mono/ MPX signal.
c) Input level of left and right channels.
d) Output power level.
e) LCD back lighted display.
f) Navigation buttons to browse/selection/operation of menus with parameter validation button.
g) LED's for high RF, high VSWR indications.

3.9.4 Following connectors /socket shall be provided, preferably on Back Panel :

i. One earthling clip (GROUND).
ii. Mains input socket with a Start/Stop switch.
iii. Female N-type socket for RF output.
iv. Female BNC socket for Multiplex / Mono input.
v. Female BNC socket for Auxiliary multiplex input.
vi. XLR socket for Balanced Analog L/ R audio Input.
vii. BNC socket for 19 kHz and multiplex output.

viii Suitable & compatible interface connectors for Remote control & monitoring

3.9.5 The Transmitter shall be supplied with a Dummy load of 250 Watts capacity with suitable line sections and shall be mounted in Equipment Rack with suitable RF Feeder Cable.

3.10 COOLING SYSTEM:

Full details of air cooling system shall be given. Temperature rise of cooling air for rated power output is to be indicated.

3.11 SPARES : (Optional)

Transmitter: The tenderer shall quote for one set of manufacturers recommended list for spares for Transmitter Unit based on the actual failure pattern. These shall also include following:

a) PA transistors
b) Low power semi conductor devices
c) PCB's modules
d) Switches/ Fuses/Meters
e) Discrete items like resistors, capacitors and inductors and control relays.
f) Spare Modules like PA, Spare power supply unit and control unit.
g) Blower / Fan with motor.
h) MOV's for Power supply Unit.
i) Other miscellaneous items.

Price of each item shall be quoted separately.

SECTION IV

TECHNICAL PARAMETERS OF THE TRANSMITTER

4.1 GENERAL

4.1.1	Frequency Range	88 to 108 MHz
4.1.2	Nominal Frequency deviation	±75 KHz (peak)
4.1.3	Maximum Frequency Deviation	±100 KHz (peak)
4.1.4	Frequency Setting	Direct from front panel in 10 kHz increments.
4.1.5	Class of Emission	180KF8E
4.1.6	Stereo transmissions	Acc. to ITU-R Rec. 450 (Pilot tone)
4.1.7	Pre-emphasis	0, 50 micro seconds (selectable).

4.2 INPUTS

4.2.1	Modulating input signal	Exciter should accept analog mono, analogue stereo (left and right) / encoded stereo signals (MPX), SCA inputs and AES / EBU digital inputs. It should be capable for mono and Stereo Broadcast using pilot tone system conforming to ITU-R, Rec.450
4.2.2	Input impedance (Analog) Input impedance (Digital)	600 ohm or greater, selectable(for mono) 2K ohm or greater selectable(for stereo) 110 ohm
4.2.3	Analog and Digital input level for ± 75 KHz (peak) deviation:	**ANALOG AUDIO INPUT:** At 1 KHz , 0 dBu Input Level Adjustable from -6 dBu to +6 dBu (adjustable). **DIGITAL AUDIO INPUT:** At 1 KHz Input Level Adjustable from -20.0 dBFS to 0 dBFS .

4.3 RF OUTPUT

4.3.1	Output power (RF)	: ≥100 W
4.3.2	Output Impedance	50 Ohms. (Unbalanced)
4.3.3	Output connector	N (F) connector (Rear)
4.3.4	Permissible VSWR	a. 1.5: 1 on full power; b. Automatic power reduction beyond 1.5:1. c. Transmitter should be protected for short and open circuit conditions.
4.3.5	Harmonic and Spurious Signal Suppression.	Within the limits as per Radio Regulations & ITU-R Recommendations. Actual values to be indicated

4.3.6	Maximum Frequency Tolerance	As per ITU-R
4.3.7	Asynchronous AM S/N *unweighted*, referred to 100% AM modulation at 400 Hz , 50 micro seconds Pre-emphasis and without FM modulation.	Better than 55 dB
4.3.8	Synchronous AM S/N at reference to 100% AM modulation at 400 Hz , 50 micro seconds Pre-emphasis with FM modulation at 75 KHz Deviation	Better than 50 dB
4.3.9	Overall efficiency	$\geq$ 50 %

4.4 MONO OPERATION :

4.5.1	S/N ratio at 75 KHz deviation (30 Hz to 15 KHz base band) rms, unweighted	$\geq$ 70 dB
4.5.2	THD + N	Better than 0.2 %
4.5.3	Amplitude response (30 Hz to 15 kHz)	Better than $\pm$ 0.5 dB
4.5.4	IMD SMPTE 60 Hz / 7 KHz , 4:1 , +4dBu	Better than 0.2 %

4.5 STEREO OPERATION:

4.6.1	Stereo separation (sine wave) (30 Hz to 15 kHz)	Better than 50 dB
4.6.2	Linear Cross Talk referred to 100% modulation (30 Hz to 15 KHz)	Better than 50 dB
4.6.3	Non-linear Cross Talk referred to 100 % modulation.	Better than 55 dB
4.6.4	S/N ratio at 75 KHz deviation (L or R) (30 Hz to 15 KHz Band Width) rms, unweighted	Better than 70 dB
4.6.5	THD + N(L or R)	Better than 0.5 %
4.6.6	IMD SMPTE (L or R) 60 Hz / 7 KHz , 4:1 , +4dBu	Better than 0.2 %
4.6.7	Amplitude Response (30 Hz to 15 kHz)	$\pm$ 0.5 dB or better.
4.6.8	Pilot Tone Stability	As per ITU(R)

4.6 WIDEBAND COMPOSITE OPERATION:

4.4.1	FM S/N ratio at 75 KHz deviation rms, unweighted	Better than 70 dB
4.4.2	Total Harmonic Distortion + Noise	Better than 0.2 %.
4.4.3	Amplitude response (30 Hz to 100 kHz)	Better than ± 0.5 dB

4.7 Compatibility of the transmitter for DRM^{+}: As per ETSI standards (amended up to date)

SECTION V

TECHNICAL SPECIFICATIONS OF THE AUTOMATIC CHANGEOVER UNIT, EQUIPMENT RACK, UPS, ANTENNA AND RF CABLE

5.1 AUTOMATIC CHANGEOVER UNIT (ACU):

5.1.1 One Automatic Changeover Unit (ACU) for operating the Transmitter in (1 + 1) mode to facilitate automatic switch "ON" of the 2nd Transmitter Unit in case of failure of RF output of 1st Transmitter Unit shall be supplied with each set.

5.1.2 Any one of the 100W Transmitter unit shall be selectable as master or slave automatically in active stand by mode. When the RF power of the 1st transmitter goes down by more than 3 dB, it should be sensed as a failure to switch to second transmitter automatically. In case of failure of the complete system, three trials at interval adjustable up to 10 minutes shall be done before final switch off.

5.1.3 The audio shall be fed to both the Transmitter Units from one external source (satellite Receiver Ku band) and therefore, distribution amplifier {as per 5.2 (iii)} for proper arrangement of splitting the audio after due amplification in Changeover Unit and permanent feeding to both the Transmitters is to be provided. In case of audio failure, an indication shall be displayed in the front panel of ACU.

5.1.4 The complete switching sequence of transmitter and associated equipments may be provided with the technical offer.

5.1.5 Arrangement shall be made for bypassing the ACU in case of its failure so as to enable operating personnel to operate the transmitter in the manual mode.

5.1.6 Power Supply to the ACU shall be fed through the UPS.

5.2 Programme Input Equipment cum transmitter Rack :

(i) Programme Input Equipment cum transmitter Rack shall house 100 W DRM^+ VHF FM Transmitters in 1+1 Configuration along with ACU,UPS, Dummy load and shall have two numbers of Stereo Jack Strip/ Audio patch Panel for analog mono signal, analog stereo L and R signals, SCA data and two numbers of Jack Strip/ Audio patch Panel for digital AES/EBU signal inputs and DRM^+

(ii) PI Rack shall be provided with cable trays, wiring necessary modulating inputs level control in steps, D/A converter, repeat coils, tag blocks, terminal strips, BNC connectors, facility to measure/ monitor levels at various points in the programme chain with a dual VU(PPM) meter and a selector switch and bar graph display, ampli speaker (1+1) with mounting arrangement, ventilation arrangement including other accessories as per AIR specifications.

(iii) The audio shall be fed to both the Transmitter Units from one external source (satellite Receiver Ku band) and therefore, distribution amplifier for proper arrangement of splitting the audio after due amplification in Changeover Unit and permanent feeding to

both the Transmitters is to be provided in Programme Input Equipment cum transmitter Rack

5.2.1 General: It shall be a standard 19" Rack conforming to professional standards of sound broadcasting for mounting equipment and accessories having Lockable door and side panels, Front Glass Panel. The Programme Input Equipment cum Transmitter Rack shall be DRM^{+} Compatible VHF FM Broadcast.

5.2.2 Mechanical

(i) Construction Details : The rack shall be sturdily constructed from aluminum extrusions of suitable size fastened to form framework properly reinforced with stiffeners, suitably welded. The front site of the rack shall be open for mounting equipments. The rear side of the rack shall be provided with a single leaf, hinged removable type door and handle with latching arrangement. The sides should be covered with panels which can be screwed to the frames. These panels should be reinforced with stiffeners. The Racks shall have holes for grouting bolts on the bottom plate. The thickness of the sheet used for sides of the rack and door shall be 1.6mm and 1.3mm respectively. The overall dimensions of the rack may be approximately 2200 mm (H) x 600 mm (W) x 700 mm(D).

(ii) Mounting Arrangement : Panel mounting rails with pre-drilled and tapped holes corresponding to metric thread 'M-S' are to be provided at the front. Suitable mounting arrangement is to be made at the top and the bottom of the frames for mounting the rails at different intervals. Pre-drilled holes shall be such that it shall be possible to mount any standard equipment of width 483mm and height 1U to 4U. Necessary equipment support angle to relive strain on holding screws wherever required shall be provided. Any equipment which is less than standard 19'' width, shall be provided with rack mount kit.

(iii) Style/Strips or Trims : To render sleek look style, strips/trims are to be provided on the front side which will cover the drilled and holes on the mounting rails.

(iv) Ventilation Arrangement : Louvers are to be provided throughout the length of rear door of the rack. provision is required to be made for mounting a cooling fan of minimum 100 CFM at the top. Separate cooling system for UPS at the bottom of the rack shall be provided.

(v) Finish of the Rack : The inside and outside of the rack shall be spray painted with dark grey after necessary anti rust treatment.

5.2.3 Jack Strip Field/ Audio patch Panel :

a. Standard Jacks Strip of robust construction and positive action shall be used. Input and output of all the equipments and the programme lines shall be brought to the Jack Field. Few jack points shall be used as check points without disrupting the signal flow & few to be left as spares for the tie lines, parallel points and for future use. The jack strip panels shall be open able on front sides without strain on connector and wiring.

b. Jack Strip construction: The jacks shall have preferably a nickel plated brass frame, with nickel-silver springs and gold-silver/ Palladium contacts. The jacks shall be mounted on 20mm centers. The Jacks shall be as per DIN specifications.

c. Contact arrangement : Each jack shall be a 20 point jack, providing a break circuit (on both wires) and an isolated earthing lug.
d. Indicating strip: A strip covered with transparent plastic shall be provided above the row of jacks for labeling purposes.
e. Separate jack strip field/ audio patch panel for analog and digital inputs will be provided by the tenderer.

5.2.4 Programme Meter (PPM/VU)

The Program Meter shall preferably be a dual VU meter or Bar graph Display with LEDs or both. The signal fed at the input connectors shall be processed, levels compared and displayed on the Bar graph. This unit shall work independently in any configuration for signal monitoring without loading the source. There shall be provision for selecting VU or Peak response using a front panel switch.

5.2.5 Ampli Speaker Panel

The Ampli Speaker (8 watt) with mounting arrangements and shall have two amplispeakers of 6" size, one for each channel. The output will be fed to the amplispeakers. The loudspeaker impedance shall be 8 ohms.

5.2.6 Repeat Coil:

(i) A Line to line audio transformer shall be provided for isolating balanced and unbalanced circuits.
(ii) Primary & Secondary Impedances : The primary secondary windings shall consist of two exactly identical sections which can be connected in series for 600 ohms operation or in parallel for 150 ohms operation.
(iii) Hum reduction : The shielding and design of the windings shall be such that the hum level picked up by the unit, when placed in normal magnetic field inside equipment racks is better then -75dBm, as measured across either winding, both secondary and primary being terminated by 600 ohms.

5.2.7 Rack Wiring :

All the wiring in the rack shall be carried out with MIL standard approved PTFE insulated, shielded, twin core, audio cables of standard in PVC cable duct.
(i) The wiring for all the equipment shall be routed through terminal blocks which shall be suitably located for easy accessibility. All the wiring on the terminal block shall be suitably marked. The wiring bunches shall be neatly laid and clamped to the body of the rack.
(ii) The low level audio lines shall be suitably isolated from high level audio lines in order to avoid interference.
(iii) Power supply wirings shall pass through separate conduits and shall be segregated suitably from the audio wiring in order to avoid noise and hum pick up.

5.2.8 Distribution Amplifiers:

The analogue stereo and digital distribution amplifier will be used for feeding a analogue stereo and digital programme to various destinations.

The analogue stereo distribution amplifier should be solid state audio amplifier having one stereo input and 4 separate individually adjustable stereo outputs.

The digital distribution amplifier should be solid state having one digital input and 4 separate digital outputs.

13.1 Analogue Stereo distribution amplifier:

1. **INPUT IMPEDANCE**
   Input impedance shall be $\geq$ 10 k ohm (balanced).
2. **INPUT LEVEL**
   (a) Nominal : 0 dBu
   (b) Maximum : +20 dBu
3. **GAIN**
   Shall have adjustable gain of $\pm$ 5 dB with respect to nominal setting.
4. **OUTPUT LEVEL**
   (a) Nominal : 0 dBu
   (b) Maximum : +20 dBu
5. **OUTPUT IMPEDANCE**
   Output impedance shall be $\leq$ 50 ohm (balanced).
6. **FREQUENCY RESPONSE**
   $\pm$ 0.5 dB in frequency range of 40 Hz to 20 kHz.
7. **TOTAL HARMONIC DISTORTION**
   Less then 0.1% at nominal level (1 kHz) and less than 0.5% at maximum output level. (Terminated into a load of 600 ohm) throughout the audio frequency range of 40 Hz to 20 kHz.
8. **SIGNAL TO NOISE RATIO AT NOMINAL INPUT/OUTPUT, RMS UNWEIGHTED (22 Hz-22kHz)**
   $\geq$ 90 dB
9. **INTER OUTPUT LOADING**
   (a) If one of the outputs gets short circuited, the level on the rest of the outputs shall not fall by more than 0.3 dB.
   (b) If two of the outputs got short circuited, the level on each of the remaining outputs shall not fall by more than 0.6 dB.
10. **INTER-CHANNEL PHASE DIFFERENCE**
    Not more than 5 degree in frequency range of 125 Hz to 10 kHz and 10 degree from 40 Hz to 20 kHz.
11. **INTER-CHANNEL LEVEL DIFFERENCE**
    Within $\pm$ 0.5dB, from 40 Hz to 20 kHz.
12. **INTER-CHANNEL CROSS TALK**
    Equal to or better than 60 dB at 20 kHz at nominal level.
13. **INPUT/OUTPUT CONNECTORS**
    Input and all outputs shall be on 3-pin XLR connectors.

13.2 Digital distribution amplifier:

	DIGITAL AUDIO INPUT	
i	Configuration :	Stereo AES/EBU standard, 24-bit resolution.
ii	Sampling Rate :	32, 44.1 or 48 KHz automatically selected.
iii	Connector :	XLR-type, female, EMI-suppressed.
iv	Input reference level	Variable within the range of -20 to 0 dBFS

	DIGITAL AUDIO OUTPUT	
i	Configuration:	Stereo AES/EBU standard.
ii	Sample Rate :	32, 44.1 or 48 KHz, selected in software
iii	Connector :	XLR-type, male, EMI-suppressed.
iv	Impedance	110 Ohm

5.2.9 Other Accessories:

(i) A lamp to illuminate when the door is opened shall be provided on one of the side at top.
(ii) Arrangement may be made for mounting tag-blocks/terminal strips at a height of 450mm from the bottom at the rear side.
(iii) PVC channels may be provided at the front as well as the rear for routing cables.
(iv) Necessary drawers shall be provided for keeping patch cords & headphones.
(v) Suitable arrangement is to be made for mounting AIR Monogram on the top frame on the front side.
(vi) Two 2U blank space shall be provided for fixing Satellite Receivers.
(vii) Blank panels of 1U height wherever required for proper gap between equipment are to be provided suitably.

5.2.10 Power Supply:

(i) A single phase Mains Panel to distribute power supply with indication lamp and MCB to the various equipment, mounted on front side bottom in the rack shall be provided.
(ii) RFI Filter to protect against electrical & EM disturbances shall be provided for protection in the mains supply. A Distribution panel with suitable rating fuses for over current protection for each outlet shall be provided at the output of this filter.
(iii) Power supply to all the equipment/circuits in the rack shall be distributed from this panel along the height of rack at each equipment level. A spare 5A,3 Pin power socket shall also be provided. The Rack shall also be provided with two additional sockets of 3 pin, 5A for AC Power supply input to the equipment. Blank Space is to be provided in the rack for mounting other equipment, if any.

5.2.11 Earthing:

All the equipment in the Rack shall be properly earthed. The earth circuits of the power supply and audio circuits shall be kept separate and brought out on suitable terminals for earthing.

5.2.12 Shielding:

The Rack shall be installed in the transmitter Hall. Necessary precautions shall be taken to shield the equipment and wiring from high level R.F. field.

N.B.: The Tenderer shall prepare schematic drawing & layout of equipment in the offered Rack and submit along with tender.

5.3 1 kVA in (1+1) configuration, on line Uninterrupted Power Supply System in hot standby mode:

The input power to the transmitter system is supplied from an external 230 V single phase system.

Two nos. of 1000 VA On-line UPS are to be provided in hot standby (1+1) mode to maintain power to the selected transmitter and other equipment with Maintenance Free Batteries with each set. In case one UPS fails the second UPS shall automatically take full load of equipment to sustain broadcast service.

1000 VA On Line UPS (hot standby mode) shall conform to the following Specifications.

S. No.	Parameters	Specifications
5.3.1	Input	180 – 260 Volt AC, 50 Hz Single Phase
5.3.2	Output	230 Volt AC $\pm$1 %.
5.3.3	Capacity	1000 VA
5.3.4	Efficiency	> 85 %
5.3.5	Indications and Protections	Self-diagnostic, Spike Suppressor, Electronic overload protection.
5.3.6	Isolation Transformer	In-built
5.3.7	Battery capacity	i) Capacity 30 minutes on full load ii) Minimum 720 VAH

5.4 ANTENNA

5.4.1 One No. of 2-Bay VHF FM side mount Pole Type Antenna along with mounting arrangement shall be supplied with each set.

5.4.2 The Antenna will be mounted on the top of the Guyed Mast / Self Supporting tower or on a Pole to be provided by AIR.

5.4.3 Following documents shall be supplied along with the Tender:

a. VSWR curve for complete Frequency range.
b. Horizontal Radiation Pattern.
c. Vertical Radiation Pattern

5.4.4 Brief Specifications of the Antenna to be supplied are given below:

S. No.	Parameters	Specifications
5.4.4.1	Operating Frequency Range	88-108 MHz
5.4.4.2	Impedance	50 ohms unbalanced
5.4.4.3	VSWR	Better than 1.20:1 over 5 MHz and to be optimized for operating frequency (to be intimated later at the time of placement of order) to 1.10:1
5.4.4.4	Power Handling capacity (Total)	> 500 Watts
5.4.4.5	Polarization	Vertical
5.4.4.6	Gain w.r.t. Half Wave Dipole	≥ 4.5 dBd
5.4.4.7	Lightening Protection	All metal parts to be DC grounded.
5.4.4.8	Branches and Clamps for mounting Dipoles	Suitable Branches and Clamps to be supplied with the Antenna.
5.4.4.9	Termination	Suitable for RF Feeder cable connections
5.4.4.10	Mounting of Antenna	All the required hardware for mounting of the antenna shall be supplied along with the Antenna. The cross-sectional size of Tower/Pole will be intimated at the time of placement of the Order.
5.4.4.11	Maximum Wind Speed	198 km/Hour
5.4.4.12	Ambient Temperature	-5ºC to 50 ºC
5.4.4.13	Humidity	95% non-condensing
5.4.4.14	Rainfall	Moderate to heavy.

5.5 RF CABLE:

5.5.1 The Coaxial RF Cable for feeding to Antenna with suitable connectors shall be supplied with each transmitter. The Transmitter shall be connected to the Antenna via foam type RF Co-axial Cable.

5.5.2 The cable shall be complete with end connectors, hoisting grips and cable clamps for its hoisting.

5.5.4 Specifications:

5.5.4.1	Inner Conductor material	Copper
5.5.4.2	Dielectric	Foam
5.5.4.3	Operating Frequency Range	88-108 MHz
5.5.4.4	Impedance	50 Ω ± 1 Ω
5.5.4.5	Outer conductor material	Corrugated copper
5.5.4.6	Attenuation at 108 MHz. at 20º C	≤ 1.3 dB/100M

5.6 REMOTE CONTROL AND TELEMETRY SYSTEM:

The transmitter shall be controllable from distant location using dial up connection, internet based IP address technique as well as locally. The PCs, modems, and allied equipment for this shall be part of the SETC of the transmitter. The telephone connection for the "dial up facility" shall be provided by AIR.

It shall be a Web based system for remote control and monitoring various parameters of FM transmitter and associated auxiliary systems from a distant location. System shall be such that an engineer sitting at a distant location is able to control and monitor various FM transmitters located at different places of the country by connecting the PC to the web through telephone lines (Via broadband connection etc.) as well as using a dial-up connection through modem.

5.6.1 Specifications:

S.No.	Technical Parameter	Specification	Comments of tenderer with technical details/ data and schematic drawing etc.
1.	Remote control and telemetry/ Controllable Setting / Monitoring:	1. Transmitter: ON/OFF 2. Exciter ON/OFF, Audio input, 3.Exciter RF forward and reflected power 4. RF Output Power Level: 5. Program 1/ Program 2 selection 6. DG Set On/Off 7. UPS Status 8.Power supply status of Voltages, currents 9.Alarm Indications: Temperature, VSWR, ON AIR, Audio etc. 10. Any other parameter which the manufacturer considers essential for proper functioning of a remote-controlled FM Station.	
2.	Data Format	To be indicated and compatible for above system.	
3.	Data Rate	To be indicated and compatible for above data format	
4.	Modem Speed	To be indicated and compatible for above data format/rate to be used for a distant/centralized location via ISDN/Digital line/TCP-IP /PSTN network/Dial up connection telephone lines.	
5.	Computer	Latest generation, Core 2 Duo processor equivalent or higher, 14" screen, RAM-4 GB, Windows-7 operating system, HDD-320 GB, DVD-RW, 2 USB ports, Card Reader	
6.	Software and hardware items to be given by the	Complete software, hardware items, accessories, single/ multi core cables, RF cable connectors, Humidity/temperature transducer, 2/3 Core Shielded Teflon cable	

	renderer	, Extension cables etc. (Items wise details of offered and included material, items & part are to be given by the renderer)	

ANNEXURE-I

INSPECTION DETAILS

The Inspection for acceptance of Sample Unit and balance quantity of the Transmitter System, antenna, RF cable , UPS, PI Rack , Remote control & Monitoring System along with Automatic Changeover Unit for different modes of operation will be carried out at the Tenderer's System Integrator Works as mentioned in the tender offer under SECTION -II . All facilities like complete set of measuring instruments, power supply, manual assistance, etc. will be provided by the tenderer without any additional charges. Complete set of instruments will be made available in advance and the list of these measuring instruments along with their set ups may be forwarded along with the ATP.

The tenderer shall put up all the Transmitter System, antenna, RF cable , UPS, PI Rack , Remote control & Monitoring System along with Automatic Changeover Unit for Inspection in lots of 25 numbers out of which 10 % randomly selected transmitter system, antenna & RF cable shall be inspected in details and measurements shall be taken.

Complete details and specifications of the Transmitter System, antenna, RF cable will be checked and all parameter values will be measured. All the 10 % randomly selected transmitters shall be tested for heat run for continuously 24 hours on dummy load.

All other equipment will be accepted on the basis of Original Equipment Manufacture's (OEM) Test Certificates (as per AIR Specification) duly signed and stamped on the letter head of the OEM, failing which Original Equipment Manufacture's (OEM) Test Certificates will be considered incomplete and equipment offered by the firm is liable to be rejected.

However, operational & functional checking of all the Transmitters shall be carried out at three different frequencies in the VHF band 88 to 108 MHz as per mutually agreed ATP.

Exhaustive checking/measurements will be carried out so as to completely check the compliance of the Transmitter and other Equipments with the requirements as projected in the specifications. It is mandatory that all parameters are checked, measurements are carried out in advance and these details, notes and figures are available at the Tenderer's System Integrator Works as mentioned in the tender offer under SECTION -II at the time of inspection. These performance reports shall also be submitted to All India Radio before giving call for inspection at least 6 weeks in advance.

Following information should also form part of above data which will also be checked for each Transmitter Unit during inspection by indenter's representative at Tenderer's System Integrator Works as mentioned in the tender offer under SECTION -II: -

1. Make and type of Transmitter System, antenna, RF cable, UPS, PI Rack, Remote control & Monitoring System along with Automatic Changeover Unit for different modes of operation., accessories and spares.
2. Dimension of Transmitter, sub-units and accessories.

3. Working/operation of all sub-units and accessories.
4. System configuration check and completeness of Transmitter.
5. Checking meter readings and calibration.
6. Measurements of parameters as per specification. All the parameters will be measured on any 3 different frequencies in the VHF FM band.
7. Checking of control/protection system of Transmitter.
8. Checking of all power levels, meters, LCDs etc.
9. Measurement of levels in the whole AF and RF chain.
10. Checking of RF voltages on test points.
11. Inter- change ability of sub-modules and PCBs.
12. Checking of spares, PCB's, modules for the respective transmitter.
13. Checking of operation of Transmitter System, antenna, RF cable , UPS, PI Rack , Remote control & Monitoring System UPS, Automatic Changeover Unit for different modes of operation.

Tentative list of the proposed100 watt FM Transmitters {total 100 Nos. (under 11th plan of AIR (Statewise/UTwise detailed list)

State: Andra Pradesh - 7

S.No.	Place	Distt	AIR/DD infrastructure
1	Achampet	Guntur	LPTV
2	Adoni	Kurnool	LPTV
3	Khammam	Khammam	LPTV
4	Banswada	Nizamabad	LPTV
5	Kuppam	Chittor	LPTV
6	Kakinada	Kakinada	LPTV
7	Medak	Medak	LPTV

State : Assam --2

S.No	Place	District	AIR/DD infrastructure
1	Nazira	Sibasagar	LPTV
2	North Lakhimpur	Lakhimpur	LPTV

State: Bihar - 7

S.No.	Place	Distt	AIR/DD infrastructure
1	Bettiah	Paschim champaran	LPTV
2	Motihari	Motihari	LPTV
3	Muzaffarpur	Muzaffarpur	HPTV
4	Madhubani	Madhubani	LPTV
5	Supaul	Supaul	LPTV
6	Forsibganj	Araria	LPTV
7	Bhagalpur	Bhagalpur	AIR

State: Chhatisgarh -7

S.NO	Place	Distt	AIR/DD infrastructure
1	Kanker	Kanker	LPTV
2	Korba	Korba	LPTV
3	Narayanpur	Narayanpur	LPTV
4	Champa	Baster	LPTV
5	Pandaria	Bilaspur	LPTV
6	Sakti	Janjgir Chmpa	LPTV

7	Jagdalpur	Jagdalpur	AIR

State: Gujrat -7

S.No.	Place	Distt	AIR/DD infrastructure
1	Bhabbar	Banaskantha	LPTV
2	Bharuch	Bharuch	LPTV
3	Mehsana	Mahesana	LPTV
4	Bhavnagar	Bhavnagar	LPTV
5	Porbandar	Porbandar	LPTV
6	Jamnagar	Jamnagar	LPTV
7	Ahwa	Ahwa	AIR

State: Haryana- 2

S.No	Place	District	AIR/DD infrastructure
1	Sirsa	Sirsa	**LPTV**
2	Ambala	Ambala	**LPTV**

State: Jharkhand-7

S.No.	Place	Dist.	AIR/DD infrastructure
1	Giridih	Giridih	LPTV
2	Deoghar	Deoghar	LPTV
3	Dumka	Dumka	LPTV
4	Gumla	Gumla	LPTV
5	Ghatsila	Purbi Singhbhum	LPTV
6	Chatra	Chatra	LPTV
7	Bokaro	Bokaro	LPTV

State: Karnataka -6

S.No.	Place	Distt	AIR/DD infrastructure
1	Bagalkot	Bagalkot	**LPTV**
2	Bidar	Bidar	**LPTV**
3	Tumkur	Tumkur	**LPTV**
4	Kumta	Kumta	**LPTV**
5	Karwar	Uttar Kannad	LPTV
6	Sagar	Shimoga	LPTV

State: Kerala -2

S.No.	Place	Distt	AIR/DD

			infrastructure
1	Punalur	Kollam	LPTV
2	Kalpetta	Waynad	LPTV

State: Madya Pradesh -7

S.No.	Place	Distt	AIR/DD infrastructure
1	Satna	Satna	LPTV
2	Jhabua	Jhabua	LPTV
3	Mandsaur	Mandsaur	LPTV
4	Harda	Harda	LPTV
5	Chanderi/Ashoknagar	Guna	LPTV
6	Neemuch	Neemuch	LPTV
7	Ratlam	Ratlam	LPTV

State: Maharashtra-6

S.No.	Place	Distt.	AIR/DD infrastructure
1	Wardha	Wardha	LPTV
2	Gondia	Gondia	LPTV
3	Washim	Washim	LPTV
4	Buldana	Buldana	LPTV
5	Sironcha	Gadchiroli	LPTV
6	Satana	Mashik	LPTV

State : Mizoram-2

S.No	Place	District	AIR/DD infrastructure
1	Sabual	Aizwal	HPTV
2	Serchip	Aizwal	HPTV

State: Orissa -7

S.No.	Place	Dist	AIR/DD infrastructure
1	Nuapara	Nuapara	LPTV
2	Baligurha	Phulbani	LPTV
3	Rayagada	Rayagada	LPTV
4	Angul	Angul	LPTV
5	Sundergarh	Sundergarh	LPTV
6	Parlakheimundi	Gajapati	LPTV
7	Paradeep	Paradeep	LPTV

State: Punjab -2

S.No.	Place	Distt	AIR/DD

			infrastructure
1	Gurdaspur	Gurdaspur	LPTV
2	Firozpur	Firozpur	LPTV

State: Rajasthan -6

S.No.	Place	Distt	AIR/DD infrastructure
1	Anupgarh	Ganganagar	LPTV
2	Jhunjhunun	Jhunjhuru	LPTV
3	Nathdwara	Raj Samand	LPTV
4	Bharatpur	Bharatpur	LPTV
5	Karauli	Karauli	LPTV
6	Sikar	Sikar	LPTV

State: Tamilnadu-2

S.No.	Place	Distt	AIR/DD infrastructure
1	Gudiyattam	Vellore	LPTV
2	Rameshwaram	Ramanathpuram	HPTV

State: Uttarakhand -5

S.No	Place	District	AIR/DD infrastructure
1	Pauri	Pauri	LPTV/AIR
2	Kalagarh	PauriGharwal	LPTV
3	Haridwar	Haridwar	LPTV
4	Pithoragarh	Pithoragarh	LPTV/AIR
5	Kashipur	Rudrapur	LPTV

State: Uttar Pradesh -7

S.No.	Place	Distt	AIR/DD infrastructure
1	Hardoi	Hardoi	LPTV
2	Bahraich	Bahraich	LPTV
3	Orai	Jalaun	LPTV
4	Balrampur	Balrampur	LPTV
5	Mahoba	Mahoba	LPTV
6	Sitapur	Sitapur	LPTV
7	Mathura	Mathura	AIR

State: West Bengal -6

S.No.	Place	Dist	AIR/DD infrastructure
1	Purlia	Purlia	LPTV
2	Medinipur	Medinipur	LPTV
3	Balrampur	Balrampur	LPTV

4	Maldah	Maldah	LPTV
5	Farakka	Farakka	LPTV
6	Krishna Nagar	Krishna Nagar	LPTV

State / UT: Andman & Nicobar Islands 1

S.No.	Place	Distt	**AIR/DD infrastructure**
1	Car Nicobar	Car Nicobar	LPTV

State /UT : Dadra Nagar Haveli- 1

S.No	**Place**	**District**	**AIR/DD infrastructure**
1	Silvasa		LPTV

State /UT : Lakshdweep- 1

S.No	**Place**	**District**	
1	Kavaratti	Lakshdweep	LPTV