

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

SPECIFICATION DOCUMENT OF DRM EQUIPMENT FOR UPGRADATION OF EXISTING
36NOS OF MEDIUM WAVE TRANSMITTERS (08 NOS. OF 300KW/200KW THALES MAKE,
TYPE- S7HP, 09 NOS OF 100KW/20KW THALES MAKE, TYPE- M2W AND 19NOS OF 20KW
HARRIS MAKE, TYPE-DX-20) FOR AM/DRM/SIMULCAST MODE OF OPERATION

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N.B: 1. The tenderer should go through all the sections of these specifications carefully and should confirm clause-by-clause compliance of all the sections clearly. Tenders received without clause by clause compliance are liable to be rejected.

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

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Dy. Director Engg. (TD/MW)

SECTION - I GENERAL CONDITIONS OF TENDER / CONTRACT

1.0 GENERAL:

These specifications cover the supply of integrated system of DRM Encoder-Modulator for upgradation of existing 36Nos of , Amplitude modulated DRM compatible AM transmitters.(08 NOS of .300KW/200KW MW THALES MAKE, TYPE- S7HP, 09 NOS OF 100KW/20KW MW THALES MAKE, TYPE- M2W AND 19NOS OF 20KW MW HARRIS MAKE TYPE-DX20), for AM, DRM & AM-DRM simulcast mode of operation.

1.1: Broad scope of supplies/ services:

(a) Items to be included:

- (i) DRM Encoder Multi-Program Multiplexer
- (ii) DRM Digital Modulator / RF Exciter.
- (iii) Set of manuals for all the above equipment.
- (iv) Training of AIR engineers at AIR sites/Manufacturer's works.

(b) Items not to be included:

The following works/services are not to be quoted for by the tenderer.

- (i) Modification of transmitters
- (ii) Any item concerning Mains Supply Cable connection upto power supply distribution of DRM equipment.
- (iii) All wiring, fittings and furniture etc, which are not forming part of equipment.

1.2 LANGUAGE AND SYSTEM OF MEASURES:

All information supplied by the tenderer and all markings, notes, designations on the drawings and associated write-ups etc. shall be in "English" language.

All dimensions and units on drawings and all references to weights, measures and quantities shall be in "Metric" Units.

1.3. DOCUMENTS TO BE SUPPLIED ALONGWITH TENDER:

The tender and associated information shall be submitted in duplicate. **Sufficient information shall be furnished to enable AIR to adjudge the full merit of the offer.**

1.3.1. Compliance statement on each and every clause of these specifications (in the order in which they appear in these specifications) indicating clearly whether or not the equipment and accessories offered conforms to these specifications.

A tender without clause by clause compliance to these specifications is liable to be rejected.

1.3.2. All documents like pamphlets, data sheets, write-ups, drawings, block schematic etc.

for DRM equipment including accessories etc. in support of compliance statement will be furnished in printed form.

- 1.3.3. An overall schematic of the DRM equipment with details showing all interfaces with transmitter.
- 1.3.4. Details of the internal test procedures/standards followed for quality control of the equipment offered and to supply a copy of ISO certification.
- 1.3.5. A general undertaking to accept / furnish the guarantees, which will be required to be complied by the contractor as listed under Clause 1.10.4 of Section- I.
- 1.3.6. **Only established brands of equipments shall be accepted.** A supply record giving the names of the customers, countries, locations, year of supply at site, type and other details of the similar equipments supplied by the tenderer or his OEM for minimum one year.
- 1.3.7. An acceptance test procedure (ATP) duly approved by AIR, shall be the basis for acceptance of DRM equipments. This should include environmental & ruggedness tests in addition to the technical performance parameters.
- 1.3.8. Any other information, which the tenderer feels relevant to his offer.

1.4 DOCUMENTS TO BE SUPPLIED AFTER PLACEMENT OF ORDER/ACCEPTANCE OF TENDER :

- 1.4.1 The following documents in duplicate in hard copies as well as CD form for approval shall be supplied within **one month** of the date of acceptance of the tender to the Director Engineering (Transmitter Design Section), P&D Unit, DG: AIR, New Delhi-110 001.
- a) Detailed logistics by tenderer and required from consignee for integration of DRM equipments into transmitters for DRM operation.
 - b) Detailed technical description along with schematic and drawings of DRM equipments.
 - c) Detailed Draft "Inspection and Acceptance Test Procedure" (ATP) as per specification for approval by AIR. This ATP after approval by AIR will form the basis for final acceptance. at site.
- 1.4.2 One set each of the above mentioned documents after updating as per approval of AIR shall be supplied to the Director Engineering (Transmitter Design), P&D Unit, DG: AIR, New Delhi-110 001 and concerned Zonal Chief Engineer (Project), and two sets each to the ultimate consignee. (Total 4 sets per transmitter.)

1.5 DOCUMENTS TO PRECEDE DISPATCH OF EQUIPMENTS:

The following documents shall be supplied, one month prior to the dispatch of equipment. One set of these shall be sent to Director Engineering (TD), P&D Unit, Akashvani Bhavan, New Delhi, one set each to the respective Zonal Chief Engineer and two set to the consignee.

- (a) Detailed list of equipment under dispatch vis-a-vis reference of supply order.
- (b) Drawings / Photographs showing location of various components indicating their part numbers in the various units/sub assemblies.

1.6 DOCUMENTS TO BE SUPPLIED ALONG WITH THE EQUIPMENTS :

- 1.6.1 Along with each equipment following documents shall be supplied.

- (a) Technical Manuals covering detailed circuit descriptions, schematic/circuit drawings for operation & maintenance, fault location and troubleshooting of all the main as well as ancillary equipment, in printed form as well as CD form.
- (b) Test reports of the tests conducted on each item of equipment during manufacturing these equipments at the manufacturer's works.
- 1.6.2 Three sets each of the above [one set for Transmitter Design Section, one set for Maintenance Wing and one set for STI(T)] shall be packed separately and supplied to the Director Engineering (TD) P&D Unit, Directorate General, All India Radio, New Delhi. One set each shall be supplied to Zonal Chief Engineer (Projects), Zonal Chief Engineer (Maintenance), and two set each shall be supplied to the consignee. (Total 7 sets per transmitter.)

1.7 DELIVERY OF EQUIPMENT:

The delivery of the entire equipment at AIR site shall be completed within **09(nine)** months from the date of placement of order in case of Indian Rupee quote. In case of FOB quote, the delivery of the entire equipment at AIR site shall be completed within **09(nine)** months from the date of opening of the letter of credit. **The equipments for each of the AIR sites shall be packed separately**

1.8 PACKING & MARKING DETAILS:

Please refer to the relevant para in the booklet "Instruction to bidders"

1.9 INSURANCE AGAINST WAR AND MARINE RISK:

Please refer to Commercial terms for transportation by Sea and Land up to site.

1.10 COMPLETENESS OF SUPPLIES, QUALITY & WORKMANSHIP OF MATERIAL USED, WARRANTEE & GUARANTEE AND AVAILABILITY OF SPARES:

An undertaking to accept the following terms and conditions along with those contained in para 8, P-49 of the Booklet "Instruction to bidders" with the exception of para 8.2.2 of the Annexure II (General terms and conditions), shall be submitted along with tender.

1.10.1 Correctness, completeness shortages and damages of stores:

- (a) The stores will be complete in every respect with mountings, fittings, fixtures and standard accessories which are normally supplied even though not specifically mentioned in these specifications. The Contractor shall not be eligible for any additional payment in respect of such mounting, fitting and fixtures and accessories which are needed for safe and efficient operation of the equipment and completeness of the system at the AIR site.
- (b) The Contractor shall arrange to replenish/repair all the items reported as shortage/ damages free of cost to AIR and send the same to the ultimate consignee at the earliest, but not later than a period of one month from the date of such intimation from AIR. Payments for freight, insurance and other incidentals for such items shall be made by the Contractor. AIR shall not pay anything extra on this account.

1.10.2 Free replacement of components:

The Contractor shall furnish guarantee to make good, at his own expense, any component which becomes defective within 18 months from the date of receipt of last consignment at site or 12 months from the date of commissioning of the equipment at site, whichever is earlier. Manufacturer shall offer an exchange program to ship replacement equipment in advance from a service centre in exchange of defective equipment. This supercedes the para 8.2.2 of the Annexure II (General Terms and Conditions) of the "Instruction to Bidders".

1.10.3. Materials & workmanship:

(i) Should any defect be noticed in the design, material and /or workmanship of any equipment, within a period of 18 months from the date of receipt of last consignment at site or within a period of 12 months from the date of acceptance of the equipment, whichever is earlier, it shall be replaced by the supplier free of cost, freight and insurance paid, to the ultimate consignee. All India Radio shall inform the supplier about any defects noticed. On receipt of such intimation, the supplier shall investigate the cause of defects and submit a report within 14 days and arrange rectification/replacement / modification of the defective equipment at AIR site without any cost to All India Radio. All such rectifications / replacements modification of the defective equipment based on report shall be done immediately, within a period not exceeding one month from the date of receipt of information by the supplier at no cost to AIR. If the supplier fails to take proper corrective action to repair/ replace the defective item/items satisfactorily within the period of one month as stated above, All India Radio shall be free to take such corrective action as may be deemed necessary, after giving notice to the supplier, at the risk and cost of the supplier. This supercedes para 8.2.2. of the Annexure II (General Terms and Conditions) of the "Instruction to bidders".

(ii) In case the equipment falls short of the guaranteed performance level, All India Radio will be free to either reject the equipment completely or impose penalty on the supplier so as to recover the cost of the deficiency. However this does not entitle the supplier to deliberately supply substandard equipment or conceal the defects of the equipment supplied by Firm.

1.10.4 Availability of spares:

- i) The supplier / manufacturer shall submit an undertaking for supply of spare parts, for a period of ten years from date of commissioning.
- ii) If at any stage during next 10 years from the date of commissioning, the manufacturer stops production of this model of transmitter or any of the spare parts, the supplier is required to submit an undertaking for giving an adequate advance notice to AIR so that the latter can procure, if necessary, the balance of the life time spare parts and critical items.

1.11 INSPECTION/ ACCEPTANCE:

1.11.1 Pre-dispatch Inspection / Acceptance Tests at manufacturer's Works:

- a) AIR will depute 2(two) engineers and carry out the inspection of the DRM equipments at Manufacturer's works, as per Acceptance Test Procedure (ATP) approved by AIR. The various tests to be performed and the measurements to be done will be to check the conformity of the equipment offered to these specifications and the various conditions of the A/T. Rate for Pre-dispatch Inspection for five (05) days per transmitter shall be quoted by tenderer in his price bid.
- b) The contractor shall give at least 8 (eight) weeks notice to AIR to carry-out the inspection, before the consignment is ready for inspection.
- c) The equipment manufacturer shall put up the equipment on the test bench, at his works, before AIR inspectors and shall provide, without any extra charge, other than that indicated in 1.11.1 (f), the power supply, consumable materials, tools, testing instruments and labour etc. as considered necessary for the tests to be carried out at the manufacturer's premises.
- d) The equipment shall be tested at the Mains Input Voltage and frequency specified against the various equipment in Section - III. Alternatively, the equipment shall be tested at the voltage prescribed in Section III, at supply frequency available at the manufacturer's works subject to an undertaking by the tenderer that the equipment shall be capable of being operated and tested successfully by AIR engineer at AIR site at the Mains Input Voltage and frequency specified in this Document in Section – II.
- e) The inspection and testing period shall be of 05 (five) working days for each equipment at the manufacturer's works.
- f) The expenditure towards To & Fro Air Journey, lodging, boarding & Daily Allowance of the inspecting Officers shall be borne by AIR.
- g) The supplier shall ensure safety of AIR's Inspectors, while on Inspection at the equipment manufacturer's works, against any accidental injury, accidents, death etc, at no cost to AIR.

1.11.2 Inspection/Acceptance Tests at AIR site (In India):

AIR will carry-out the following inspections/tests at AIR site, in India.

- a) Physical inspection, after receipt of the equipment at AIR site, for reporting any shortages or damages for free replacements / repairs by the manufacturer/contractor.
- b) Testing of equipment after it's installation by AIR and testing & commissioning by the tenderer as per the ATP to confirm the performance of the equipment to Contract specifications, before finally taking-over/accepting the equipment.
- c) If any component fails or is found defective on receipt at site as well as during the installation/testing/commissioning these will be supplied free of cost to AIR site by the manufacturer / contractor. The Contractor will be bound to make free replacements even if the equipment is commissioned by AIR as per the testing / commissioning procedure specified by the contractor/ manufacturer.
- d) A test for a continuous period of 24 hours as per the ATP shall be done keeping in view the specifications and as per the claims made by the tenderer. Should this test get interrupted for any reason connected with the failure of any component or power failure, for a period exceeding 20 minutes a further period of 24 hours must be commenced. In essence, AIR has to be satisfied that the equipment supplied is capable of operating continuously for a period of 24 hours.

- e) Any other tests which may be found necessary to prove the performance of the equipment as a result of the preceding tests or as a result of the inspection by the inspecting authority.

1.12 TRAINING OF AIR ENGINEERS:

1.12.1 At AIR Site:

The tenderer shall organize to train a group of about 10 AIR engineers free of cost to AIR, for a period of 5 (five) working days after the testing and commissioning of the transmitter equipment at AIR site. The training will be imparted for operation, maintenance and trouble shooting of the DRM equipment. The Training will also include practical demonstration of circuits, fault finding, circuit tracing, major part replacements and also for the use of the various test and measuring equipment, jigs and tools etc. This is required to be done with a view to develop necessary skills for efficient operation and maintenance of the DRM equipment by AIR staff..

(The expenditure towards to & fro Journey, lodging, boarding & Daily Allowance for the trainees as per Govt. of India norms shall be borne by AIR.)

1.12.2 At transmitter manufacturer's Works: (OPTIONAL)

- (a) The contractor shall be required to train Six (6) AIR Engineers for a period of 10 (ten) working days at manufacturer's works to enable them to become acquainted with all particulars in respect of operation, testing & commissioning, maintenance and trouble-shooting of the complete set of DRM equipments . This training shall be imparted on the same type of equipment as being supplied to AIR.
- (b) The tenderer shall quote separately for the Training charges in his price bid. (The expenditure towards to & fro Air Journey, lodging, boarding & Daily Allowance for the trainees shall be borne by AIR)
- (c) The supplier shall ensure safety of AIR's trainees, while on training at the equipment manufacturer's works, against any accidental injury, accidents, death etc, at no cost to AIR.

14 AFTER-SALES SUPPORT:

The equipment manufacturer/contractor shall guarantee for the after-sales support for all the equipment offered under the contract for a minimum period of 10 years, after commissioning of the equipment. The details of the type of after-sales support and list of the various after-sales support centers in India and elsewhere shall be indicated in the tender.

SECTION-II

(Technical parameters of equipments)

2.0 General

The section defines the technical parameters of the system of DRM Encoder-Modulator equipment consisting of a DRM Encoder Multi Program Multiplexer and Modulator/Exciter compliant with ETSI standard capable of AM, DRM and AM-DRM (SCS/MCS) Simulcast operation modes with selectable bandwidth required to be supplied for upgrading the existing 36 Nos. (08 NOS of .300KW/200KW MW THALES MAKE, TYPE- S7HP, 09 NOS OF 100KW/20KW MW THALES MAKE, TYPE- M2W AND 19NOS OF 20KW MW HARRIS MAKE TYPE-DX20), of fully solid state DRM compatible Amplitude Modulated transmitters for AM/DRM/SIMULCAST operation mode with automatic change over facility to analogue, at AIR sites as per Section-III. The system comprising of above equipments, shall be complete in all respect so as to accept audio and data and deliver output compatible to drive the above transmitters for AM/DRM/AM-DRM Simulcast modes of operations.

2.1 DRM Encoder Multi-Program Multiplexer:

2.1.1 General:

The DRM Encoder Multi-Program Multiplexer shall be stand-alone units mounted in a rack. Analogue & digital audio (Specific AES/EBU) Cable with XLR3 connectors, User Handbook in English, Dedicated Front panel for local control and monitoring shall be the part of the equipment. DRM encoder and multiplexer shall have selectable setting of audio encoding i.e. AAC, AAC+SBR, HVXC, HVXC+SBR, CELP, CELP+SBR, Parametric Stereo, AAC+SBR stereo. The equipment shall be designed to meet all the demands of DRM broadcast with provision of triple functionality i.e. DRM audio encoding, Data service, generating of full digital DRM multiplexed stream (MDI) with following key features.

- Capable of handling up to 4 audio and/or data services to generate multiplexed Stream for providing DRM/DI MDI as well as MDI+MCI stream for the modulator of broadcast transmitter.
- Graphical user interface to guide the user to create and configure stream and source encoder as well as creation and configuration of input hardware.
- The equipment shall be equipped with an MPEG-4 AAC real time audio encoder, with MPEG-4 CELP as well as MPEG-4 HVXC real time speech encoders along with the utilization of bandwidth enhancement SBR technology for all the three types of audio encoders. Audio input shall include mono, stereo and Parametric Stereo Modes.

- The equipment shall be capable of inserting text messages/pictures and multi-media object transfer Data (MOT) for slide show or broadcast web site format.

2.1.2 Technical Specification:

S. No.	Parameters	Specifications
1	INPUT CHARACTERISTICS	
a)	AUDIO INPUT	(i) Analog Audio: Four (Stereo) (ii) Digital Audio AES/EBU: Four (Stereo)
b)	IMPEDANCE	(i) Analog Audio: 600 Ohm (ii) Digital Audio: 110 Ohm as per AES/EBU Standard
c)	CONNECTOR	XLR3 female
d)	FREQUENCY	i) Digital Audio: sample standard from 22.05KHz. to 48 KHz. ii) Analog Audio: Maximum 20 KHz.
2	OUTPUT CHARACTERISTIC	
a)	OUTPUT	MDI Ethernet
b)	CONNECTOR	RJ45 female
c)	FREQUENCY	10/100 M bauds
d)	REMOTE MONITORING	Ethernet, RJ45 female 10/100 M bauds
3	GENERAL CHARACTERISTICS	
a)	STANDARD	As per relevant ETSI Standard
b)	SINGLE FREQUENCY NETWORK (SFN)	Internal GPS Receiver/ External NTP Server.
c)	MOUNTING	19" Rack Mounting or integrated with the transmitter
4	MAINS POWER SUPPLY	230V AC \pm 5%, 1 Phase, 50 Hz.
5	ENVIRONMENTAL CONDITION	
a)	OPERATING TEMPERATURE	0° C to 45° C
b)	ALTITUDE	Upto 1000 Mtrs.

2.2 DRM Digital Modulator / RF Exciter:

2.2.1 General:

DRM Digital RF Exciter /Modulator shall be stand-alone units mounted in a rack and shall be capable to generation of MSC, SDC & FAC, selection of robustness modes and modulation bandwidth (4.5/5kHz), Nominal Bandwidth (9/10kHz), Double Bandwidth (18/20kHz), 64/16 QAM MSC with all code rates, 16/4 QAM SDC, hierarchical modulation, standard modulation, Equal Error Protection, Unequal Error Protection Long/Short Interleaving, Service Reconfiguration, Channel Reconfiguration etc. The equipment shall be designed to meet requirements of all broadcasting modes and to provide easy switchover between Analogue AM (DSB), pure DRM, single channel or multi channel Simulcast (SCS/MCS) with following key features.

- Real time Channel Coder / Modulator for coding and modulation functions by means of powerful embedded digital processing and shall deliver all the standardized DRM digital modes with signal bandwidth up to 20 kHz.
- Digital Integrated Synthesizer to generate RF.
- Ethernet Ports for DRM/MDI input.
- One AES/EBU Digital Audio Input, One Analogue Audio Input.
- SFN/MFN Operation Capability with internal GPS and/or through external NTP server.
- Spectral Shaping as per ETSI standard for meeting the requirement of providing good AM signal reception in Simulcast mode of operation of the transmitter.
 - It shall have remote control and monitoring facility.

2.2.2 Technical Specification:

S. No.	Parameters	Specifications
1	GENERAL CHARACTERISTICS	
a)	STANDARD	As per relevant ETSI Standard.
b)	TRANSMISSION STRUCTURE	COFDM, Analog AM
c)	SIGNAL BANDWIDTH	4.5, 5, 9, 10, 18 and 20 kHz.
d)	DRM MODES	Modes A, B, C and D.
e)	SINGLE FREQUENCY NETWORK (SFN)	Either Internal or External GPS receiver Or through NTP Server & 1 PPS time reference.
2	INPUT CHARACTERISTICS	
a)	INPUT	i) MDI Ethernet, ii) Digital Audio (stereo) AES/EBU.

		iii) Analog Audio (stereo), iv) RF GPS Analog v) RF Feed- back Analog.
b)	INPUT CONNECTOR	RJ45 female, XLR3 female, SMC, BNC
c)	FREQUENCY	i) MDI Ethernet: 10/100 M bauds. ii) Digital Audio Stereo: Sample Standard from 22.05 KHz. to 48 KHz. iii) Analog Audio Stereo: 20KHz. maximum. iv) RF Feedback: 50KHz. to 26.1 MHz.
d)	IMPEDANCE	i) Digital Audio Stereo: As per AES3 Standards. ii) Analog Audio Stereo: 600Ω. iii) RF Feedback: 50Ω iv) RF GPS: 50Ω
3	OUTPUT CHARACTERISTICS	
a)	OUTPUT	(i) Envelope, Phase modulated RF (A, Ø) (II) I, Q Base Band signal.
b)	FREQUENCY	525KHz to 1605KHz
c)	CONNECTORS	Standard BNC and standard XLR connectors
4	ENVIRONMENTAL CONDITIONS	
a)	OPERATING TEMPERATURE	0° C to 45° C
b)	ALTITUDE	Upto 1000Mtrs.
5	MAINS POWER SUPPLY	230V AC ± 5%, 1 Phase , 50 Hz
6	MOUNTING	19" Rack Mounting or integrated with the transmitter

SECTION-III

SCHEDULE OF REQUIREMENTS:

AIR requires the following system of DRM Encoder-Modulator equipment as per technical specifications detailed under section I & II for upgradation of the existing 36Nos. of fully solid satate amplitude modulated DRM compatible MW Transmitters.

Note: The combined cost of the system comprising of item no. 3.0 to 3.4 will be taken for ranking purpose

Item	Detailed Schedule of Material	Qty.
3.0	<p>Supply of systems comprising of DRM Encoder-Modulator equipment for Up gradation of existing 36 nos. amplitude modulated DRM compatible medium wave transmitter for AM/DRM/SIMULCAST operation at the following AIR Sites(There are 36 sites in total):</p> <p>(a) THOMSON MAKE, S7HP TYPE:</p> <p>(i) 05 Nos. 300kW MW Transmitters at Cuttack, Srinagar, Imphal, Jodhpur, Nagpur</p> <p>(ii) 03 Nos 200kW MW Transmitters at Kargil, Indore, Najibabad</p> <p>(b) THOMSON MAKE, M2W TYPE:</p> <p>(i) 07 Nos. 100kW MW Transmitters at Cuddapah, Delhi - 'B', Kohima, Portblair, Shilling, Shimla and Raipur</p> <p>(ii) 02 Nos.20kW MW Transmitters at Naushera and Kupwara J &K.</p> <p>(c) HARRIS MAKE, DX-20 TYPE:</p> <p>(i) 19 Nos.. 20kW MW transmitters at Aizwal, Ambikapur ,Bhuj, Chattarpur, Chennai, Darbhanga, Gangtok, Jalgaon, Kota, Udipi,</p>	36 Systems

3.1	Rewa, Hyderabad, Leh, Ratnagiri, Rohtak, Silchar, Trivandrum , Tirunelveli and Tura.	36Nos.
3.2	DRM Encoder Multi-Program Multiplexer as per clause 2.1 of Section II	36Nos.
3.3	DRM Digital Modulator / RF Exciter as per clause 2.2 of Section II	Per site basis
3.4	Training for operation, maintenance, trouble shooting of DRM system for 4 AIR engineers at a few selected AIR sites for 5 working days per site.	36Nos.
4.0	Manuals for all above equipments	
4.1	OPTIONAL ITEMS	1 lot
	Training of Six (6) AIR Engineers for a period of 10 (ten) working days at manufacturer's works	