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

Specification Document for SITC of Augmentation of Captive Earth Station at 3 AIR Stations.

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SUMMARY OF CONTENTS:-

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

1(5)/2014-TC/CES-XII plan

Subject: Specifications for SITC of Augmentation of Captive Earth Station at 3 AIR Stations i.e Mumbai, Kolkata &Chennai under IEBR.

INTRODUCTION:-

AIR requires Augmentation of Captive Earth Stations (CES) at 3 Stations ie. Mumbai, Kolkata & Chennai to uplink its Radio programmes for distribution in its network through Satellite. The Captive Earth Station under reference is to be augmented at 3 Stations. The Programmes uplinked by these CES will be received by other AIR stations with their Radio Networking (Receive) Terminal (RNT) and used either for Recording or for Broadcasting through their Terrestrial Transmitters.

A Representative diagram of CES is placed at Annexure-I at page no.15.

SECTION-A

1. BILL OF MATERIAL:

AIR requires following Equipments/Services as per specifications detailed under section A & B. Tenderer shall quote price of each item separately with necessary breakup keeping in view of the following.

(i) Make and Model of Each Item is to be mentioned.

(ii) Intender reserve full right to choose schedule the quantities of Equipments/Service etc. at the time of placing order.

(iii) All items mentioned under mandatory items will be taken into consideration for ranking purpose.

(iv) Present requirement is for AIR Mumbai, Kolkata &Chennai

Mandatory Items per Site

S.No.	Item	Quantity	Reference
1.	(i) Digital Encoder (ii) Digital IF Modulator(1+1) in Hot Stand by configuration with Auto Changeover Unit Comprising Digital IF Modulator -2 Nos. Auto- Changeover Unit-1 No.	2 Nos 1 Set	Section B-1 Section B-2
2.	Receiving system: (i) Professional IRD (ii) Interconnecting cables connectors (F type male to Male – 10 Nos. of 2 meter each) & accessories along with L Band Splitter 1:8- 1 No.	5 Nos. 1 Set	B-3 B-4
3.	Details of any other items, required for complete integration of the system	1 Set	
4.	Installation, Testing & Commissioning of Augmentation of CES System at Site	1 Job	B-5
5.	Inspection	1 Job	A-7
6 .	Manuals	1 set	A-9
7.	Operation & Maintenance Training at Site	1 Job	A-8

2. Quantity:

Total Quantity is to be triple as per BOM at Section A -1 for AIR Mumbai, Kolkata & Chennai

LOCATION FOR SUPPLY & INSTALLATION:-

Supply, Installation, Testing and Commissioning at AIR Mumbai, Kolkata &Chennai.

3. SCOPE:

The scope of this tender includes supply of the equipment as per specifications, technical requirements and quantities as detailed in the tender along with Installation, testing and commissioning of the equipments as per mutually accepted ATP.

4. ELIGIBILITY:

The bidder shall have proven experience of carrying out SITC of Earth Station or, related experience. Bidder shall provide documentary proof (With attested copies of certificate from client including contact details like Telephone nos. and e-Mail address of successfully carrying out at least one work of SITC.

5. SCHEDULE OF MATERIAL:-

A comprehensive schedule of material offered shall be attached with the offer as mentioned in Section A-1 in the same format as price bid minus the price. Price against each item as indicated in Section A-1(Bill of Material) shall be mentioned separately item wise.

6. COMPLIANCE

The compliance from Original Equipment Manufacturer (OEM) only will be considered. While complying to the specification, it may be noted that just mentioning 'complied' will not suffice. Compliance should be supported by proper data/ documentation and should substantiate the specifications. In compliance statement each specification item complied, reference of compliance documents page no. etc. should be indicated.

One no of Encoder, Digital Receiver and Modulator shall have to be submitted within one month of opening of Technical Bids for testing its compatibility.

Each page of the datasheet/specification shall be duly signed, with seal, by both the OEM and tenderer. The full name, Postal and Telephone contact details including E-mails address of the person signing on behalf of OEM must be indicated on at least one of the pages. Bids not complying with the above shall be rejected.

7. INSPECTION:

Inspection of the Equipments and Testing of the installed Equipment shall be done as per mutually accepted and approved Acceptance Test Procedure (ATP). Draft ATP is annexed keeping the requirements of SITC.

a) Pre-dispatch Inspection:

Pre-dispatch Inspection of the Equipments shall be carried out at Integrator's works by the Engineers(s) of All India Radio. The expenses towards to and fro journey, DA and lodging as per Govt. Of India norms will be borne by Prasar Bharati. The performance certificate along with measurements taken on all equipments (duly certified by OEM) is required to be submitted by the tenderer before inspection at their premises.

During the Pre-dispatch inspection, supplier shall put up all the equipments for test on the test bench at integrator premises before the AIR representative and shall provide electric energy, consumable materials, and tools. Testing instruments, and assistance of required kind for carrying out acceptance tests. All the individual factory test reports of the complete lot of the equipment shall be made available to the inspecting authority before inspection. Complete Specifications and Details for each equipment will be checked and all parameters/ values will be measured as per ATP. Typical details are enclosed in draft ATP. Details ATP shall be submitted by the Firm/OEM and after mutual discussion it shall be approved and inspection shall be carried out on these lines. Three weeks prior intimation for carrying out inspection at Works is to be given by the supplier to the indenter. Inspection charges, if any are to be quoted separately in the commercial bid.

b) Site Inspection:

After completion of Installation of all the equipments at the Station, final inspection of the installation at the Station will be carried out by the representatives of AIR for certifying the Installation. This inspection will include visual examination of the installation, overall performance measurements and any other measurement/ examination considered necessary by AIR. At least seven working days' prior notice shall be given by the supplier for conducting final Site Acceptance Test.

8. TRAINING

The tenderer shall provide one day training to AIR Engineers on Setting up, Configuration, Operation and Maintenance of the Equipments at each Station.

9. MANUAL/ DOCUMENTATION & TEST CERTIFICATES

Manual: 1 Set for each concerned station, One Set for Directorate & one Set for concerned Zonal Office. Each manual shall consist of following.

a) Manual for operation, configuration, maintenance of each equipment, sub system, NMS, accessories and complete integrated link along with drawings and wiring diagram for the system.(both hard soft copies)
b) Test procedures for parameters measured at subsystem and integrated system levels.
c) Test records/reports of all the measurements performed for each equipment and integrated system.

10. DELIVERY PERIOD:-

The Delivery Period for SITC and handing over of complete installation for all the sties shall be Three (3) months from the date of AT.

11. GENERAL REQUIREMENTS:

a. Technical/General Details

i) The Tenderer, in order to enable the indenter to carry out the full Technical Evaluation of the Tender, should give all the details required to ascertain full merits and demerits of the technical offer. Apart from printed technical data/specs of the equipment from the OEM, Block schematic upto the sub-system, interconnection and wiring diagram should be give.

ii) The equipment offered shall be of renowned make, well established and field proven. All the equipments should conform to the power supply and environmental requirement as detailed in para A-13.

iii) The tenderer may be asked to demonstrate the equipment to show compliance to AIR's specification at the technical evaluation stage.
One set of Encoder, IF Modulator and IRD receiver shall be submitted by tenderer at technical evaluation stage for checking compliance with DTH Free to AIR STB (This is mandatory).

iv) This equipment shall be of state of art technology, capable for 24 x7 operation. It should be incorporated with standard feature of safety and protection.

v) Installation & Commissioning at respective stations shall be carried out without any disruption of AIR/Doordarshan Services. This may require installations at some sites to be carried out even during night hours for which adequate arrangements will have to be made by the supplier at no extra cost to the indenter.

vi) The tenderer shall ensure that the equipments offered fully incorporate the standard feature of safety and protection including shielding from EMI/RFI as the receive end of the link will be installed at high power transmitter site.

vii) Apart from printed technical data/specs of the equipment, Block schematic upto the sub-system, interconnection and wiring diagram, photograph etc. must also be attached with the offer.

viii) Successful bidder may conduct site survey at all the Stations, if felt necessary, to ascertain the conditions at Stations for facilitating installation of indoor equipments.

Minor changes at site, if any, necessitated due to site conditions shall have to be taken care of by the supplier during installation without any extra cost to the indenter.

ix) After Acceptance of the tender, the successful tenderer shall also provide detailed plans of supply of material, testing and commissioning as per ATP.

x) During the installation of these equipment, supplier shall be responsible for safety and security of his material and personnel. At the same time the supplier shall also ensure that there is no damage to AIR material and personnel

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

xii) Maintenance support including availability of spares for baseband equipment is to be ensured for at least 10 years from the date of supply. Details of the same should be mentioned in the tender. If at any stage during next ten years the manufacturer proposes to stop production of these equipment and spares, supplier shall intimate AIR in advance to enable AIR to stock the critical items of spares for the life of the equipment

xiii) The tenderer shall mention the source of supply (with proper authorization) for major and critical components/ spares so that no difficulty is encountered later on in procuring the spares for maintenance/repair of these equipment.

xiv) The firm/tenderer must ensure repairs within 72 hours at site & in case the equipment cannot be repaired at site then the firm shall bear all the charges including to from freight charges to repair the equipment within or outside the country during the warranty period.For all equipments after sales service is to be ensured for post warranty period also for 10 years.

13. ENVIRONMENTAL & POWER SUPPLY

a) Ambient Temperature:-

-10° C to +40°- For indoor equipment

b) Relative Humidity : Upto 95% non condensing at 40° C

c) Safety/Features : Standard features for safety & protection have to be build in/ incorporated for both personnel/equipment.

d) Power Supply : 230 VAC± 10%, single phase, 48-52 Hz.

SECTION -B

TECHNICAL SPECIFICATIONS

1. AUDIO BASE BAND DIGITAL ENCODER:

S.No.	Parameter	Specification
1.	Audio Input No. Of Channels	Analog and Digital AES/EBU compatible as standard professional, which can be selectable in each stereo channel. 8 Stereo
2.	Audio encoding Format	MPEG-1& MPEG4 With AAC,AAC LC, AAC .HE v1 & v2
3.	Mode	Stereo, Dual Mono channel
4.	Encoding rate	64 kbps to 384 kbps
5.	Sampling frequency	48 KHz
6.	Audio Frequency Range(Analog)	50 Hz to 15 KHz, ±0.5dB
7.	Distortion	<0.1 % from 50Hz to 15KHz
8.	Signal to noise ratio	≥ 80 dB
9.	Output	DVB-ASI
10	ASI Input	Built-in / External multiplexer for encoder cascading of upto 10 Mbps ASI stream
11	Input power	230 VAC normal, 50 Hz
12	Operating temperature	0 to + 50° C

2. DIGITAL IF MODULATOR (1+1) WITH Auto Changeover Unit

Modulator is to be DVB S/S2 Compliant	
ASI Inputs	2nos.
Compliance	1 Backward compatible mode.(Should be capable of operating on both DVB-S & DVB-S2/ IP mode, one at a time)2 Constant Coding and Modulation (CCM)
Input bit-rate	64 kbps to 10 Mbps
Forward Error Correction and Modulation Scheme	
FEC Coding(LDPC), Reed Solomon & Convolution	DVS-S: ½, 2/3, 3/4 , 4/6, 7/8 DVS-S2: 1/3, 2/5, ½, 3/5, 2/3, ¾, 4/5, 5/6, 8/9, 9/10
Spectrum Roll off factor	DVB-S: 25% and 35% selectable DVB-S2: 20%, 25% and 35% selectable
Modulation Format	DVB-S:QPSK DVB-S2: QPSK
Baud Rates	Variable, 0.05 to 10 M symbols/sec

IF OUTPUT INTERFACE SPECIFICATIONS	
Output Frequency range	52 to 88 MHz tunable
Synthesizer Step Size	1 KHz, step
Frequency Stability	<± 0.1 khz(all causes over 10 years)
Output Impedance	75 ohms unbalanced
Connector	BNC, female
Output Return Loss	>20 dB(50-90MHz)
Output Level Range	-20 to 0 DBm
Level Step Size	0.1 dB, steps
Spurious Outputs	<-65 dBc/4KHz@-10dBm
Synthesizer Phase Noise	Meets requirements of IESS-308
CW mode	Selectable
Noise floor(C/No)	< -120 dBc/Hz
Spectrum sense	Normal/Inverted

Note: The Tenderer shall demonstrate all quoted equipments for confirming compatibility with CES, NBH, AIR Delhi setup as part of Technical evaluation.

3. Professional IRD Receiver

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

RF Parameter Specifications:

(a)	Input Frequency Range	950-1750 MHz
(b)	No. Of Inputs	1 nos.
(c)	Tuning Step Size	1 KHz
(d)	Satellite Frequency Bank	C-& KU-Band, selectable
(e)	Input Impedance	75 Ohms
(f)	Input Connector	F-Type Female
(g)	Output Connector	XLR for analog & AES-EBU or,Break-out Box with XLR.
(h)	Input Power Range	-30 to -65 dBm per carrier
(i)	De-modulation Method	DVB-S QPSK,DVB-S2 QPSK demodulation
(j)	Variable Symbol Rates	0.256 to 10 N sym/sec
(k)	Convolutional Inner FEC Rates selectable	R=1/2,2/3,3/4,5/6,7/8(DVB -S, QPSK) R=1/3, 2/5, ½, 3/5, 2/3, ¾, 4/5, 5/6, 8/9, 9/10(DVB-S-2, QPSK)
(l)	IF filter Bandwidth	Automatic selection(Dependent on Symbol Rate

Audio Decompression Parameters

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

Audio Output:-

Each analog audio output shall be presented as a stereo pair. In the event of "Mono" transmission, as the same encoder input channel side will be output to both left and right connector.

Analog Audio Output Specifications

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

Audio Performance Specifications (at 48 KHz sampling rate)

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

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

4. INTER-CONNECTING CABLES, CONNECTORS AND ACCESSORIES

Interconnecting RF & Audio cables, power supply cables, connectors, audio patch chord (20 nos. Assorted length) and other accessories required for the monitoring system shall be included in the tender.

5. INSTALLATION & COMMISSIONING

Installation will include all the equipments within the wired racks in the present Base band Rack of concerned CES. All BOM mentioned is to be integrated to the existing system. Commissioning Certificate will be issued by the official posted at respective CES ie, Mumbai, Kolkata &Chennai.

SECTION 'C'

DRAFT ATP

1. INTRODUCTION

This document describes the Acceptance Test Procedure (ATP) for testing the various units of Augmentation CES Equipment under procurement. It covers the details of the item to be tested, list of equipment required for testing and the tests required to be carried out.

2. ITEMS TO BE TESTED

a) Digital Encoder and Modulator.
b) Monitoring System comprising IRD.

3. TEST EQUIPMENT

a) All requisite test equipment conforming to the required standard for testing and commissioning shall be provided by the supplier
b) List of the test& measuring equipments.
(This is a tentative list. Additional equipment shall be specified by the indenter if needed).
   i. Audio analyzer and Spectrum Analyzer
   ii. Digital Modulation Analyzer.
   iii. PC with Printer.
   iv. Any other equipment and standard reference source/setup necessary for measurements.
   v. Calibrated Directional coupler, inter-connecting cables, Attenuator, combiner, Dividers, adopters etc. as may be necessary for the test.

4. TEST REQUIRED TO BE CARRIED.

(Note: This is only a tentative list, Additional items of tests may be specified and carried out by the indenter, if needed.

4.1 DIGITAL MODULATOR AND DIGITAL ENCODER

a) Functionality test for individual modulator and in (1+1) configuration
b) I.F. Range
c) O/P Frequency stability and accuracy
d) O/P level stability
e) Coding standard, data rates check
f) Digital modulation selectability check
g) All Base-band measurements along with receivers.
h) Spurious Check

i) Any other test to check the conformity to the specs.

4.2 MONITORING SYSTEM

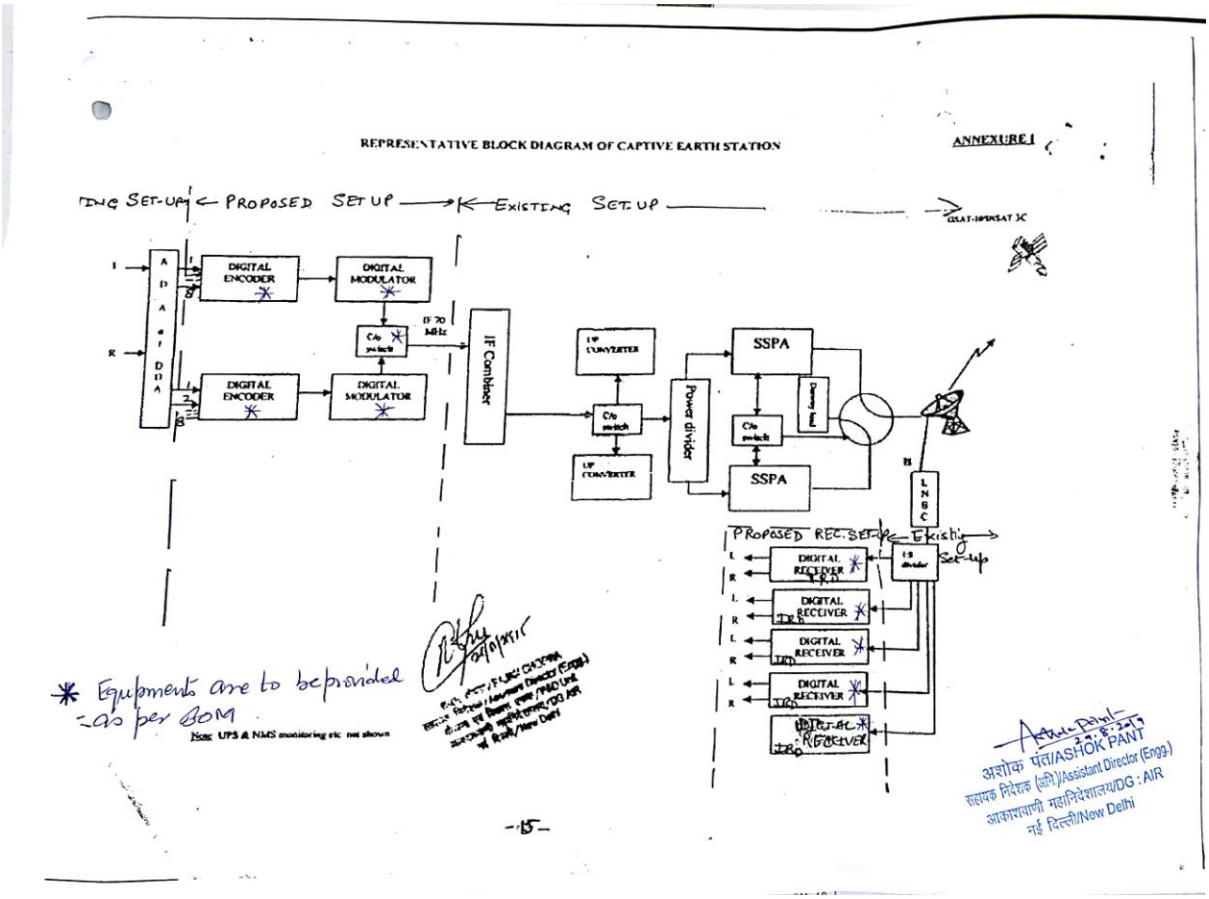
a) Functionality check for individual monitoring setups for Digital Demoluator.

b) Test for IRD Receiver including carrier lock range. Eb/No, Analogue and digital (AES/EBU) outputs, level, THD, Noise level, Freq. Response and Cross Talk for both stereo channels, BER immunity test etc.

5. GENERAL

a) Based on above, supplier shall give a detailed ATP document giving procedure for tests of individual item as well integrated setup. This should include test setup, equipment details, inter-connections diagram and the Format for test reports.

b) The indenter will examine the same and then it will be finalized after mutual discussion.


REPRESENTATIVE BLOCK DIAGRAM OF CAPTIVE EARTH STATION
ANNEXURE I
PROPOSED SET UP
EXISTING SET UP
DIGITAL ENCODER
DIGITAL MODULATOR
IF 70 MHz
IF Combiner
Power divider
SSPA
SSPA
LNBC
PROPOSED REC. SET-UP
DIGITAL RECEIVER
DIGITAL RECEIVER
DIGITAL RECEIVER
DIGITAL RECEIVER
* Equipments are to be provided as per BOM
Note: UPS & NMS monitoring etc not shown
-15-
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