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

**Specification Document for modernization and Up-gradation of Earth Station equipment's at 8 Stations namely AIR, Leh, Shimla, Lucknow, Ahmedabad, Bhopal, Banguluru , Kohima and NBH Delhi.**

| | | |
|---|---|---|
| ADD. DIRECTOR GENERAL-E | : | ADG-E. (NEZ, SZ, NZ, WZ) AIR&DD |
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SUMMARY OF CONTENTS:-

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## 1/1/2022/SCD/CES-7stations

**Subject:** Specification Document of modernization and Up-gradation of Earth Station equipment's at 7 Stations AIR, Leh, Shimla, Lucknow, Ahmedabad, Bhopal Banguluru , Kohima and NBH Delhi.

**INTRODUCTION**:-

AIR Earth Stations (ES) are uplink its Radio programmes for distribution in its network through satellite. The programmes uplinked by these ES 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. As it is well known that the band width is very precious and available in very limited quantity. AIR is by now using Single Channel per Carrier (SCPC) mode for uplinking from above said 8 uplink stations. The Multi Channel Per Carrier (MCPC), Open Mode Transmission System is therefore, proposed for future use. It is thus required that all existing SCPC mode uplink stations are changed to MCPC mode to maintain reliable networking as the existing equipments have became obsolete and in the event of failure of equipment the network will be difficult to maintain. For this purpose the Encoder, Modulator along with critical equipment Up convertor and HPA/SSPA at the stations required to be changed and IRD receivers shall have to be provided to all field stations.

A Representative diagram of CES is placed at Annexure-I.

## SECTION-A

### 1. BILL OF MATERIAL:

AIR requires following equipment's/services as per specifications detailed under section A & B. Tenderer shall quote price of each item separately with necessary breakup data its 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 equipment's/service etc. At the time of placing orders.

(iii) All items mentioned under mandatory items will be taken into consideration for ranking purposes, whereas all item mentioned under optional items will not be considered for ranking purpose.

(iv) Present requirement is for 1. AIR, Leh 2. AIR Shimla 3. AIR Lucknow 4. AIR Ahmedabad 5. AIR Bhopal 6.AIR, Bangluru 7.AIR,Kohima & 8.NBH,Delhi

a) **MANDATORY ITEMS PER SITE ( S No. 1 to 7) STATIONS**

| S.No. | Item | Quantity | Reference |
|---|---|---|---|
| 1. | 50 W C-bank Solid State Power Amplifier (1+1) in Hot Standby configuration with provision of power measurements displace and auto-changeover unit along with Dummy-load Comprising HPA-2 Nos Chageover with dummy load 1 No. | 1 Set | B-1 |
| 2. | Sythesized IF to C-Band Up-Converter 1+1 with auto-chageover Unit. Comprising sized IF to C-Band Up-Converter 1+1 with auto-changeover Unit. Comprising Up-convertor- 2 Nos, Changeover- 1 Nos. | 1 Set | B-2 |
| 3. | Digital Encoder | 2 Nos. | B-3 |
| 4. | Digital IF Modulator(1+1) in Hot Standby configuration Auto Changeover Unit Comprising Digital IF Modulator -2 Nos. Auto- Changeover Unit-1 No | 1 Set | B-4 |
| 5. | Inter- Facility link including Wave guide couplers, IF Combiner (6:1), Power | 1 set | B-5 |

| | | | |
|---|---|---|---|
| | Divider (1:8) adopters, cables and other accessories for Antenna connection to SSPA etc. Interconnecting cables, connectors & accessories. | | |
| 6. | Receiving system:<br>Professional IRD | 5 Nos. | B-6 |
| 7. | Installation, Testing & Commissioning of CES System at Site | 1 Job | B-7 |
| 8. | Inspection | 1 Job | A-8 |
| 9. | Manuals | 1 set | A-10 |
| 10. | Details of any other items, required for complete integration of the system | | |
| 11. | Operation & Maintenance Training at Site | 1 Job | A-9 |

b). **MANDATORY ITEMS PER SITE ( S No. 8) AIR, NBH, Delhi STATION**

| S.No. | Item | Quantity | Reference |
|---|---|---|---|
| 1. | 50 W C-bank Solid State Power Amplifier (1+1) in Hot Standby configuration with provision of power measurements displace and auto-changeover unit along with Dummy-load Comprising HPA-2 Nos Chageover with dummy load 1 No. | 2 Set | B-1 |
| 2. | Sythesized IF to C-Band Up-Converter 1+1 with auto-chageover Unit. Comprising sized IF to C-Band Up-Converter 1+1 with auto-changeover Unit. Comprising<br>Up-convertor- 2 Nos,<br>Changeover- 1 Nos. | 2 Set | B-2 |
| 3. | Digital Encoder | 4 Nos. | B-3 |
| 4. | Digital IF Modulator(1+1) in Hot Standby configuration<br>Auto Changeover Unit<br>Comprising<br>Digital IF Modulator -2 Nos.<br>Auto- Changeover Unit-1 No | 2 Set | B-4 |
| 5. | Inter- Facility link including Wave guide couplers, IF Combiner (6:1), Power Divider (1:8) adopters, cables and other accessories for Antenna connection to | 2 set | B-5 |

| | | | |
|---|---|---|---|
| | SSPA etc. Interconnecting cables, connectors & accessories. | | |
| 6. | Receiving system:<br>Professional IRD | 5 Nos. | B-6 |
| 7. | Installation, Testing & Commissioning of CES System at Site | 1 Job | B-7 |
| 8. | Inspection | 1 Job | A-8 |
| 9. | Manuals | 1 set | A-10 |
| 10. | Details of any other items, required for complete integration of the system | | |
| 11. | Operation & Maintenance Training at Site | 1 Job | A-9 |

c). **OPTIONAL ITEMS:-**

| S.No. | Item | Quantity | Reference |
|---|---|---|---|
| 1. | Digital Encoder | 1 Nos | A-12, B4 |
| 2. | Digital Modulator | 1 Nos | A-12, B5 |
| 3. | IRD | 5 Nos | A-12, B6 |

**2. QUANTITY**

Total Quantity is as per BOM S No. 1 , IV a). for 1. AIR, Leh 2. AIR Shimla, 3. AIR Lucknow 4. AIR Ahmedabad 5. AIR Bhopal 6.AIR, Bangluru 7.AIR,Kohima and BOM S No. 1 , IV b). for NBH, Delhi.

**3. LOCATION FOR SUPPLY & INSTALLATION**

Equipment as per BOM is to be Supplied, Installed, Tested and commissioned, at following location namely 1. AIR, Leh 2. AIR Shimla, 3. AIR Lucknow 4. AIR Ahmedabad 5. AIR Bhopal 6.AIR, Bangluru 7.AIR,Kohima and NBH Delhi.

**4. SCOPE**

The scope of this tender shall include supply along with Installation, testing and commissioning of the equipment, technical requirements and quantities as per mutually accepted ATP.

**5. ELIGIBILITY**

The bidder shall have proven experience of carrying out SITC of Earth Station or, supply, installation and Testing of mentioned related equipments. 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.

**6. SCHEDULE OF MATERIAL**

A comprehensive schedule of material offered shall be attached with the offer as mentioned in Section A-2 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 for mandatory as well as optional items.

**7. COMPLIANCE**

The compliance from original equipment manufacturer 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.

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.

**8. INSPECTION**

Inspection of the equipment and testing of the installed SITC of the equipment shall be done as per mutually accepted and approved Acceptance Test Procedure (ATP). Draft ATP is annexed.

**a) PRE-DISPATCH INSPECTION**

Pre-dispatch Inspection of the equipment's 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 equipment's (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 equipment's 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 vender/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 equipment's 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, link level 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

**9. TRAINING**

The tenderer shall provide three days training to AIR engineers on setting up, configuration, operation and maintenance of the equipment at site.

**10. MANUAL/ DOCUMENTATION & TEST CERTIFICATES**

**Manual**: 1 Set comprises Two each for the stations, two for Directorate, one each for zonal office & one for STI(T). 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.

**11. DELIVERY PERIOD**

The Delivery Period for SITC and handing over of complete installation for all the sites shall be 5 months from the date of A/T or 5 months from the date of Decision Letter (DL) from WPC in respect of RF equipment whichever is later. Part supply will be accepted for Non RF equipment. Part payment of supply of Non RF equipment will be paid after acceptance of equipment & installation at site after certification by Installation Officer (IO). SITC Installation payment will be made only after completion of SITC.

**12. SPARES**

Tenderer must quote separately essential spares as recommended by the OEM, including their quantities and cost (per unit). The cost of spares shall not be counted for deciding the commercial raking of tenders. Various RF modules like transmitter, receiver, interface units, Audio Encoder-Decoder modules, Multiplexer-Demultiplexer modules, Power supply modules, and any item which is to encounter more wear and tear etc. must be quoted as spares along with other units.

**13. 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 given.

ii) The equipment offered shall be of renowned make, well established and field proven. All the equipment's should conform to the power supply and environmental requirement as detailed in para A-14.

iii) The tenderer may be asked to demonstrate the equipment to show compliance to AIR's specification at the technical evaluation stage.
The tenderer shall furnish the list of the customers along with contact details (including telephone no's e-mail) where similar equipment's has been supplied by the tenderer/manufacturers in absence of such list, tender may be rejected.

iv) This equipment shall be of state of art technology, capable for 24 x365 days 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 equipment's 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 al all the Stations, if felt necessary, to ascertain the conditions at Stations for facilitating installation of indoor equipment's.

ix) 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.

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

xi) 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. The successful tenderer shall make good all damage to the purchaser's buildings, property, equipment, article and departmental personnel throughout the guarantee period.

xii) The successful tenderer shall indemnify and hold harmless the purchaser against all claims in respect of damages to buildings, property, articles situated nearby not belonging to the purchaser, throughout the guarantee period.

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

xiv) The tenderer shall take all necessary safety measures and precautions during the SITC work.

xv) 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

xvi) 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's.

xvii) All optional items mentioned in the tender must be quoted. Failing this, the tender would be liable to be rejected. However, these items would not be considered ranking purpose.

xviii) The tenderer/firm must have a well-equipped & established service centre in India. The complete address and contact details of the Service centres in India, duly certified by the OEM, shall be indicated. 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.

**14. 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 built in/ Incorporated for both personnel/equipment.

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

**SECTION -B**

**TECHNICAL SPECIFICATIONS**

## 1. 50W C- BAND SOLID STATE POWER AMPLIFIER (SSPA)(1+1) WITH AUTO CHANGE-OVER UNIT FOR SSPA ALONG WITH DUMMY LOAD.

SSPA shall be of compact and composite construction, lightweight and rack mounted with front access for operation and control, etc. It shall be offered along with its inbuilt/associated power supply unit. It shall also have front panel meter to monitor Forward power, VSWR alarm, Reverse power and indications for status, alarm, faults, over temperature, etc. The SSPA should have its own cooling arrangements and should not require any external cooling.

| | | |
|---|---|---|
| a) Type | : | SSPA |
| b) Rated continuous o/p power (P1dB) | : | +46 dBm |
| c) Input freq. | : | 5850- 6425 MHz |
| d) Gain Frequency Response | : | ± 0.6dB over any 40 MHz |
| e) Saturated output power | : | 50 W |
| f) Gain | : | ≥ 46 dB |
| g) R.F. level control | : | 0-20 dB continuous |
| h) Gain stability Over full temp. range | : | : ±1.3:1 |
| i) Input VSWR | : | ≤1.3:1 |
| j) Output VSWR | : | ≤ 1.3:1 |
| k) Phase Noise | : | Should meet IESS 308/309 |
| l) Harmonic | : | Better than : - 50 dBc (at rated Output) |
| m) Spurious ( in band) | : | Better than:- 60 dBc(at rated output) |
| n) SSPA standby operation | : | 1+1 hot redundancy auto changeover with manual over ride. |
| o) Mounting | : | 19'' Rack |
| p) Two tone inter-modulation At 3dB total back off from 1 dB compression point | : | -25 dBc or better |
| q) Monitoring | : | RF Sample output port |
| r) RF input connector | : | N female |
| s) RF output | : | CPR137 |
| t) Operating temp. range | : | 0° to +50°c |

**2. SYNTHESIZED IF TO C-BAND UPCONVERTER (1+1) WITH AUTO CHANGOVER UNIT**

It should be possible to operate the upconverter manually. The upconverter should not require a PC or a controller for normal operation and control. Any interface required for operation in 1+1 hot standby mode with auto changeover shall be included in the offer.

| | | | |
|---|---|---|---|
| a) | Input Frequency | : | 52 MHz to 88 MHz |
| b) | Output Frequency | : | 5850 MHz to 6425 MHz |
| c) | Frequency setting | : | Synthesized, 125 KHz step size |
| d) | Frequency stability | : | Better than ±1x $10^{-9}$ or better per day |
| e) | Input impedance | : | 75 Ω |
| f) | Output Impedance | : | 50 Ω |
| g) | Input level | : | -15 dBm nominal |
| h) | Input connector | : | BNC-F |
| i) | Input Return loss | : | 19dB or better |
| j) | P1 dB Output level | : | +10 dBm or more |
| k) | Overall Coversion gain | : | 30 dB or more |
| l) | Gain control | : | 30 dB in steps of 0.5 dB or smaller |
| m) | Gain Slope | : | ± 0.05 dB/MHz |
| n) | Output Return loss (VSWR): | | 19 dB or better (≤ 1.25:1 |
| o) | Amplitude/Gain stability | : | ± 0.25 dB per day at constant temp. |
| p) | Type of conversion | : | Dual conversion spectrum non-inverted |
| q) | Third order IMD Product | : | -40 dBc with two equal carriers at 10 dB total Output Back off from P1 dB. |
| r) | Phase noise | : | -70 dBc/Hz. 100 Hz away from carrier<br>-80 dBc/Hz, 1 KHz away from carrier<br>-100 dBc/Hz, 1 MHz away from carrier |
| s) | Spurious (in Band) | : | -60 dBc below carrier (un-modulated) |
| t) | Standby operation | : | 1+1 hot redundancy, auto change-over with manual over ride feature. |
| u) | Mounting | : | 19° Rack |
| v) | Test Port | : | IF and RF |
| w) | Remote Interface | : | R S232/RS485 got parameter setting |
| x) | Front Panel Indication | : | Power, Standby, fault, Remote/Manual |
| y) | Operating temp. | : | 0 to +50°C |

**3. AUDIO BASE BAND DIGITAL ENCODER:**

| S.No. | Parameter | Specification |
|---|---|---|
| 1. | Audio Input<br><br><br>No. Of Channels | Analog and digital AES/EBU compatible as standard professional, which can be selectable in each stereo channel.<br>8 Stereo |
| 2. | Audio encoding Format | MPEG-1& MPEG-4with ACC,ACC-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. | Frequency Response | 50 Hz to 15 KHz ±0.5dB |
| 7. | Distortion | <0.1 % from 50 Hz to 15KHz |
| 8. | Signal to noise ratio | ≥ 80 dB |
| 9. | UDP Multicast IP Input port ( at least 1 MBPS Stream) | Mux with 8 stereo Audio (Analog and Digital) at S No.1 |
| 10 | Output | DVB-ASI |
| 11 | Input power | 230 VAC nominal, 50 Hz |
| 12 | Operating temperature | 0 to + 50° C |

**4. 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 mode, one at a time)<br>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<br>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:10%,15%, 25% and 35% selectable<br>DVB-S2: 20%, 25% and 35% selectable |
| Modulation Format | DVB-S:QPSK<br>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, if required.**

**5. INTER FACILITY LINKS (In Uplink Chain)**

The tenderer shall quote for couplers, adaptors, Power Spitter, cables and other accessories required All these accessories shall be of professional standard and compatible with the system. Make, Technical specifications and detailed quantity of each of these shall be mentioned clearly in the offer. Interconnecting cables, power supply cables, connectors and other accessories required for the integration of the existing system.

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

**6. 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 |
| (h) | Input Power Range | -30 to -65 dBm per carrier |
| (i) | De-modulation Method | DVB-S QPSK,DVB-S2 QPSK demodulation |
| (j) | Variable Symbol Rates | 0.128 to 10 M sym/sec |
| (k) | Convolution Inner FEC Rates selectable | R=1/2,2/3,3/4,5/6,7/8( DVB-S,QPSK) R=1/3, 2/5, 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 and Video Decompression Parameters

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

**Audio Output:-**

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

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

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

**7. NETWORK MANAGEMENT SYSTEM (NMS)**

The Monitoring & Control Software shall have all the necessary features and parameters to control supplied equipment with OEM network Management System (NMS) for acquiring data from Digital encoder & modulators, upconverters, SSPA and IRDs

**8. INSTALLATION & COMMISSIONING**

Installation will include all the equipment's within the wired racks at AIR Stations. Racks and all the equipment must be earthed as per existing earth pit. The workmanship of the entire Installations shall be of high professional standard.

**9. SPARES (Optional)**

OEM recommended essential maintenance spares must be quoted by the tenderer for items offered including Encoder, modulator, IRD.

**SECTION 'C'**

**DRAFT ATP**

## 1. INTRODUCTION

This document describes the Acceptance Test Procedure (ATP) for testing the various units of 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) Solid State Power Amplifier (SSPA).
b) Up-converter.
c) Digital Encoder and Modulator.
d) 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 equipment's.
(This is a tentative list. Additional equipment shall be specified by the indenter if needed).
    i. Audio analyzer and Spectrum Analyzer(> 8 GHz range)
    ii. Power Meter with sensor & Attenuator etc.(Capable to measure 125 W)
    iii. Frequency counter (≥7 GHz)
    iv. Signal Generator (≥ 7 GHz)
    v. Noise figure meter with noise source
    vi. Digital Modulation Analyzer.
    vii. PC with Printer.
    viii. Any other equipment and standard reference source/setup necessary for measurements.
    ix. 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 S.S.P.A

a) Functionality test for individual SSPA and in (1+1) configuration
b) Power output check
c) Gain check
d) Gain flatness check
e) Frequency response
f) IMD Product

g) Spurious
h) Any other tests to check the conformity to the specs

**4.2 UP-CONVERTER**

a) Functionality test for individual up-convertor and in (1+1) configuration
b) Output frequency check
c) Output level and stability check
d) Frequency stability
e) IMD Product
f) Spurious check
g) Phase Noise check
h) Any other test to check the conformity to the specs.

**4.3 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.

**4.4 INTEGRATED SETUP (AT SITE)**

a) After the individual tests the equipment will be installed and integrated to work as CES as per specs. The integrated setup will then be tested for complete system performance and functions.
b) The tests for commissioning would include the integration check and conformity to system specs including:.
    i. Overall uplink/down-link check and performance measurements to meet the specs.
    ii. Any other tests necessary to check the conformity to specs.

**4.5** In addition, all the manuals/drawings will be inspected for completeness.

## 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.

ANNEXURE-1

**REPRESENTATIVE BLOCK DIAGRAM OF CAPTIVE EARTH STATION**