



प्रसार भारती/ PRASAR BHARATI
भारत का लोक सेवा प्रसारक/ INDIA'S NATIONAL PUBLIC SERVICE BROADCASTER
आकाशवाणी महानिदेशालय/DIRECTORATE GENERAL: ALL INDIA RADIO
योजना और विकास एकक आकाशवाणी भवन, संसद मार्ग, नई दिल्ली-110001
P & D UNIT, AKASHVANI BHAWAN, SANSAD MARG, NEW DELHI-110001
[क्रय अनुभाग/PURCHASE SECTION]

No. 01(61)11/NIT-38/2020-D(P)/E/2306

Dated: 04.08.2020

Notice inviting e-Tender No.38/2020

E-tenders are invited for and on behalf of Director General, All India Radio under two bid systems for Supply/SITC/SETC of the following Equipments from firms registered with GeM/NSIC and from reputed Indian manufacturers/authorized agents and stockiest dealing with the equipments as detailed below:

Sl. No.	Tender Ref. No.	Description of Stores	Qty.	Estimated Cost of work/ Procurement (Rs. in Lakh)	EMD (Rs. in Lakh)	Tender Submission Date/Time (online)	Tender Opening Date/Time (Online)
1	No.12(52)01/10kW/2020/D(P)/670-D(P-S)Cell/E	Supply of 10 kW Digital Compatible VHF FM solid state MOSFET Technology based Broadcast Transmitter (Liquid Cooled) in (1+1) Configuration and Associated Equipments / items.	(5) Places	1406.33	42.19	23.09.2020 (02:30 PM)	23.09.2020 (03:00 PM)
2	No.12(59)01/20kW/2020/D(P)/672-D(P-S)Cell/E	Supply of 20 kW Digital Compatible VHF FM solid state MOSFET technology based Broadcast Transmitter (Liquid Cooled) in (1+1) Configuration and Associated Equipments / items.	(1) Place	463.80	9.28	30.09.2020 (02:30 PM)	30.09.2020 (03:00 PM)
3	No.12(60)01/SW/2020/D(P)/673-D(P-S)Cell/E	Supply, Testing & Commissioning of 50 kW AM - DRM SW Transmitter.	(1) Place	2034.11	101.71	07.10.2020 (02:30 PM)	07.10.2020 (03:00 PM)

NOTE:

- The bid forms, General Instructions to Bidders and other details including amendments/ changes can be viewed/ downloaded from the website <http://prasarbharati.eproc.in>.
- Tender notice is also available on the Prasar Bharati website www.prasarbharati.gov.in (using the link: Tender) and CPP PORTAL on website <http://eprocure.gov.in>.

(Signature)
04/08/2020

(हृदेश कुमार/ Hirdesh Kumar)

निदेशक (अभि.)/ Director (Engg.)

कृते महानिदेशक आकाशवाणी/for Director General: All India Radio

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प्रसार भारती/ PRASAR BHARATI

भारत का लोक सेवा प्रसारक/ INDIA'S NATIONAL PUBLIC SERVICE BROADCASTER
आकाशवाणी महानिदेशालय/DIRECTORATE GENERAL: ALL INDIA RADIO
योजना और विकास एकक आकाशवाणी भवन, संसद मार्ग, नई दिल्ली-110001
P & D UNIT, AKASHVANI BHAWAN, SANSAD MARG, NEW DELHI-110001
[क्रय अनुभाग/PURCHASE SECTION]



No. 01(61)11/NIT-38/2020-D(P)E/ 2349

Dated: 04.08.2020

Notice inviting e-Tenders No. 38/2020

A. GENERAL INSTRUCTIONS TO BIDDERS:

1. The tenders under this NIT are only for Indian bidders as per Amendment in General Financial Rules, 2017 - Global Tender Enquiry issued by Ministry of Finance Department of Expenditure Letter F. No. 12/17/2019-PPD dated 15.05.2020.
2. The scope of work for stores to be tendered are available in the complete bid documents which can be viewed / downloaded free of cost from Prasar Bharati portal www.prasarbharati.gov.in or e-tender portal of AIR <http://prasarbharati.eproc.in>, or CPP Portal <http://eprocure.gov.in>.
3. Both Technical Bid and Financial Bid will be submitted concurrently duly digitally signed in the website <http://prasarbharati.eproc.in>.
4. It is highly recommended that the bidders should not wait till last date of bid submission to avoid complications like internet connectivity issue, network problems, system crash down, power failure, browser compatibility issue, system compatibility issue, improper digital signature certificate problem etc. In view of this context, neither Prasar Bharati nor C1 India Pvt. Ltd. will be responsible for such eventualities. No claim shall be entertained on account above. Bidders are advised to upload their bids well in advance to avoid last minute technical snags.
5. All Corrigendum/Amendment/Corrections, if any, will be published on the Portal <http://prasarbharati.eproc.in>.
6. All documents / papers uploaded / submitted by the bidder must be legible.
7. It is mandatory for all the bidders to have Class-III Digital Signature Certificate with both DSC Components i.e. Signing & Encryption (in the name of person who will sign the bid document) from any of the licensed Certifying Agency under CCA, Ministry of Electronics and Information Technology, Government of India to participate in e-tendering portal of Prasar Bharati. Bidders can see the list of licensed CAs from the link www.cca.gov.in, C1 India Pvt. Ltd. also facilitate Class III Digital Signature Certificate.
8. To participate in the e-tendering submission, it is mandatory for the applicants to get registered their firm/joint venture with the Prasar Bharati e-tendering portal <http://prasarbharati.eproc.in> to have user ID & Password by submitting a non-refundable Annual registration charges for vendor/supplier are given in table below through online mode (net banking/ debit card/ credit card). Validity of registration is 1 year.

No. 01(61)11/NIT-38/2020-D(P)E

Dated: 04.08.2020

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9. To participate in e-bid, bidders have to pay e-Tender Processing fee (non-refundable) per tender per bid through online mode (net banking/ debit card/ credit card) as per following table-

Estimated Value of the Tender	Processing Fees per Tender per Bidder
Less than or Equal to Rs.10 Lakhs	Rs. 475.00 + 18% GST
More than 10 Lakhs But Less than or Equals to 50 Lakhs	Rs. 925.00 + 18% GST
More than 50 Lakh	Rs. 1150.00 + 18% GST
Annual Charges for Online Bidder/ Vender for the Registration	Rs. 450.00 + 18% GST

- Bid document contains certain conditions for Manual submission of tender and are now redundant. Document shall be deemed to have been modified to that extent.
 - Paying Authority will be respective Pay & Accounts office of the Zonal Office.
- The bidder may modify or withdraw their bid after submission prior to the Bid Due date. No bid shall be modified or withdrawn by bidder after the bid due date and time.
 - Both 'EMD' and 'Tender Document Fee', if any, are mentioned in individual tender document published at Prasar Bharati e-Tendering Portal(<https://prasarbharati.eproc.in>).
 - For helpdesk, please contact e-tendering cell and Help Desk Support Monday to Friday Ph: 0124-4302033/36/37, prasarbharatisupport@c1india.com.
 - Page No. shall be given on each and every paper/documents serially uploaded in the technical bid.
 - Bidders shall ensure to quote rate of each items. If any cell is left blank and no rate is quoted by the bidders, the rate of such item shall be treated as "0" (Zero).
 - The bid security (EMD) may be accepted in the form of Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee from any of the Commercial Banks or payment online in an acceptable form. The Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee from any of the Commercial Banks may be in favour of **PB, BCI, DG: AIR, New Delhi** with the validity for a period of forty-five days beyond the final bid validity period.
 - 'EMD deposit' shall be placed in a single sealed envelope superscripted with tender reference no. and date of opening so as to reach Assistant Engineer in Room No.326/346, P&D Unit, Akashvani Bhawan, DG: AIR, New Delhi before scheduled time on prescribed tender opening date. EMD received late shall be summarily rejected. Hard copy of any other tender document shall not be accepted.
 - Performance Security may be accepted in the form of an Account Payee Demand Draft, Fixed Deposit Receipt from a Commercial bank, Bank Guarantee from a Commercial bank or online payment in an acceptable form. The Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee from any of the Commercial Banks may be in favour of

PB, BCI, DG: AIR, New Delhi with the validity for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including warranty obligations.

Estimated Value of the Contract/Tender (X)	Amount of Bid Security	Amount of Performance Security
X is less than or equal to Rs. 10 crore	2%	5%
X is greater than Rs. 10 Crore and less than or equal to Rs. 15 Crore	3%	7%
X is greater than Rs. 15 Crore and less than or equal to Rs. 20 Crore	4%	8%
X is greater than Rs. 20 Crore	5%	10%

18. The successful tenderers will be required to furnish Security Deposit as per above table within 30 days of placement of contract.
19. Tenderers may ask any clarification, if required, before the date stipulated in the details of tender items for the purpose. After that no request will be entertained.
20. Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) or are registered with the Central Purchase Organisation or the concerned Ministry or Department or Start-ups as recognised by Department of Industrial Policy & Promotion (DIPP) for the items required in NIT shall be exempted from payment in respect of cost of Earnest Money as per the Government instructions on the subject on submission of documentary evidence of valid Registration. Policy is meant for procurement of only goods produced and services rendered by MSEs. However, traders are excluded from the purview of Public Procurement Policy.
21. The purchaser reserves the option to give Purchase preference to the offer from Public Sector Units and/or from Small Scale Cottage Industries Units over those from other firms, in accordance with policies of the Government of India from time to time.
22. Tenderers shall separately indicate the rate and amount of GST/IGST etc. as applicable on the date of tendering in their offer failing which the offer will be summarily rejected.
23. Tenderers have to submit GST Registration Certificate while uploading the tender.
24. Tenderers shall separately indicate the HSN/SAC code, rate and amount of GST/IGST as applicable on the date of tendering in their offer, failing which the offer will be summarily rejected.
25. IGST and Compensation Cess (wherever applicable) will be levied on imports.
26. Public Procurement (Preference to Make in India) Order No. P-45021/2/2017-B.E-II dated 15.06.2017 of Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion shall be applicable.
27. Terms Conditions given in specification will supersede for conflict with any terms and condition given in AIR Tender Document.
28. In Repeat Order Clause 6.9, page-10 and Clause 22, page-52 of AIR Tender Document, 50% may be read as follows-
 - (i) Variation of Quantities at the Time of award: At the time of awarding the contract, the quantity to be procured must be re-judged based on the current

Signature
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data, since the ground situation may have very well changed. The tendered quantity can be increased or decreased by 25 (Twenty-Five) per cent for ordering, if so warranted.

- (ii) Option clause: In case of long running, yearly procurements, to take care of any change in the requirement during the currency of the contract, a plus/minus option clause (normally 25 (Twenty-Five) per cent) is incorporated in the tender document, reserving purchaser's right to increase or decrease the quantity of the required goods up to that limit without any change in the terms and conditions and prices quoted by the tenderers.

B. LIST OF MANDATORY DOCUMENTS (to be uploaded with tender):

1. Copy of EMD.
2. AIR Tender Document duly filled and signed on each page along with all Annexures and amendment.
3. AIR Technical Specifications duly signed on each page.
4. Integrity Pact (for estimated contract value of Rs. Two Crores or more) duly filled and signed.
5. Letter of authority to sign and upload bid documents.
6. Original Equipment's Manufacturer's (OEM) Authorization for Equipment quoted.
7. Past performance along with the user certificate in respect of Supply/ SITC/SETC of the Equipment quoted.



Handwritten signature and date: 04/08/2020

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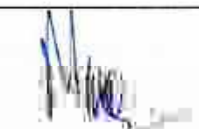
PRASAR BHARATI
(India's Public Service Broadcaster)
DIRECTORATE GENERAL: ALL INDIA RADIO
(PLANNING & DEVELOPMENT UNIT)

INTRODUCTION: This specification is for supply of 20 kW Digital Compatible (HD and DRM+) VHF FM solid-state MOSFET technology based broadcast transmitter (Liquid Cooled) in (1+1) configuration and associated equipments/items.

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Specification No: 2016W FM/EXG/April/2020-DTD/FM)

A. ESSENTIAL REQUIREMENTS FOR TENDER:

1. (i) The tenderer should submit Schedule of Requirements/Materials of Supply without price in the same format as given in Section-V (A & B) of AIR Specifications in the technical bid, failing which the tender shall be considered incomplete and is liable to be rejected.

(ii) It is also mandatory to mention Make & Model of the offered equipment in the Schedule of Requirements/Materials of Supply, failing which the tender shall be considered incomplete and is liable to be rejected.

2. Each statement of this specifications has to be complied with & supported by printed technical literature, technical data sheets, schematic drawings and technical manuals from the manufacturer of the equipment by the tenderer, to assess the full merit of the offer without which tender will be considered incomplete and is liable to be rejected.

3. The tenderer should submit the tender offer to AIE in the format given below, section wise & clause wise, in respect of all the sections of technical specifications. The O/M/tenderer must provide the page number reference, in column (4) of the table given below, of the technical bid clearly indicating the volume number also, if any, for each supporting document to verify the parametric values shown in the compliance statement, to assess the full merit of the offer, failing which the tender shall be considered incomplete and is liable to be rejected.

S. No. of AIR Specifications (Section wise & Clause wise) (1)	Details of AIR Specifications (Part/ Section wise & Clause wise) (2)	Compliance (Yes/No) (3)	The page no. of the tender offer, where the information/ supporting document is available; (4)	Remarks (5)
A. Essential requirements for tender				
B. Essential eligibility criteria for tenderer				
Section-I Clause wise				
Section-II Clause wise				
Section-III Clause wise				
Section-IV Clause wise				

4. The tenderer should quote the rate/cost of individual items in the tender offer while submitting the offer for spares. (OPTIONAL) in commercial bid.

5. The complete technical specifications (Section wise & Clause wise) compliance statement along with Schedule of Requirements/Materials (un-priced) must be signed & stamped by the respective Original Equipment Manufacturer (OEM) in the tender document, failing which the tender shall be considered incomplete and is liable to be rejected.


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S. Singh, ETR/CH

Specification No: 20.100 FM TN/2/April/2020-DCT D/T/M

In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also sign & stamp on Technical specifications (Section wise & Clause wise) compliance statement, failing which the tender shall be considered incomplete and is liable to be rejected. The OEM & tenderer should mention their name in CAPITAL LETTERS & designation of the signatories, full address with pin code, phone number, fax number, e-mail addresses etc.

6. All the volumes of the entire technical bill must be page numbered.
7. The authorization and guarantee must be given by respective Original Equipment Manufacturer (OEM) on their letter head and duly signed & stamped. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer must also give guarantee on their letter head and duly signed & stamped, failing which the tender shall be considered incomplete and is liable to be rejected. Guarantee shall be as per the format given in clause 1.9 of Section-I. Guarantee for the commercially available off-the-shelf (COTS) products shall be given by tenderer.
8. In case tender offer is from other than the Original Equipment Manufacturer, the tenderer should also furnish a certificate from the OEM that the tenderer can quote items of the OEM directly, failing which the tender shall be considered incomplete and is liable to be rejected.
9. Public Bids will follow the reciprocal market access strategy of the Government of India, which describes in the Clause 10(d) of Public Procurement Preference to Make in India Order 2017. The Purchaser shall have right to not consider any Bid and may restrict such bidders from the bidding process, who originate from those countries, where they do not allow market access for Indian companies. In such cases, the Clause 10 (d) of Public Procurement Preference to Make in India, order 2017, shall be invoked wherever applicable, when it is relevant.
10. Amendment in General Financial Rules (GFRs), 2017-Guided Tender Enquiry issued vide P. No. 12/17/2019-PD, dated 15.05.2020 of Government of India, Ministry of Finance, Department of Expenditure, Public Procurement Division shall be applicable.
11. Any change in the AIR technical specifications format or language or in parameters or of any other nature including the deletion/addition of technical specifications, clause, words, lines in the technical specifications compliance statement by the OEM/ tenderer will not be acceptable to AIR and the tender is liable to be rejected.
12. Optional items will not be considered for ranking purpose.


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Munzoon Ali/ GAO


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S. D. Singh/ DE

Specification No: 20 KW FM TX/2/April/2020-D (FD/FM)**B. ESSENTIAL ELIGIBILITY CRITERIA FOR TENDERER:**

(a) The tenderer shall be from India only.

(b) The tenderer should either be the OEM of FM transmitter or their authorized representative/dealer.

(c) (i) The OEM of the transmitter must have an experience of manufacturing and supplying FM transmitters (air/liquid cooled) of power output not less than 20 kW for at least last 10 years. Documentary evidence to support this must be provided.

(ii) The OEM should have supplied Liquid Cooled FM transmitters to reputed public broadcasters. The OEM must provide the details of past supply record (in the format given below) for at least 10 Nos. of such offered Liquid Cooled FM transmitters of power output not less than 20 kW supplied during last five years ending last day of the month previous to the one in which the tender is invited.

Supply order Number with date	Type, Model & Power rating of FM Transmitter supplied	Quantity supplied	Name of the Customers/Broadcasters with full postal address including e-mail addresses to whom FM Transmitter was supplied.	Remarks
(1)	(2)	(3)	(4)	(5)

(iii) All India Radio reserves the right to get performance feedback of the transmitters from any of the above Customers/Broadcasters directly by the tenderer/OEM.

(iv) Copies of Supply order/completion certificates/delivery challans/invoice of 10 Nos. of such Liquid Cooled FM transmitters of power output not less than 20 kW submitted by the tenderer in above format are also to be enclosed by the tenderer.

(d) In case tenderer is the authorized representative/dealer i.e. other than OEM, the tenderer must be an authorized representative/dealer of any OEM of FM transmitters/TV transmitters/AM Transmitters of power output not less than 5 kW for last three years or more **OR** must be in the business of sales and supply of FM transmitters/TV transmitters/AM Transmitters of power output not less than 5 kW for last three years or more. Documentary evidence to support this must be provided.

(e) The OEM of the offered FM transmitter must have his local office/authorized representative/dealer in India for after sales support. A certificate as per Annexure III duly signed by the OEM as well as local office/authorized representative/dealer must be submitted with the offer. Copy of Agreement/MoU executed between OEMs and their authorized representative/dealer duly signed by both must also be submitted with the offer.


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SECTION-I GENERAL

Brief Description:

1.0 20 kW Digital Compatible FM Transmitter (Liquid Cooled) in (1+1) configuration with automatic changeover unit and associated equipments/items shall be capable of round the clock operation. The transmitter shall be complete in itself, integrated in standard rack and shall be supplied with all associated equipments/items as per Section-V (A&B). The offered transmitter and associated equipment shall be field proven for satisfactory operation.

1.1 The following are excluded from the scope & will be provided by AIR:

- 1.1.1 Construction of necessary buildings, all masonry works & materials connected therewith, masonry foundations, cable trenches & under floor ducts etc. (Dimensions for which are to be furnished by the transmitter supplier, if any).
- 1.1.2 Power supply connection for the transmitting equipment at a single point.
- 1.1.3 Furniture & fittings not forming a part of the transmitter equipment.

1.2 Instruction to bidders: Tender documents shall be referred for general terms and conditions of contract for supply including all the commercial aspects like Packing and Packing List, Insurance and Marine Risk etc., Payment terms, Penalty/Compensation for Delay, Damages and Liabilities, Time Period and Extension for Delay, Forfeiture of Contract due to Abandonment or Reduction in Scope of Supply, Unacceleration of Contract in Full or Part, Recovery of Security Deposit, Performance Guarantee, Unsatisfactory Workmanship, Damages Incurred During Transit, Tenderer Liable for Damages, Defects, Recovery of Compensation, Ensuring Payment and Amenities, Tenderer to Indemnify Government against Patent Rights, Release of Security Deposit, Safety Code, Insurance from manufacturer's works/factory to respective site etc. i.e. in totality.

1.3 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, measures and quantities shall be in SI units.

1.4 DOCUMENTS/INFORMATION TO BE SUPPLIED WITH THE TENDER OFFER:

1.4.1 The complete technical specifications (Section wise & Clause wise) compliance statement alongwith Schedule of Requirements/Materials (un-priced) duly signed & stamped by the respective Original Equipment Manufacturer (OEM) and countersigned by the tenderer as per the format given above in clause A-13), to assess the full merit of the offer, without which the tender offer will be considered incomplete and is liable for rejection.

1.4.2 Complete printed technical literature/technical data sheet/schematic drawings/detailed information including Technical Manual (for Installation, Testing, Commissioning, Operation, Maintenance & Servicing, including theory of operation, circuit description and fault diagnosis) of 20 kW Digital Compatible FM transmitter in (1+1) configuration and associated equipments/items as per Section-


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Specification No. 20 kW FM TX 27 April 2020-D(CTD/EM)

V/A&B) from the respective Original Equipment Manufacturer (OEM) in support of compliance statement should be furnished, to assess the full merit of the offer, without which the tender offer will be considered incomplete and is liable for rejection.

1.4.3. Detailed Schedule of Requirements/Materials (un-priced) for the supply of 20 kW Digital Compatible FM (transmitter in DTT) configuration and associated equipments/items should be in conformity with Section-V(A&B) without any change in the format. Failing which the tender will be considered incomplete and is liable for rejection. The tenderer must quote all items.

1.4.4. Descriptive information and complete details of each equipment offered shall be given by the tenderer.

1.4.5. Country of Origin, Make, Type & Model of all the offered items should be mentioned including the name & address of their vendors.

1.4.6. The performance figures of the offered equipment/items must be given by the tenderer, to assess the merit of the offer, without which the tender will be considered incomplete and is liable to be rejected.

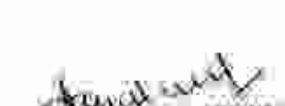
1.4.7. A copy of Technical Manuals (for Installation, Testing, Commissioning, Operation, Maintenance & Servicing, including theory of operation, circuit description with detailed circuit drawings and fault diagnosis), must be enclosed with technical bid for assessing the transmitter system. The transmitter shall be installed by AIS engineers as per the instructions given in the Installation Manual. The Technical Manual (for Installation, Testing, Commissioning, Operation, Maintenance & Servicing, including theory of operation, circuit description with detailed circuit drawings and fault diagnosis) must include at least the details given below:

- (a) The Installation Manual must describe the following information:
- (i) A suggestive floor equipment layout plan drawing with dimensions in metres for installation of the VHF FM transmitter system in a transmitter hall with all associated equipment.
- (ii) Diagrams showing the isometric view of FM transmitter and associated equipment with dimensions in metres are to be provided.
- (iii) All installation drawings with dimensions in respect of supplied equipment are to be provided.
- (iv) All mechanical assembly drawings of the FM transmitter system with dimensions are to be provided.
- (v) All the views, i.e. front, rear, top and side (open) of the FM transmitter with dimensions are to be provided.
- (vi) The details of unpacking are to be provided.
- (vii) A detailed write-up in English only regarding installation of FM transmitter system along with its associated equipments/items should be provided.
- (viii) The procedure of alignment and adjustment of various assemblies & sub-assemblies of FM transmitter such as Oscillator, PA, Control Circuit, output stage etc. should be described in detail with practical examples.
- (ix) All Do's and Don'ts which are essential for safe installation of the transmitter system should be described.
- (x) An inter-wiring diagram for all transmitter sub-modules installed in the transmitter rack, input/output to transmitter and interlocks with external units and accessories like dummy load, changeover switches, patch panel etc. which are wired in the transmitter interlocks should be


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- provided.
- (b) **Operation, Maintenance & Servicing Manual must describe the following:**
 - (i) General description of the offered FM transmitter, transmitter block diagram/schematic drawings indicating the details of different blocks, modules and redundancy incorporated in transmitter and its subsystems.
 - (ii) General description and structural overview of the transmitter racks indicating the position of different modules, units, power distribution etc. front, rear, top & side (open) views with dimensions.
 - (iii) Colour Photographs of transmitter showing the following:
 - (a) Front view of the transmitter
 - (b) Rear view of the transmitter
 - (c) Top view of the transmitter
 - (d) View of PA with cover opened showing full view of pallets/RF Boards, various adjusting pots and field replaceable parts.
 - (e) Enlarged open view of PA showing at least two RF transistors and bias adjustment pots.
 - (f) Front view and rear view of PA.
 - (g) Open view of Exciter.
 - (iv) Screen shots of various display screens showing monitorable and measurable parameters of transmitter.
 - (v) A detailed description of working of circuits with all relevant circuit diagrams (components, parts of circuit diagrams will be co-related with circuit description provided) of the transmitter should be provided with details of test points.
 - (vi) The details of all electrical circuits in various stages of the transmitter used along with their detailed write-ups.
 - (vii) General description of RF signal flow diagram for complete RF chain from exciter to filter output with information about power level at input & output of each stage. Losses and gains in various stages including power dividers, combiners, etc. must also be shown.
 - (viii) Description of transmitter interlocks, protections under abnormal conditions and schematic drawing indicating interconnections to different transmission units, external units and accessories like dummy load, changeover switches, patch panel etc. which are wired in the transmitter interlocks.
 - (ix) Details and schematic drawings of cooling system with description.
 - (x) Details and schematic drawings of remote monitoring and control facilities using web based GUI and third party Network Management System/Simple Network Management Protocol (SNMP) over TCP/IP network along with screen shots of the interface displays. The transmitter parameters that can be remotely monitored and controlled should be clearly mentioned.
 - (xi) General description of transmitter control system and schematic drawing(s) for control signal distribution should be provided.
 - (xii) A detailed description of working of circuits with all relevant circuit diagrams for the control circuit of the transmitter should be provided.
 - (xiii) General description of exciter unit, block schematics showing details of all sub units, Exciter front and rear views indicating all inputs, outputs and interfaces.
 - (xiv) A detailed description of working of circuits with all relevant circuit diagrams (components, parts of circuit diagrams will be co-related with circuit description provided) of the exciter unit should be provided with details of test points.


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 Manoj Kumar, AE, ADI


 Rajendra Kumar, DE


 Aditya Chattervedi, DKG(E)


 S Hydar, BXC(E)

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- (xxv) General description and architecture of Power Amplifier's block schematic drawings, front, open and rear views indicating all inputs, outputs and interfaces.
- (xxvi) A detailed description of working of circuits with all relevant circuit diagrams (components, parts of circuit diagrams will be co-related with circuit description provided) of the Power Amplifier should be provided with details of test points.
- (xxvii) Description of FM transmitter and the details of No. of PAs, combiners etc. used.
- (xxviii) Description of measurement of DC voltages, currents and RF power of PA.
- (xix) Description of protection mechanism against high VSWR, overload, high temperature of the exciter, Power Amplifiers and transmitter system.
- (xx) Description of VSWR/temperature foldback alongwith range of foldback. The explanation of foldback with the help of circuit diagram must also be provided.
- (xxi) Details of splitter and combiner system's schematic drawings used in the transmitter.
- (xxii) Description of various interfaces, connectors, connecting cables and accessories used in the FM transmitter.
- (xxiii) A complete list of all parts/transistors/ICs/components (alongwith part numbers of OEM of the components) used in the transmitter must be provided.
- (xxiv) The make and number of LDMOS/MOS devices used in the power amplifier must be mentioned clearly.
- (xxv) Technical data sheet of all high power RF devices/RF components used in the transmitter.
- (xxvi) All details of putting "ON" and "OFF" the transmitter with the sequence of operation of the transmitter.
- (xxvii) Procedure for changing the frequency of operation of the transmitter.
- (xxviii) Procedure for operating the transmitter below the rated power of 20 kW.
- (xxix) The detailed procedure and possibilities of by-passing control circuit should be described with diagrams.
- (xxx) The description of manual operation of control system and cooling system.
- (xxxi) All the screen shots of display of control unit in sequential manner for operation, monitoring and control of each unit viz., Exciters, PAs, cooling systems, power supply, various settings in software etc.
- (xxxii) **All Do's and Don'ts which are essential for safe Operation & Maintenance of the transmitter should be described.**
- (xxxiii) The various test and measuring equipment required and essential for the routine maintenance and calibration along with the procedure for taking such measurement should be mentioned.
- (xxxiv) Various test fixtures and accessories required for the maintenance/repair of the FM transmitter should be described clearly.
- (xxxv) The detailed procedure for trouble shooting of the FM transmitter preferably up to component level should be described.
- (xxxvi) The systematic trouble shooting/flow tree and flow diagram should be provided for diagnosis of the faults with their remedial measures.
- (xxxvii) The maintenance schedule for the transmitter should also be described.
- (xxxviii) General description of electrical power distribution and schematic drawing of power supply system used for the transmitter system.
- (xxxix) Signal/voltage details of all interlocking connectors should be provided.

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Rajendra Kumar, DE

Anil Chandra, DDG/ET

Surya Prakash

1.4.8 List of equipment for which respective OEMs' compliance statements, guarantee certificates and certificates for authorization for after sales support is required:-

- (i) Transmitter including automatic changeover control unit
- (ii) Dummy Load-25 kW
- (iii) Thin line power meter
- (iv) RF coaxial copper rigid lines & accessories
- (v) Motorized RF coaxial changeover switch

All the above documents are necessarily to be provided on respective OEMs' letterhead, duly signed by authorized signatory of the OEM with name and designation of authorized signatory. The documents must have clear reference of item being offered by the respective OEMs.

1.4.9 In addition to above, the tenderer is also required to submit the document (s) information as asked elsewhere in the technical specifications.

1.5 DOCUMENTS TO BE SUPPLIED BY THE TENDERER WITHIN 15 DAYS AFTER ISSUE OF ACCEPTANCE OF TENDER:

One set of **Technical Manuals** (containing all the details as in 1.4.7(a) & (b) for Installation, Testing, Commissioning, Operation, Maintenance & Servicing, including theory of operation, circuit description with detailed circuit drawings and fault diagnosis), **COLOUR** printed and duly bound, for 20 kW Digital Compatible FM transmitter in (1-1) configuration, Automatic Changeover Unit (ACU), Dummy Load, Thin Line power meter, Motorized RF coaxial changeover switch, RF coaxial copper rigid line, Remote Monitoring & Control facility etc. along with one soft copy on Pen drive must be supplied to "The DDG (E-FM), P & D Unit, DG AIR, New Delhi-110011".

1.6 INFORMATION TO PRECEDE DESPATCH OF EQUIPMENT:

Following information should be supplied to The DDG (E-FM), P & D Unit, DG AIR and consignees prior to dispatch of equipment:

- (a) Detailed list of equipments under dispatch.
- (b) Photograph showing location of various units/units with item numbers marked thereon.

1.7 DOCUMENTS TO BE SUPPLIED ALONG WITH EQUIPMENT:

Technical Manuals (containing all the details as in 1.4.7(a) & (b) for Installation, Testing, Commissioning, Operation, Maintenance & Servicing, including theory of operation, circuit description with detailed circuit drawings and fault diagnosis), for 20 kW Digital Compatible FM Transmitter in (1-1) configuration, Automatic Changeover Unit (ACU), Dummy Load, Thin Line power meter, Motorized RF coaxial changeover switch, RF coaxial copper rigid line, Remote Monitoring & Control facility etc. and inspection report shall be supplied as per the details given below:-

- (i) For Consignee: 2 Sets of technical manual in hard copies Colour printed and duly bound along with one soft copy on pen drive.
- (ii) For the following Offices/Officers-One soft copy on pen drive for each offices/officers:
DDG(FM), DDG(E-FM), Zonal Office (Maintenance Wing of South zone), Zonal Office (Project Wing of south zone), Technical Library(P&D Unit), R&D & NABM(T)


S.P. Singh, AE


Manager AE, ADP


Rajendra/Nahar, DE


Aditya Chandra, DDG(FM)


S. Jyoti, DDG(E)

Specification No: 20 kW FM TX/2/April/2020-10(FM/5M)

1.8 DELIVERY PERIOD OF EQUIPMENT:

Supply will have to be completed within four months from the date of Acceptance of Tender or three months from the date of the Decision Letter from AIPC (whichever is required) in respect of RF equipment, provided by AIR, whichever is later.

1.9 GUARANTEE:

The tenderer shall submit with his offer an undertaking to accept the following guarantees:

(This guarantee clause is applicable to all the equipments/items mentioned in Schedule of Requirements/Materials (as priced)).

- (i) 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.
- (ii) A guarantee to make good within 15 days (from the date of first intimation to OEM/tenderer) at tenderer's expense any component which becomes defective under normal operating conditions for 60 MONTHS from the date of supply. If the tenderer failed to rectify the fault within the stipulated period of 15 days, the guarantee period for that particular equipment/item would be extended corresponding to the outage period.
- (iii) A guarantee to supply all components for a period of ten years from the date of supply. A note at which these are being supplied by the firm to other customers and also should match prices of original manufactures of these components prevailing at that time.
- (iv) If at any stage during next 10 years, the manufacturer stops production of this model of transmitter, the firm shall intimate All India Radio in advance to enable the latter to stock the critical items.

1.10 INSPECTION:

1.10.1 Detailed inspection of transmitters on dummy load will be carried out at tenderer's Works/Site by two Engineers of All India Radio as per details given in Annexure-I.

1.10.2 Call for Pre-shipment Inspection (PSI) of transmitter at tenderer's Works/Site (to be given by the tenderer to All India Radio at least 2 weeks in advance. Inspection period will be four days including one day to test the compatibility of the transmitters for HD or DRM mode. Testing/measurement reports as per approved ATP must be submitted to All India Radio along with the call for inspection of transmitters for analyzing etc.

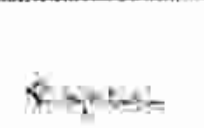
1.10.3 For AIR inspecting engineers, expenses toward to and fro air journey, boarding, lodging etc. will be borne by All India Radio.

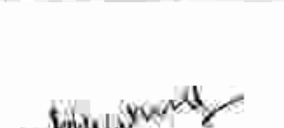
1.10.4 The complete Acceptance Test Procedure/Protocol (ATP) will be prepared by the OEM of the transmitter and submitted to DDG (F-FM), P&D Unit, DG, AIR for approval within 15 days of issue of Acceptance of Tender. ATP will also indicate full details of setup for measuring/testing equipments to be deployed during the performance measurements/inspection. The approved ATP shall form the basis for performance measurements/inspection to be carried out. AIR has the right to include other technical parameters in ATP submitted by OEM within the ambit of specification of the product offered.

1.10.5 Inspection of all other associated equipment/items i.e. Dummy Load, Motorized RF coaxial


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S. H. Datta, DE

changeover switch, RF coaxial copper rigid line etc. as per details given in Annexure-1.

1.11 SPARES (Optional):

- The minimum recommended essential spares as per Section-VI D) and any other critical spares suggested by the OEM, required to maintain the continued service of the transmitter in a reliable manner, shall be quoted by the tenderer.
- The minimum recommended essential spares may be based on predicted rate of failure.
- In case, the tenderer quotes the optional items as 'a lot', the details of the components/items offered in the lot must be spelt out clearly including their Make & Model and quantity. Failing which the tender offer is liable to be rejected.
- All India Radio at its own discretion may procure essential spares for a value not exceeding 10% of the cost of equipments. The tenderer should quote all the essential spares.

1.12 ESSENTIAL REQUIREMENT FOR LOCAL OFFICE/AUTHORIZED REPRESENTATIVE/DEALER IN INDIA FOR AFTER SALES SUPPORT:

- The OEM should have complete setup for maintenance/repair of the transmitter in India, either at its own or through local office/authorized representative/dealer.
- The local office/authorized representative/dealer will be the nodal point for resolving issues related to after sales support. It is the responsibility of local office/authorized representative/dealer to arrange the repair/replacement of faulty items. Any module of transmitter or other equipment requiring repairs will be repaired at site. If it is not feasible to repair the module at site, the same will be collected from the site by local office/authorized representative/dealer that will arrange repairs locally. The cost of transportation, repairs etc. shall be borne by the tenderer during the guarantee period.
- After sales support for the repairs/maintenance of transmitter system after the completion of guarantee period, shall also be provided by the respective OEM of the transmitter and other associated equipments through their local offices/authorized representative/dealers in India.
- The details of technical facilities available with local office/authorized representative/dealer for after sales support such as test bench, necessary test & measuring equipment and photographs thereof, must be provided in the technical bid.
- At the discretion of AIR, the representatives of AIR may visit the works of local office/authorized representative/dealer of OEM in India to ensure/verify that adequate technical infrastructure is available for after sales service for timely resolving the issues related to attending/replacing the equipments. Tenders from the tenderers who failed to meet these criteria shall be considered incomplete and is liable to be rejected.

1.13 TRAINING:

- OEM's Engineer(s) shall train total 15 AIR Engineers for 5 working days at AIR site / Delhi to enable them to become acquainted with all particulars as well as installation, operation, maintenance, trouble shooting of the transmitter and associated equipments at no cost to AIR. However, AIR shall bear all touring expenses of AIR Engineers deputed for training and the same is not to be included by the tenderer.


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Rajendra Kumar, DI


Anil Kumar, DDCI


S. Hyder, DDO

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in their offer.

- b. The training shall cover theoretical concepts, illustration of salient features, configuration of transmitter, operational, maintenance & servicing, fault finding, circuit tracing, component/module replacements, trouble shooting, preventive maintenance, remote control operation and other relevant topics etc. related to the transmitter.
- c. Training material in hard and soft copies are to be provided by the OEM to each AIR engineer undergoing the above training.
- d. **Colour printed & duly bound two sets of training lecturer notes, schematic drawings, hand books etc.** shall be supplied to DDG (E-FM), P&D Unit, DG: AIR within One Month after approval of ATP.

1.14 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 DDG (E-FM), P & D Unit, DG: AIR, New Delhi.

1.15 ENVIRONMENTAL CONDITIONS FOR TRANSMITTER AND ALL ASSOCIATED EQUIPMENT:

Ambient temperature range for operation	$0^{\circ}\text{C}/0 \pm 45^{\circ}\text{C}$
Relative humidity	: 95 percent non-condensing
Working altitude	: Up to 2000 meters AMSL

1.16 POWER SUPPLY FOR THREE PHASE EQUIPMENT:

Operating Line Voltage	AC Three phase 4 wire, 300V $\pm 10\%$
Frequency & Power Factor	50Hz $\pm 4\%$ & Better than 0.9 respectively

1.17 POWER SUPPLY FOR SINGLE PHASE EQUIPMENTS:

Operating Line Voltage	AC Single phase 230V $\pm 10\%$
Frequency & Power Factor	50Hz $\pm 1\%$ & Better than 0.9 respectively

1.18 DEMONSTRATION OF THE OFFERED TRANSMITTER THROUGH WEB CONFERENCING:

The tenderer will have to arrange a demonstration of the offered Transmitter through web conferencing during technical evaluation stage, if required by AIR, within 10 days of the issue of request letter. Accordingly, the tenderer should be in readiness for web demonstration, failing which the tender offer is liable to be rejected without any further correspondence.

Functional checking as per AIR specification under Section-II and performance measurements as per AIR specification under Section-III will be carried out on a single transmitter during web demonstration. Complete system in (1-1) configuration and Digital compatibility of the transmitter will be carried out during TDU only.

The tenderer will also have to make all necessary arrangement for functional checking/testing of the offered transmitter with full rated power during web demonstration. All expenses & liabilities for demonstration through web conferencing of above offered VHF FM transmitter will be borne by the tenderer. This web demonstration will be purely for Technical Evaluation of the offered VHF FM transmitter and is without any commitment for acceptance of offer.


M. P. Singh-SE


Manoj Kumar, ADP


Rajendra Kumar, DE


Anil Kumar, DDG (E-FM)


S. V. Kumar, TDCD

SECTION-II TECHNICAL DESCRIPTION OF TRANSMITTER

1.0 TRANSMITTER CONFIGURATION:

20 kW Digital Compatible FM Transmitter (Liquid Cooled) in (1+1) configuration with automatic changeover unit shall be supplied with the following configurations:-

- a) Each 20 kW Digital Compatible FM Transmitter shall be supplied with two Exciter units i.e. one set of 20 kW Digital Compatible FM Transmitter in (1+1) configuration shall have total four Exciter Units. The second Exciter unit will work in hot or active standby in automatic changeover mode (with manual override) which will also incorporate auto audio (Analog L/R, ALS/EBU, RDS/DARC, SCA) changeover. The automatic changeover of Exciter should take place when power of active Exciter goes down by $\geq 3dB$.
- b) 20 kW Digital Compatible FM Transmitter shall be configured to operate in (1+1) mode. The second 20 kW Digital Compatible FM Transmitter will work as hot or active standby in automatic changeover mode (with manual override). The operation in (1+1) configuration is done by an Automatic Changeover Unit (ACU). The automatic changeover of Transmitter should take place when power of active Transmitter goes down by $\geq 3dB$.
- c) The audio shall be fed to both the Transmitter Units from single external audio source and therefore, proper arrangement of feeding the audio (Analog L/R, ALS/EBU, RDS/DARC, SCA) to both the Transmitters through audio distribution unit shall be made.
- d) 20 kW Digital Compatible FM Transmitter in (1+1) configuration should have provision for automatic switching of either 20 kW Digital Compatible FM Transmitter to the Antenna & Dummy load. The automatic changeover of transmitter should take place when power of active transmitter goes down by $\geq 3dB$.
- e) 20 kW Digital Compatible FM Transmitter shall be frequency agile and capable of giving ≥ 20 kW power with 5% headroom. It should consist of four or more number of low power hot pluggable modular power amplifiers.
- f) The 20 kW Digital Compatible FM Transmitter should be compatible for HD Radio and DRM+ mode for future upgradation. Details regarding the compatibility of the transmitter should be given by the tenderer in the tender offer. HD/DRM+ Equipments shall not be the part of supply in respect of this tender. However, all necessary equipments required for checking the compatibility of the offered FM transmitter in HD or DRM+ mode during PDI at tenderer's works/site will be arranged by the tenderer.
- g) The 20 kW Digital Compatible FM Transmitter should have the facility on the front panel of the transmitter for selection of either FM Mode OR Digital Mode OR (FM + Digital Mode) so that external HD Radio OR DRM+ Modulator is selected in place of FM Exciter.
- h) The Power Amplifiers of the 20 kW Digital Compatible FM Transmitter should be able to switch into class AB linear mode for OFDM use without any requirement of modifications in the supplied transmitter equipment.


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S. Prasad, DPO

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- i) The transmitter will be complete in all respects. All India Radio will provide three phase, 4 wire power supply at a single point as per Section-I. All other transmitter's sub-system shall derive supply through this source. No other voltage will be acceptable to AIR at the transmitter's input circuit breaker and failing which the offer is liable to be rejected. The performance of transmitter as per parameters in Section-III should be ensured without degradation with the given power supply tolerances.
- ii) The transmitter should be suitable for unattended 24x7 operations.
- iii) The transmitter equipment shall be housed in a rack having pleasing appearance. All metal works shall be protected against rust and corrosion. All materials used in transmitter shall be non-flammable and fire retardant.
- iv) All stages i.e. Exciter unit, IPA (as the case may be), PAs, combiner, harmonic filters etc. should be capable of operation in the entire VHF Band i.e. 88 MHz to 108 MHz without change of components/settings/tuning.
- v) The transmitter shall be suitable for Mono and Stereo FM Radio Broadcast.
- vi) Transmitter should be of modular design for easy maintenance & part replacement. It should be possible to take out PA module without "switching off" the transmitter.
- vii) The transmitter construction shall ensure complete shielding of high power RF circuits to minimize radiation. The FM transmitter will have to work in a common transmitter hall having other high power Medium Wave transmitters, Short Wave transmitters, TV transmitters in VHF & UHF band as well as other FM transmitters. Therefore, the transmitter should be adequately protected from resultant E.M.C. (Electro Magnetic Compatibility) as per IT5-300447.
- viii) It should comply with IEC 60215 safety standards so as to eliminate hazards to personnel. Access to parts carrying dangerous voltages shall be through interlocked doors.
- ix) The transmitter will consist of solid state devices such as MOSFETS in IPA (if applicable)/PA stages. It must have auto ramp up circuit for power rise when transmitter is "switched-on". It should be possible to vary the transmitter power from a low value (minimum 2 kW) to full value from front control panel. Details to be provided by tenderer.
- x) The Power Amplifiers and Exciter Unit of one transmitter should be interchangeable with second transmitter and vice-versa.
- xi) The life of transmitter should be at least ten years and it must be certified by the OEM.

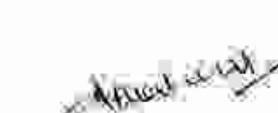
2.1 Exciter:

2.1.1 The Exciter should have Direct Digital Synthesis. It should accept Analog Mono, Analog Stereo


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Kaundin Naban, DE


Aditya Chaturvedi, EDO (ET)


K. Hyde, MDO

(left and right) / Encoded Stereo signals (MPX), RDS/DARC, SC/A and AES/EBU inputs. It should be compatible for Mono and Stereo Broadcasting using pilot tone system.

- 2.1.1 All the input modules mentioned in 2.1.1 must be included in the offered Exciter unit i.e. in board or separate input modules to be used in one or same slot.
- 2.1.2 It should have its own manually adjustable power control. The pre-emphasis should be selectable/switchable.
- 2.1.3 It should display various parameters like forward and reflected power, frequency deviation, input audio level on its panel meters or LCD display. Status and faults should also be indicated. Full details of parameters being measured/displayed to be provided.
- 2.1.4 It should be synthesized with easy channel selection of minimum 10 kHz spacing i.e. can be operated on any of the frequency in VHF Band i.e. 88 MHz to 108 MHz. The Exciter should be "Frequency agile" i.e. not requiring any tuning over its entire specified operating frequency range.

- 2.2 **Intermediate Power Amplifier Modules** If Intermediate Power Amplifiers are provided as per design of manufacturer, Total transmitter output power will be developed by an optimum combination of low power IPA modules and should be frequency agile and capable of operation in the entire VHF Band i.e. 88 MHz to 108 MHz without tuning.

The rated power output of the IPA unit and its maximum power output should be indicated. IPAs must be protected against "short" & "open" loads, "over-current", "high VSWR", "over-temperature", "over-drive" etc. The efficiency figures for each IPA are to be mentioned.

- 2.3 **Power Amplifier Modules** Total transmitter output power will be developed by four or more number of hot pluggable Power Amplifiers (PAs) and should be capable of operation in the entire VHF Band i.e. 88 MHz to 108 MHz without tuning.

Each of the Power Amplifier (PA) should be inter changeable in any position. The rated power output of the PA unit and its maximum power output may be indicated. PAs must be protected against "short" & "open" loads, "over-current", "high VSWR", "over-temperature", "over-drive" etc. The efficiency figures for each PA are to be mentioned.

- 2.4 **Combiner Unit:** The final power combiner required to provide desired output power level by combining the power of various output power amplifier modules/stages shall be of such type so as to be capable to operate in entire VHF Band i.e. 88 MHz to 108 MHz without any tuning & change of components/settings.

The tenderer shall offer both transmitters of 20 kW Digital Compatible FM transmitter (F41) set in separate cabinet/each. No other combination shall be acceptable.


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Anand K. Singh, AUP


Rajendra Nath, DE


Aditya Chandra, DDC(B)


S. K. Singh, DDC(B)

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The tenderer shall indicate the reduction in transmitter RF output power in case of failure of individual Power Amplifier units in the following format:

S. No.	Number of PA Unit failure	Transmitter RF Power Output in kW
1	One No.	_____ kW
2	Two Nos.	_____ kW
3	Three Nos.	_____ kW
4	Four Nos.	_____ kW
N	N...Nos.	_____ kW

Absorbers should be designed suitably so that they do not fail due to heat dissipation, in case of failure of power amplifiers resulting in unbalance power dissipation in absorbers.

2.5 **Final Output Harmonic Filter for transmitter:** The final Output/Harmonic Filter should be capable of operation in the entire VHF Band i.e. 88 MHz to 108 MHz **without tuning & change of components/settings**. The details along with schematic diagrams should be enclosed in the tender.

2.6 **Protection System:** Adequate protection system should be provided to safe-guard the system from damage under fault conditions. The protection system should be fast acting to safe-guard the system and components. Following are the typical requirements in this regard:

- 2.6.1 Protection against over loads, transients, severe fluctuation/variation in power supply, any other malfunctioning etc. for transmitter as well as individual PAs etc.
- 2.6.2 Protection against over temperature of heat sinks.
- 2.6.3 Protection against pump failure and less volume of cooling.
- 2.6.4 Protection against high VSWR including open and short conditions at output.
- 2.6.5 Immediate power fold back under severe/damaging fault conditions of VSWR and temperature. The power of transmitter should automatically come down to a suitable safe design limit, so that the transmitter and its subsystems do not get damaged due to load mismatch/high temperature. Details of fold back are to be provided.
- 2.6.6 Transmitter should be protected against lightning by providing DC/RF discharge path and details of the same are to be given.

2.7 **Control and Interlocking:**

2.7.1 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 or manual controls on transmitter panel. Switching-in of the auxiliary units such as Dummy Load, Reject loads, exhaust fan and shall be suitably interlocked. External units and accessories like Dummy Load, Change over Switches etc. should be wired in transmitter interlock.

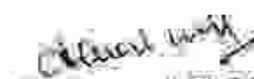
2.7.2 Details of the control/monitoring/protection unit should be given.

2.7.3 It should be possible to switch off the entire transmitter in emergency by the operation of a single


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Aditya Chandra, JTO/CE


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push button/manual command. This should be on front panel.

- 2.7.4 Sequences of sequential operations of switching "ON" and "OFF" of the transmitter shall be indicated by use of suitably coded electronic display or through WEB GUI. In addition, all protections as indicated in clause 2.6 shall remain indicated until reset. The fault indication shall be supplemented with audible alarm.

2.8 INSTRUMENTATION & INDICATIONS:

All important parameters required for monitoring and fault diagnosis should be displayed on either respective meters or on LCD display. Some of these are Forward & Reflected power of transmitter and individual PA units.

- 2.8.1 Transmitter status and fault conditions shall be indicated by colour coded display.
- 2.8.2 Transmitter shall have the facility to display Forward and reflected transmitter output power.
- 2.8.3 Suitable test points for operational check outside the module shall also be provided.
- 2.8.4 RF Outputs (Forward and Reverse) should be provided on connectors for performance measurement.

2.9 COOLING SYSTEM:

- (a) The transmitter must have closed circuit liquid cooling system. Air cooled transmitter system is not acceptable. The cooling system alongwith required pipes and hoses must be provided by the OEM of the transmitter only. Full details of liquid cooling system and subsystems shall be given.
- (b) Normal and standby transmitter in (1+1) configuration shall have separate and independent cooling system and heat exchangers. Each transmitter cooling system should have two nos. of pumps & two nos. of heat exchangers for adequate redundancy of pumps and fans with automatic changeover to make it fully reliable. Manual changeover should also be possible.
- (c) The detail of type of coolant and quantity required against each transmitter must be provided by the OEM of the transmitter.
- (d) Full required quantity of the spare coolant is also to be supplied with the system in addition to the filled up quantity for the transmitter.
- (e) A proper and professional coolant filling arrangement shall also to be supplied with the cooling system.
- (f) Particle filter, monitoring of temperature at inlet and outlet, flow sensors and pressure sensor should be provided.
- (g) One set of all the essential tools required for installation, maintenance & servicing of cooling system must be supplied with each transmitter.
- (h) Tubes and hoses on amplifiers etc. shall be of self-locking type so that no liquid leaks during changeover/replacement/repairing.
- (i) Outside temperatures may vary from -10°C to 50°C . Heat exchanger and liquid coolant used must be compliant with these temperature variations.
- (j) The capacity of the heat exchanger and the pumps etc. should be such that it is suitable for the Transmitter.
- (k) Full detailed description of the liquid cooling system is to be provided with the offer. A typical diagram showing details of liquid cooling system and heat balancing of transmitter system bringing out all special


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requirements should be attached with the offer.

- (1) A typical layout showing the maximum permissible distance between the transmitter and the cooling system (Pump assembly and heat exchanger assembly) must also be provided with the offer. The necessary length of the pipes as per the maximum permissible distance must be supplied.

2.10 TRANSMITTER POWER SUPPLY:

The transmitter shall be complete in all respects. AIR shall provide three phase, 4 wire power supply as per Section-1 at a single point. All the power supply required for the transmitter and its associated equipments should be derived from the same point.

The AC and DC supply should have their protective devices. Separate External suitable Ferrite-Core of reputed make (Fair-Rite etc.) should be provided at the power supply input terminal in addition to other protections whatever already provided against RFI/EMI. The rectifier and filter circuits should be able to take care of swifiting voltage surges on power lines. Adequate metering / indications like DC voltage and current to be provided. Power supply unit to be protected against "over temperature", "over-current" and "over-voltage", transients etc. The imbalance between the phases shall not exceed by 10% of the total line/phase current during normal conditions of operation. The tenderer shall provide following technical details as per table given below, failing which the offer is liable to be rejected.

Transmitter Power in kW	Phase Current (I _a) Amp.	Phase Current (I _b) Amp.	Phase Current (I _c) Amp.	Neutral Current (I _n) Amp.
1				
2				
4				
6				
8				
10				
>				
Upto 20				

2.11 AUTOMATIC CHANGEOVER CONTROL UNIT (ACU):

- (i) One Automatic Changoover Unit (ACU) for operating the transmitter in (1-1) configuration to facilitate automatic switch "ON" of the 2nd transmitter (fail in case of failure of RF output of 1st transmitter) will shall be offered by the tenderer.
- (ii) Any one of the 20 KW Digital Compatible FM transmitter unit shall be submittible as master or slave automatically in active standby mode. When the RF power of the 1st transmitter goes down by 3 db or more, it should be sensed as a failure to switch to second transmitter automatically. In case of failure of the complete system, there shall be interval adjustable up to 1 minutes to switch ON the master/slave transmitter shall be done before final switch OFF.
- (iii) Arrangement shall be made for bypassing the ACU in case of its failure so as to enable operating personnel to operate the transmitters in the manual mode.
- (iv) Power Supply to the ACU shall be fed through the UPS.


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Rajendra Nath, DE


Anil Kumar, EDC/DE


Sushant, DED/DE

(v) The changeover time between the two transmitters should be ≤ 10 seconds.

2.12 REMOTE MONITORING & CONTROL FACILITIES:

- a) The transmitter shall have the facility for remote monitoring and control from distant location with web browser-based GUI and third party Network Management System/SNMP over TCP/IP using broadband connection with fixed IP, with password protection using any PC/laptop or smart phone.
- b) The Remote monitoring and control facilities should be capable for controlling and monitoring various parameters of FM transmitter and automatic changeover unit from a distant location.
- c) Details of monitoring, control parameters, indications & metering etc. shall also be given by the tenderer.
- d) Software and hardware required for remote monitoring and control of transmitter shall be part of the supply of the transmitter. The broadband connection with fixed IP shall be provided by A/R.
- e) MIB files will be provided by tenderer.


T.P. Singh, AE


Manoj Kumar, ADR


Rajendra Nath, DB


Aditya Chaturvedi, DDC(V)


S. Hyder, DDC(B)

Specification No: 20 kW FM TX/2/April/2020-D(TD/FM)

SECTION-III TECHNICAL SPECIFICATIONS OF TRANSMITTER

S. No.	TECHNICAL PARAMETERS	TECHNICAL SPECIFICATIONS
3.1	GENERAL	
3.1.1	Frequency Range	88 MHz to 108 MHz
3.1.2	Nominal Frequency Deviation	±75 kHz (peak)
3.1.3	Maximum Frequency Deviation	±100 kHz (peak)
3.1.4	Frequency Setting	Direct from front panel in 10 kHz steps
3.1.5	Class of Emission	180K/P8E
3.1.6	Stereo Transmissions	Pilot tone system
3.1.7	Pre-emphasis	0, 50 µs (selectable)
3.2	RF OUTPUT	
3.2.1	Rated Output Power	≥ 20 kW continuous with 3% headroom
3.2.2	Output (Load) Impedance	50 Ω unbalanced
3.2.3	Permissible VSWR	1.5:1 with full power. Power fold-back beyond 1.5:1. Details of power fold back characteristics to be provided.
3.2.4	Harmonics and Spurious Suppression	Within limits as per Radio Regulations & ITU-R Rec. The actual values are to be indicated.
3.2.5	Overall Efficiency (AC to RF Out) for FM (Analog) Mode	≥ 70 %.
3.2.6	RF Output Connector	1-1/8" with IFA flange
3.2.7	Max. Frequency Tolerance	As per ITU-R Rec.
3.2.8	Synchronous AM S/N Ratio referenced to 100% AM modulation at 100 Hz, 50 µs Pre-emphasis with FM modulation at ±75 kHz deviation	Better than 50 dB
3.2.9	Asynchronous AM S/N Ratio unweighted, referenced to 100% AM modulation at 400 Hz, 50 µs Pre-emphasis and without FM modulation	Better than 53 dB
3.3	INPUTS	
3.3.1	Modulating Input Signal	Transmitter should accept Analog Mono, Analog Stereo (left and right)/Encoded Stereo Signals (MPX), AES/EBU, RDS/TARC and SC-A inputs. It should be capable for Mono and Stereo Broadcast using pilot tone system.
3.3.2	(i) Input Impedance (Analog)	10 kΩ or greater (for Mono)
		10 kΩ or greater (for Stereo)
	(ii) Input Impedance (AES/EBU)	75 Ω Nominal



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Rajendra Kumar, DE



Anil Chaturvedi, DMHF



Siddhar, DMHF

3.3	Analog and AES/EBU input level for ± 25 kHz (peak) Deviation:	ANALOG AUDIO INPUT: Input Level adjustable from -9 dBu to +6 dBu. AES/EBU AUDIO INPUT: Input Level adjustable from -15 dBFS to 0 dBFS.
3.4	POWER SUPPLY	
3.4.1	Power	Three phase, 4 wire as per Section-1
3.5	MONO OPERATION	
3.5.1	FM S/N Ratio at ± 75 kHz Deviation (30 Hz to 15 kHz), rms, unweighted (22 Hz - 22 kHz)	Better than 75 dB
3.5.2	Total Harmonic Distortion plus Noise (THD+N) (30 Hz to 15 kHz)	Better than 0.1%
3.5.3	Inter Modulation Distortion (IMD) SMPTE (60 Hz/7 kHz, 4:1)	Better than 0.1%
3.5.4	Amplitude Response (30 Hz to 15 kHz)	Better than or equal to ± 0.1 dB
3.6	STEREO OPERATION	
3.6.1	Stereo Separation at ± 75 kHz Deviation (30 Hz to 15 kHz)	Better than 50 dB
3.6.2	Linear Cross Talk referred to 100% modulation (30 Hz to 15 kHz)	Better than 50 dB
3.6.3	Non-linear Cross Talk referred to 100% modulation	Better than 50 dB
3.6.4	FM S/N Ratio at ± 75 kHz Deviation (L or R) (30 Hz to 15 kHz) rms, unweighted (22 Hz - 22 kHz)	Better than 75 dB
3.6.5	Total Harmonic Distortion Plus Noise (THD+N) (L or R) (30 Hz to 15 kHz)	Better than 0.1%
3.6.6	Inter Modulation Distortion (IMD) SMPTE (L or R) (60 Hz/7 kHz, 4:1)	Better than 0.1%
3.6.7	Amplitude Response (L or R) (30 Hz to 15 kHz)	Better than or equal to ± 0.1 dB
3.6.8	Pilot Tone Stability	As per ITU-R Rec.
3.7	WIDEBAND COMPOSITE OPERATION	
3.7.1	FM S/N Ratio at ± 75 kHz Deviation, rms, unweighted (22 Hz - 22 kHz)	Better than 75 dB
3.7.2	Total Harmonic Distortion Plus Noise (THD+N) (30 Hz to 15 kHz)	Better than 0.1%
3.7.3	Inter Modulation Distortion (IMD) (SMPTE) (60 Hz/7 kHz, 4:1)	Better than 0.1%
3.7.4	Amplitude Response (30 Hz to 100 kHz)	Better than or equal to ± 0.1 dB
3.8	Turn Around Loss	Better than 20 dB (Measurement set-up should be enclosed with the tender documents).
3.9	DIGITAL OPERATION:	The Transmitter should be compatible for HD Radio and DRM mode for future.

S.P. Bhattacharya

Srinivasa Rao, ADP

Rajendra Nathar, DP

Aditya Chaturvedi, TENG (E)

S. Hydari, BPO (E)

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		upgradation whenever required.
3.9.1	MER (Modulation Error Ratio) for HD Radio	To be given by the tenderer.
3.9.2	MER (Modulation Error Ratio) for DRM+	To be given by the tenderer for 16-QAM & 32-QAM respectively.
3.9.3	Simulcast FM operations with HD/DRM+	Analog & Digital Power with bandwidth requirement for HD & DRM+ may be specify.

3.10. TECHNICAL SPECIFICATIONS OF REMOTE MONITORING & CONTROL FACILITIES:

S.No.	TECHNICAL PARAMETERS	TECHNICAL SPECIFICATIONS
1.	Remote Monitoring and Control facility (Controllable Settings/Parameters)	1. Transmitter ON/OFF 2. Exciter ON/OFF 3. Exciter 1/ Exciter 2 selection 4. RF Output Power Level Control 5. Audio input level 6. Selection of Transmitters 1&2
2.	Remote Monitoring and Control facility (Monitorable Settings/Parameters)	1. RF forward and reflected power of each Exciter 2. RF forward and reflected power of small Power Amplifier 4. Power supply status i.e. Voltages, Currents etc. 5. Alarm Indications, Temperature, VSWR, ON/Alk, Audio etc. 6. Demodulated audio/data 7. Any other parameters which the manufacturer considers essential for proper control/ functioning of a remote-controlled FM transmitter.
3.	Data Format	To be indicated by tenderer and compatible for above system.
4.	Data Rate	To be indicated by tenderer and compatible for above data format.
5.	General Purpose PC	8 th Generation, Intel Core i7 processor equivalent or higher, minimum 19" FHD Screen, 8 GB RAM, Windows-10 or latest Operating System, Hard drive(Solid State Drive), 512GB, 4 USB ports (3.1) & Card Reader, Headphone/ Mic Combo, HDMI (2.0), RJ45
6.	Software and Hardware Items	Complete software, hardware items, accessories, cables, connectors, Extension cables etc. (Details of offered items are to be given by the tenderer) Broadband internet connection with fixed IP shall be provided by ATR.


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Mahesh Ch., ADF


Rajendra Nalla, DE


Aditya Chaturvedi, HBS (P)


Shyam, HBS (P)

SECTION-IV TECHNICAL SPECIFICATIONS OF ASSOCIATED EQUIPMENTS/ITEMS

SECTION-IV(A) - TECHNICAL SPECIFICATIONS OF 25 kW AIR COOLED DUMMY LOAD

4.1

Dummy Load: One number, 25 kW forced air cooled Dummy Load, 50 Ω are to be quoted for transmitter as per technical specifications given below.

All the technical specifications/parameters are to be supported with printed technical literature/data sheet etc. from the OEM.

DUMMY LOAD-25 kW

S. No.	TECHNICAL PARAMETERS	TECHNICAL SPECIFICATION
4.1.1	Power Rating	25 kW continuous
4.1.2	Connector	3-1/8" EIA Flange
4.1.3	Frequency Range	88 to 108 MHz
4.1.4	VSWR	≤ 1.05
4.1.5	Impedance(Nominal)	50 Ω
4.1.6	Load Cooling	Forced Air cooled
4.1.7	AC Power Supply	As per Section -I
4.1.8	Dimensions (Length x Width x Depth)	To be given by the tenderer.
4.1.9	Weight	To be given by the tenderer.
4.1.10	Environmental Conditions	As per Section -I

THRU LINE RF POWER METER

S. No.	TECHNICAL PARAMETERS	TECHNICAL SPECIFICATION
4.1.11	RF Power Meter (dual type) with simultaneous FORWARD & REFLECTED power measurement suitable for mounting in 19" rack with separate Transmitters/Sensing elements for measuring forward (≤ 25 kW) & reflected (≤ 2.5 kW), elements sockets, line section and 3-1/8" EIA flanges including all accessories, cables complete (2 Nos.) as per specifications for connecting with the rigid line. The RF power meter may also be suitable for digital modulated RF power. All the technical specifications/parameters are to be supported with printed technical literature/data sheet etc. from the OEM.	1 Set
4.1.12	Power Rating Forward Power	25 kW continuous
4.1.13	Power Rating Reflected Power	2.5 kW
4.1.14	Frequency Range	88 MHz to 108 MHz
4.1.15	VSWR	≤ 1.15
4.1.16	Impedance	50 Ω
4.1.17	Accuracy	$\pm 5\%$ or better
4.1.18	Directivity of Line Section	30 dB or Better



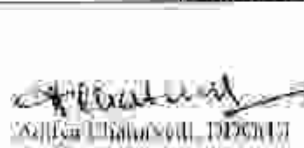
P. S. Sankar



S. S. Sankar



Rajendra Kumar DE



S. S. Sankar



S. S. Sankar

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4.1.19	VSWR of Line Section	< 1.05
4.1.20	AC Power Supply	As per Section-1
4.1.21	Dimensions (Length × Width × Depth)	To be given by the tenderer
4.1.22	Weight	To be given by the tenderer
4.1.23	Environmental Conditions	As per Section-1

SECTION-IV(B)-TECHNICAL SPECIFICATIONS OF MOTORISED RF CO-AXIAL CHANGEOVER SWITCH

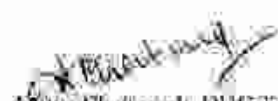
4.2 Motorized RF Co-axial Changeover switch: Four ports, 3-1/8" Motorized RF coaxial Changeover switch fitted with 3-1/8" matching EIA flanges for connecting rigid line, including control panel, is to be quoted as per technical specifications given below. RF coaxial switch should also work in manual mode. The switch should be equipped with a visual position indicator and emergency knob for manual switching. All the technical specifications/parameters are to be supported with printed technical literature/data sheet etc. from the OEM.

S. No.	TECHNICAL PARAMETERS	TECHNICAL SPECIFICATIONS
4.2.1	No. of Ports	4
4.2.2	Input Ports (two), Output Port(one), Termination/Dummy Load Port(one)	3-1/8" EIA male.
4.2.3	Frequency Range	28 MHz to 108 MHz
4.2.4	Impedance (Nominal)	50 Ω
4.2.5	Power Supply	As per Section -1
4.2.6	Control Voltage	To be given by tenderer
4.2.7	Average Power Handling Capacity	>=3.0 kW
4.2.8	Isolation	> 60 dB
4.2.9	VSWR	< 1.05
4.2.10	Insertion loss	< 0.05 dB
4.2.11	Mechanical life	> 1, 00, 000 operations
4.2.12	Switching time	< 2 sec.
4.2.13	Signaling and Interlock Contacts	The interlock contacts should be coupled with RF contacts for interrupting RF power before and during switching. They should open before the RF contacts separate and closes after the RF contacts are in their new position. The auxiliary contacts should be suitably rated.
4.2.14	Dimensions (Length × Width × Depth)	To be given by the tenderer
4.2.15	Weight	To be given by the tenderer
4.2.16	Control panel	Suitable for above Motorized RF co-axial Changeover switch.
4.2.17	Environmental Conditions	As per Section-1


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Anura Chatterjee, D/GF


S. H. Singh, D/GF

SECTION-IV (C)-TECHNICAL SPECIFICATION OF RF COAXIAL COPPER RIGID LINES & ASSOCIATED ACCESSORIES

4.3. Transmitter power will be fed to the Antenna System by an internal 3-1/8" RF coaxial copper rigid line and then an external air dielectric RF coaxial cable of suitable size.

Separate/External Earthing core suitable for 3-1/8" RF coaxial copper rigid line should be provided in addition to other protections whatever already provided against RFI/EMI.

Following are the Technical Specifications of RF coaxial copper rigid lines & associated accessories. All RF coaxial copper rigid lines with associated accessories are to be offered as per details given in SECTION-V(A). RF coaxial copper rigid lines and associated accessories should be of standard make. All the technical specifications/parameters are to be supported with printed technical literature/data sheet etc. from the OEM.

S. No.	TECHNICAL PARAMETERS	TECHNICAL SPECIFICATION	TECHNICAL SPECIFICATION
4.3.1	Size	1-5/8"	1-1/8"
4.3.2	Attenuation @ 100 MHz at 20°C	≤ 0.70 dB/100M	≤ 0.35 dB/100M
4.3.3	Average power handling capacity at ambient temperature 40°C	≥ 12 kW	≥ 45 kW
4.3.4	Frequency Range	88 MHz-108 MHz	88 MHz-108 MHz
4.3.5	Impedance	50 Ω	50 Ω
4.3.6	Material for Outer & Inner Conductor of Rigid lines	High conductivity copper conforming to 95% IACS/99% purity	High conductivity copper conforming to 95% IACS/99% purity
4.3.7	Material for Outer Conductor for Elbows & Adapters	Copper/Copper alloy	Copper/Copper alloy
4.3.8	Material for Inner Conductor for Elbows, Adapters and for all the other support inner bullets	Silver-plated brass/ Silver-plated Copper	Silver-plated brass/ Silver-plated Copper
4.3.9	Material for all the support insulators	High quality Virgin Teflon (PTFE)	High quality Virgin Teflon (PTFE)


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Rajendra Nishan, M


Aditya Chaturvedi, DSGM


S. Jyoti, ADM

Specification No: 20 KW FM TX/2/April/2020(DTD/FM)

SECTION-V (A)

Schedule of Requirements/Materials (Un-Priced) for Supply of One Set of 20 kW Digital Compatible FM Transmitter (Liquid Cooled) in (1+1) configuration & associated equipments/items

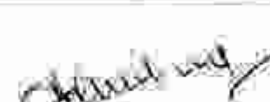
[The tenderer must quote all items]

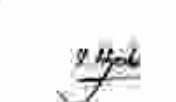
S. No.	Description	Make	Model	Qty.	Unit
(1)	(2)	(3)	(4)	(5)	(6)
1.	(i) Supply of 20 kW Digital Compatible VHF FM solid state MOSFET technology based broadcast Transmitter (Liquid Cooled) in (1+1) configuration including 4 Nos. of Exciter units in total, against both the transmitters including technical manuals as per AIR Specifications. Each transmitter shall be capable of giving ≥ 20 kW continuous power.			1	Set
	(ii) Supply of Automatic changeover unit for 20 kW Digital Compatible VHF FM solid state MOSFET technology based broadcast Transmitter (Liquid Cooled) in (1+1) configuration complete with all accessories as per specification.			1	Set
	(iii) Supply of Hardware and Software required for remote monitoring and control facilities of transmitter as per AIR specifications.			1	Set
2.	Supply of General Purpose PC suitable for Remote Monitoring & Control facilities complete as per AIR specifications (EXTS item)			1	Set
3.	Supply of complete installation material as given below such as RF Coaxial rigid lines, elbows, couplings & matching reducers wherever necessary to complete the installation for feeding to the Antenna & Dummy Load as per AIR specifications in Section-IV [Rates per meter/number shall also be quoted in addition to rates of quantity given in column (5)]			-	-
3.1	3-1/8" RF coaxial copper rigid line (complete with outer, inner & insulators)			24	Mts
3.2	3-1/8" Un-flanged 90° Elbow with equal leg (complete with outer, inner & insulators)			8	Nos.
3.3	3-1/8" Clamp type Coupling (complete with outer, inner & insulators)			12	Nos.
3.4	3-1/8" to 5 Test Reducer			2	Nos.
3.5	1-5/8" to 5 Test Reducer			2	Nos.
3.6	3-1/8" Field Flange (Clamp type)			7	Nos.
3.7	3-1/8" to 1-5/8" reducer/adaptor			2	Nos.
3.8	Hanger for 3-1/8" RF coaxial copper rigid line			12	Nos.
4.	Supply of 25 kW Forced air cooled Dummy Load, 50 Ω as per AIR specifications.			1	Set
5.	Supply of RF Power Meter (dual type) with simultaneous FORWARD & REFLECTED power measurement suitable for mounting in 19" rack with separate Transducers/Sensing elements for measuring forward (≤ 25 kW) & reflected (≤ 2.5 kW), elements sockets, line section and 3-1/8" EIA flanges including all accessories, cables complete (2 Nos.) as			1	Set


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Mukund A.V. NIDH


Rajendra Mahor, DE


Anoop Chaturvedi, DTD/21


S. P. Singh, DTD/21

	per specifications for connecting with the rigid line.				
6.	Supply of Four parts, 1-1/8" Motorized RF coaxial changeover switch with 1-1/8" matching R/A flanges for connecting rigid line including control panel as per AIR specifications.			1	Set
7.	Supply of Ferrite-C ore suitable for 1-1/8" RF-coaxial/copper rigid line for protection against RFI/EMI.			1	Set
8.	Supply of Ferrite-C ore for the power supply input terminal for protection against RFI/EMI.			1	Set
9.	Supply of any other items/accessories required for completeness of the system. Items wise details (including part number, if any) are to be given by the tenderer. State NA, if not applicable.			1	Set
10.	Inspection charges at tenderer's Works/Site of transmitter as per AIR specifications.			1	Lot



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Manojit M. ADL



Rajendra Kumar, DE



Aditya Chaturvedi, UPSC



S. Hyder, M/3(E)

SECTION-V(B)

Schedule of Requirements/Materials (Un-Priced) for Supply of One Set of 20 kW Digital Compatible FM Transmitter (Liquid Cooled) in (1-1) configuration & Associated Equipments/Items (OPTIONAL ITEMS) (Not to be considered for ranking purpose). (The tenderer must quote all items).

[illegible]

All India Radio at its own discretion may procure spares for a value not exceeding 10% of the cost of equipments. The tenderer should quote all the essential spares.



Mantecor All-AGE

Rajendra Nath DE

Autism: A Manual of Best Practice (2003)

Stylosanthes
SODIPUR (1966)

Specification No: 20 kW FM TX/2/April/2020-D(TD/FM)

ANNEXURE-I

INSPECTION DETAILS

The inspection for acceptance of the transmitter equipment on dummy load will be carried out at Tenderer's Works/Site by Engineers of All India Radio (AIR) in accordance with Acceptance Test Procedure/Protocol (A/T/P). All facilities like complete set of measuring instruments, power supply, manual assistance etc. will be provided by the Tenderer. Complete detail and specifications of the transmitter will be checked and all parameter values will be measured.

All the testing/measurements including Operational & functional checking of the transmitter during PDI at Tenderer's Works/Site, will be carried out at 105% of the rated output power of the offered transmitter. The tenderer is also required to demonstrate the digital compatibility of the offered FM transmitter in IID or DRM+ mode. However, the tenderer is required to give an undertaking during PDI that the offered transmitter is compatible for both IID and DRM+ mode. All measurements applicable for IID/DRM+ mode shall also checked as per AIR specifications. All necessary equipments required for this purpose will be arranged by the tenderer.

All the spares ordered as per AT will be tested in actual circuit at Tenderer's Works/Site by Engineers of AIR. Testing/measurements including operational & functional checking of all the transmitters shall be carried out at three different frequencies including operating frequency of the transmitter in the VHF Band i.e. 88 MHz to 108 MHz as per approved A/T/P.

Exhaustive checking and measurements will be carried out so as to comply check the compliance of the transmitter and its sub systems with the requirements as projected in the specifications. Tenderer shall also arrange for the photographs of inside of transmitter's cubicle which will be attached with the A/T/P inspection report.

Testing/measurements including Operational & functional checking of the transmitter will be carried out at Tenderer's Works/Site on three phase, 4 wire, 400 Voh (rms) $\pm 10\%$, 50 Hz $\pm 4\%$ power supply available at the transmitter's input circuit breaker without any outside transformer unit etc. No other voltage will be acceptable to AIR at the transmitter's input circuit breaker, failing which the transmitter equipment is liable to be rejected. The technical facilities/equipment for varying within $\pm 10\%$ of 400 Volts (rms), three phase, 4-wire, should be available at Tenderer's works/site for Testing/measurements including Operational & functional checking of the transmitter during the inspection. The performance of transmitter as per parameters in Section III shall be guaranteed without degradation with the given power supply tolerances.

It is mandatory that testing/measurements including operational & functional checking of all the transmitters as per approved A/T/P at these different frequencies including operating frequency of the transmitter in the VHF Band i.e. 88 MHz to 108 MHz without change of components, settings/tuning are carried out well in advance. These measurements as per approved A/T/P must be submitted to All India Radio along with the call for inspection of transmitters for analyzing etc. These measurement details, graphical plots/notes and figures must also be available at the factory at the time of inspection.

All other associated equipments/items i.e. RF coaxial copper rigid lines and accessories, Dummy Load, Motorized RF coaxial switch etc, will be accepted on the basis of OEM test certificates (as per AIR specifications) duly signed and stamped by respective OEM or the representative of the OEM, failing which, test certificates will be considered incomplete and equipment offered by the firm is liable to be rejected.

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Manzoor Ali, ADM

Rajendra Kumar, CE

Aditya Choudhary, DGCOR

S. P. Singh, SDCOR

Specification No: 201/W/FM/TN/2/April/2021-D/TD/1M1

All OEM test certificates are also to be submitted by the tenderer to AIR India Radio along with the bill for inspection for analysing etc. These OEM test certificates must also be available at the time of inspection at Tenderer's Works/Site.

Following information should also form part of above data which will also be checked for each transmitter during inspection by AIR representatives at Tenderer's works/Site:-

1. Origin of Country, Make, Type, Model & name of all parts of transmitter, other items & accessories and spares.
2. Dimensions of transmitter rack, sub-units, other items & accessories.
3. Working operation of all sub-units and accessories.
4. System configuration check and completeness of transmitter.
5. Automatic changeover of T-setter and IPA (if applicable) etc.
6. Checking meter readings and calibration.
7. Checking of control and protection system of transmitter.
8. Checking of all power levels meters, LUDs etc.
9. Checking of RF voltages on test points.
10. Interchangeability of PAs, sub-modules.
11. Bandwidth operation, checking and measurements.
12. Working of Exciter in all modes including modulating inputs as per specifications.
13. Measurement of levels in the whole AF and RF chain.
14. Checking of all spares, PCT's, modules for the respective transmitter, other items & accessories.


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Muzum Ali, ADE


Rajendra Kumar, DE


Anil Kumar, HOD/FA


S. K. Singh, HOD/FA

ANNEXURE-II

TRANSMITTER TECHNICAL DATA TO BE SUBMITTED BY THE TENDERER

S. No.	Description	Details to be submitted by the tenderer		
		Width: _____ (mm)	Height: _____ (mm)	Depth: _____ (mm)
1.0	Transmitter dimensions:			
2.0	Transmitter weight:	_____ kg		
3.0	Transmitter I lost dissipation at 20 kW RF output:	_____ kW _____ BTU / Hr		
4.0	Transmitter Air - conditioning requirement:	_____ TR		
5.0	Number of racks:	_____ Number		
6.0	Size of racks: Transmitter rack dimensions:	Width: _____ (mm)	Height: _____ (mm)	Depth: _____ (mm)
7.0	Size of Heat Exchanger of cooling system:	Width: _____ (mm)	Height: _____ (mm)	Depth: _____ (mm)
8.0	Pumps of cooling system: (Total No. of pumps):	_____ Number		
9.0	Fan of cooling system (Total No. of fans):	_____ Number		
10.0	Ful required quantity of coolant for cooling system against one 20 kW FM TX:	_____ Litres		
11.0	Power consumption at 20 kW RF output:	_____ kW		
12.0	Typical Power supply line voltages (phase to phase voltages):			
12.1	Voltage between Red phase & Yellow phase:	_____ Volt		
12.2	Voltage between Yellow phase & Blue phase:	_____ Volt		
12.3	Voltage between Blue phase & Red phase:	_____ Volt		
13.0	Typical Power supply phase voltages (phase to neutral voltages):			
13.1	Voltage between Red phase & Neutral:	_____ Volt		
13.2	Voltage between Yellow phase & Neutral:	_____ Volt		
13.3	Voltage between Blue phase & Neutral:	_____ Volt		
14.0	Typical Power supply line current/phase current:			



N. P. Singh, AE



Nandini Singh, AOE



Rajendra Singh, DE



Anil Kumar, BDO/EX



J. K. Singh, BDO/EX

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14.1	Line current/Phase current (Red phase):	 Amp.
14.2	Line current/Phase current (Yellow phase):	 Amp.
14.3	Line current/Phase current (Blue phase):	 Amp.
14.4	Neutral current:	 Amp.
15.0	Power factor:	


 Y.P. Singh, AU


 Manzoor Ali, ADE


 Rajendra Kumar, DE


 Ashish Chandra, PWD/ST


 S. Huda, TSO/GC

ANNEXURE-III

PERFORMA FOR INFORMATION ABOUT LOCAL OFFICE /AUTHORIZED REPRESENTATIVE/ DEALER IN INDIA FOR AFTER SALES SUPPORT

1.	Address of local office/authorized representative/dealer	
	Telephone (Landline) No.	
	Mobile No.	
	E-mail Address	
2.	Address for communication (if different)	
3.	Legal Status (local office/authorized representative/dealer)	
4.	Name, contact number (Mobile number) & e-mail address of official representative of the local office/authorized representative/dealer	
5.	Detail details of Technical facilities available for after sales support: The details of technical facilities available with local office/authorized representative/dealer for after sales support such as test bench, necessary test & measuring equipment and photographs thereof, must be provided in the technical bid.	
6.	Main line of business, specialization and number of years of operation	
7.	Total number of permanent technical employees including their designation and qualification	
8.	Details of Agreement/MoU for after sales support with OEM (Copy must be provided with the offer). Date of Agreement: Executed at: Executed by:	
(Authorized Signatory of local office/authorized representative/dealer) Name: Signature: Place and Date:		(Authorized Signatory of transmitter OEM) Name: Signature: Place and Date:

A. P. Singh, AE

Manoj K. P. ADP

Rajendra Nath, DC

Aditya Chaturvedi, DOG (R)

Pradyot, DOG (R)

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ANNEXURE-IV

List of Place for supply of 20 kW Digital Compatible VHF FM solid-state MOSFET technology based broadcast transmitter (Liquid Cooled) in (1+1) configuration and associated equipments/items:

S. No	Name of Places	State
1	Rameswaram	Tamil Nadu

Y.T. Singh/AM

Manoj K. A. AM

Rajendra Kumar AM

Ananya Chandra (M0004)

Rajendra Kumar AM