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DIRECTORATE GENERAL : ALL INDIA RADIO
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(TELECOM DIVISION)

SPECIFICATIONS COVER SHEET

TITLE : Mobile Digital Satellite News Gathering (DSNG) Equipment

SPECIFICATION NO. : TC/SPEC/71/2009/CES-DSNG_NE

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SCHEME : Provision of Three Nos. Mobile Digital Satellite News Gathering Equipment in North East under NE SPL. Plan.

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**Subject: Specification for the Mobile Digital Satellite News Gathering (DSNG)
Equipment & Measuring Equipment in North East Region.**

1. INTRODUCTION:

Name of the Project/ Scheme:

**Procurement of Mobile DSNGs Terminals & Measuring
Equipment for North East Region.**

DSNG System:

The DSNG Terminals comprise of a medium sized vehicle having satellite antenna mounted on the top and equipment housed inside the body of the vehicle. The equipment component will be fully digital and compatible with the existing C-Band RN-System of AIR. The programme uplinked through these Mobile DSNG Terminals will be received directly by the stations with the C-Band receive terminals at Stations.

A block diagram showing the DSNG set up is enclosed as Annexure-A.

Configuration and general requirements of DSNG are detailed in Section-'A'.

The technical specification/ requirements are detailed in Section 'B'.

The Draft ATP for DSNG equipment is given in Section - 'C'

SECTION 'A'

2. CONFIGURATION:

Satellite News Gathering Equipment for each location will be as per the configuration given below:

ITEMS REQUIRED FOR EACH MOBILE DSNG

A. Main Equipment:

| Sl. No. | Item | Quantity | Reference |
|---------|---|----------------------------------|---|
| 1. | 1.8 meter motorized parabolic dish antenna, foldable, easily transportable & deployable atop the DSNG vehicle. | 1 No. | Section B -1 |
| 2. | 100 W C-band Solid State Power Amplifier 1+1 with auto-changeover Unit for SSPA along with Dummy-load. | 1 Set | B - 2 |
| 3. | Synthesized IF to C-Band Up-converter 1+1 with auto-changeover Unit. | 1 Set | B - 3 |
| 4. | Digital Encoder (1+1) and Digital IF Modulator (1+1) with auto-changeover Unit | 1 Set | B - 4 |
| 5. | Lap Top required for Digital Equipments | 1 No. | B - 5 |
| 6. | Inter-facility links including Wave guides, couplers, cables and other accessories for Antenna connection to SSPA | 1 Set | B - 6 |
| 7. | Monitoring system: (i) LNBC(1+1) C-Band (ii) Digital Receivers (iii) Stereo audio Monitoring equipment (iv) Interconnecting cables connectors & accessories | 1 Set 2 Nos 1 Set 1 Set | B - 8 B-8 (a) B-8 (b) B-8 (c) B-8 (d) |
| 8. | Satellite Phone including its activation | 1 No. | B - 9 |
| 9. | DSNG Van | 1 No. | B – 10 |
| 10. | Wired racks for equipment | 1 Set | B -11 |
| 11. | Portable Petrol Generator with Stabilizer (4 KVA) | 1 No. each | B -12 |
| 12. | Miscellaneous items for system integration | 1 Set | B -13 |
| 13. | UPS 3 KVA (Rack Mount Type) | 1 No. | B-14 |
| 14. | Integration & Commissioning of the above as DSNG Van | 1 set | -- |
| 15. | Inspection | 1 Job | |
| 16. | Installation, Testing & Commissioning of the above including NOCC clearance | 1 Job | |

B. List of Items required for DSNG Hub Station.

| Sl. No. | Item | Quantity | Reference |
|---------|--|------------|----------------|
| 1 | Digital Satellite Receivers with LNBCs | 2 no. each | Section B-8 |
| 2 | Stereo Audio Monitoring Equipment | 1 set | Section B-8(c) |

C. Measuring Equipment for DSNG Van

| Sl. No | Item | Quantity | Reference |
|--------|-------------------|----------|-------------------|
| 1. | Spectrum Analyzer | 1 No. | Section B-15 (i) |
| 2. | GPS Meter | 1 No. | Section B-15 (ii) |

D. Training of DSNG setup.

- E.** Details of other items, if any required for complete integration & operation of equipment (not included in these specifications) may be furnished with the tender and must be quoted in the commercial bid. Subsequently no payment on account of any missing item which is required to complete the system specified, shall be admissible.

3. LOCATION FOR SUPPLY:

The mobile DSNG will be provided at O/o Chief Engineer (NEZ), Guwahati.

4. SCOPE:

The scope of supply of DSNG – involves integration of equipment from different manufacturers to build up a rugged and professional DSNG van on turnkey basis. The tenderer should evolve a professional design keeping in view the quality, reliability and long life of the DSNG van and should furnish full details of the same. The supplier shall ensure that the equipment assembly and integration are in accordance with international quality standard ISO 9002 through the accredited manufacturer.

4.1 The Scope of this tender supply includes

- a) Supply & integration of the equipment as per requirements and specifications given in Section A and Section 'B'.
- b) Acceptance testing of the equipment as per Draft ATP given in Section 'C'.

4.2 The indenter will provide

- a) Technical requirements (as at Section 'B')
- b) General requirements (as at Section 'A' Point 5)

4.3 The tenderer should provide full

- a) Detailed configuration of the equipment being supplied.
- b) Details of input/output requirements of the equipment being supplied.
- c) Details of power supply and air-conditioning requirements.
- d) Mechanical mounting/installation details of the equipment.

The offer should include preliminary design of the DSNG equipment layout in the van and drawings showing the layout of Racks, Equipment system etc.

- 4.4 The tenderer shall ensure that the equipment offered fully incorporate standard features for safety and protection.
- 4.5 All the offered equipment shall be field proven and from reputed manufacturers. A list of clients with their contact details, to whom similar equipment has been supplied, shall be furnished. Tenders without such client list would be liable for rejection.
- 4.6 Tenderer's proposal shall also contain the details of the sub-contractor, if any, proposed to be awarded by the tenderer for some part of the system or subsystem to another supplier, like profile of such a supplier, their experience in executing similar type of system / subsystem for which the sub-contract is being awarded, etc. Proposals without the above mentioned details will not be evaluated and will be rejected without any further communication to the tenderer.
- 4.7 After the acceptance of the tender by the indenter, the supplier shall be submitting the ATP for approval on the guidelines of Draft ATP. After the approval of ATP, the entire equipment shall be inspected as per this approved ATP. The supplier has to make all the arrangements including the test equipment in this regard.
- 4.8 **Inspection** : Inspection will be carried out at Supplier/ integrator's Works by engineer(s) (minimum two) of All India Radio. It may take four/ five working days/ per van. The supplier shall put up all the equipment for test on the test bench at his premises before the AIR Representative and shall provide electric energy, consumable materials, tools, testing instruments, labour and assistance of every kind for carrying out acceptance tests.
- Complete specifications & details will be checked and all parameters values will be measured as per approved ATP.
- 4.9 Supplier shall give intimation to the indenter for carrying out Inspection at supplier's Works at least 6 weeks in advance. Following expenses are to be quoted separately.
- i) Inspection charges.
 - ii) Any other charges.
- To and fro journey, DA and lodging as per Govt. of India norms will be borne by AIR in respect of Engineers deputed for inspection.
- 4.10 The technical offer of the tender should contain, apart from the technical compliance statement, all original data sheets of the manufacturer in support of the technical compliance statement. The tenders containing only technical compliance statement without the original data sheet/pamphlets of the equipment offered in full shall be rejected.
- 4.11 Tenderer may be asked to demonstrate the equipment(s) within one month of opening of technical bids.

One no. Encoder, modulator and digital receiver shall have to be submitted to AIR within one month of opening of technical bids for testing compatibility in the existing setup.

5. GENERAL REQUIREMENTS

5.1 Technical/ General Details

The tender/offer should also include the following details:

- i) The tenderer, in order to enable the indenter 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.
- ii) Sufficient information should be furnished with the tender to technically evaluate the offer and to assess full merits/demerits of the same.
- iii) Apart from printed technical data/specs of the equipment, Block schematic up to the sub-system, interconnection, equipment placement in rack and wiring diagram, photograph etc. should also be attached with the offer.

5.2 Compliance

While complying with these specifications, it may please be noted that just mentioning 'complied' will **NOT** suffice. The compliance shall be supported by proper printed data/documentation from original equipment manufacturer duly signed by them, substantiating the compliance in respect of the specifications. Deviations, if any, shall be brought out clearly in the compliance statement. Copies of performance reports on similar equipment shall be submitted with the tender.

5.3 Spares

Tenderer **must quote** separately for recommended essential spares including their quantities minus cost in the technical bid.

5.4 Training (Optional)

The tenderer shall be required to provide 3 days training to about five AIR Engineers on **Operation & Maintenance** of the equipment.

In addition to above five working days training for four engineers on servicing of equipment will be required to be arranged at manufacturer/suppliers works. The expenses on to & fro journey and DA, etc. will be borne by AIR.

5.5 Schedule of Material

A comprehensive schedule of material offered shall be attached with the offer in the technical bid (as per Configuration in Section 'A') in the same format as price bid minus the price.

5.6 Maintenance support

Maintenance support including availability of spares and repairs/ service is to be ensured for at least 10 years.

5.8 Manual:

Total 12 Sets Original copy of manuals [Two nos. for each van, Two for Directorate (Telecom Division), One for Hub Station, One for Zonal Office, One for STI (T) & One for R&D].

Manual for complete DSNG: Original manuals for Installation, Operation & Maintenance and Servicing of the System as well as sub-systems & accessories, both drawings & wiring diagram for the complete system in Hard and Soft copy.

5.9 Environmental & power supply

- a) Ambient Temperature : 0°C to +50°C
- b) Relative Humidity : 95% non-condensing at 45°C
- c) Safety : Standard features for safety & protection have to be built in/ incorporated for both personnel/ equipment.
- d) Power supply : 230 V AC $\pm 10\%$, single phase, 50 Hz $\pm 4\%$

5.10 Delivery Period

The delivery period for SITC of all the items shall be of five months from the date of order.

SECTION - B

TECHNICAL SPECIFICATIONS/REQUIREMENTS

MAIN EQUIPMENT SPECIFICATIONS FOR MOBILE DSNG EQUIPMENT

1. 1.8 M PARABOLIC MOTORISED DISH ANTENNA, EASILY TRANSPORTABLE, FOLDABLE & DEPLOYABLE ATOP THE DSNG VEHICLE

| | | |
|--|---|--|
| a) | Material | Light weight rugged material like carbon fiber/ carbon composite |
| b) | Type | Elevation over Azimuth |
| c) | Nominal Diameter | 1.8 Meter |
| d) | Frequency Range a) Transmit b) Receive | 5.850 to 6.425 GHz 3.700 to 4.200 GHz |
| e) | Antenna gain(mid band) | i) Transmit : ≥ 39 dB ii) Receive : ≥ 35 dB |
| f) | Antenna G/T with 35°LNBC | 15 dB are better |
| g) | Side lobes (Transmit and Receive) | As per ITU-R Recs.580-5 (latest amendments) |
| Note : Antenna radiation pattern conformity to ITU-R standard to be got cleared by the tenderer/ firm from NOCC/DOT before acceptance and commissioning). | | |
| h) | Feed and Feed Port | 2 Port feed linear i) Transmit VLP/HLP ii) Receive HLP/VLP |
| i) | Cross polarization isolation | ≥ 30 dB |
| j) | Feed mounting/ configuration | Prime focus/ offset |
| k) | VSWR (Return loss) a) Transmit ports b) Receive ports | $\leq 1.30 : 1$ $\leq 1.30 : 1$ |
| l) | Output wave guide flange interface a) Transmit ports b) Receive ports | CPR - 137 G CPR - 229 G |
| m) | Power handling capacity | ≥ 1 KW CW |
| n) | Antenna orientation | Manual & motorized version for AZ, EL & POL. Alignment. |
| o) | Polarization adjustments | $\pm 90^\circ$ |

| | | |
|----|--|--|
| p) | Antenna steerability a) Elevation b) Azimuth | 15° to 90° (continuous) ± 180° (continuous) (Scale(s) to be provided for indication) |
| q) | Wind Speed a) Operational b) Survival | 60 kmph 100 kmph |
| r) | Lightening Protection | For antenna as well as for vehicle |

The antenna would be mounted on the rooftop of the vehicle. It would normally remain folded on the roof and should have adequate protection from wind while vehicle is driven. When the vehicle is positioned on OB spot the antenna would be unfolded and deployed to required satellite look angle orientation. No portion of the antenna should protrude out on the top of the vehicle.

2. 100 W C-BAND SOLID STATE POWER AMPLIFIER (1+1) WITH AUTO CHANGE-OVER UNIT FOR S.S.P.A. 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 should be available along with its inbuilt/ associated power supply unit. It should 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. It should not require any external cooling.

- | | | | |
|----|---|---|--|
| a) | Type | : | SSPA |
| b) | Rated output power at the output of wave-guide flange | : | 80 W continuous |
| c) | Frequency range | : | 5850 - 6425 MHz |
| d) | Gain Frequency Response | : | ± 1 dB over any 40 MHz |
| e) | Saturated output power | : | Nominal +50 dBm |
| f) | R.F. level control | : | 0-20 dB continuous |
| g) | Gain stability for constant temp. & drive | : | ± 2 dB over 0° to 50° Celsius |
| h) | Input VSWR | : | ≤ 1.3 : 1 |
| i) | Output VSWR | : | ≤ 1.25 : 1 |
| j) | Phase Noise | : | Should meet IESS 308/309 |
| k) | Harmonic | : | Better than : - 50 dBc (at rated output) |
| l) | Spurious (in band) | : | Better than : - 60 dBc (at rated output) |

- m) S.S.P.A. standby operation : 1 + 1 hot redundancy auto change-over with manual over ride.
- n) Mounting : 19" Rack
- o) Two tone inter-modulation at 3dB total back off from 1 dB compression point : Better than -25 dBc
- p) Monitor : RF output sample port

3. SYNTHESIZED IF TO C- BAND UPCONVERTER (1+1) WITH AUTO CHANGEOVER 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 $\pm 1 \times 10^{-8}$ over temp. 0° to 50°C
- 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 : 19 dB or better
- j) P1 dB Output level : +10 dBm or more
- k) Overall Conversion gain : 30 dB or more
- l) Gain control : > 30dB in steps of 0.2 dB or smaller.
- m) Gain Slope : ± 0.05 dB/MHz
- n) Output Return loss (VSWR) : 19 dB or better ($\leq 1.25 : 1$)
- 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
-80 dBc/Hz, 1 KHz away from carrier
-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 | : | RS232/ RS485 for parameter setting |
| x) | Front Panel Indications | : | Power, Standby, Fault, Remote/Manual |

4. AUDIO BASE BAND DIGITAL ENCODER

The Digital encoder for base band encoding should conform to the standard and specification of the existing digital radio networking system in AIR Network. It should be possible to control/set encoder through front panel as well as through PC. **One no. Encoder shall have to be submitted to AIR within one month of opening of technical bids for testing compatibility in the existing setup.**

| | | | |
|----|---|---|--|
| a) | No. of Analog audio inputs | : | Two mono/one stereo |
| b) | Digital Audio input | : | AES/EBU Standard (Professional) |
| c) | Audio Signal Bandwidth | : | 20 Hz to 20 KHz |
| d) | Input level (max.) | : | +12 dBu (peak) |
| e) | Dynamic range | : | ≥ 80 dB. |
| f) | Compression | : | ISO/MPEG-1 layer 2 |
| g) | Data rates | : | 64, 128, 192, 256 & 384 kbps (selectable) |
| h) | Modes | : | Mono, Dual Mono, Joint stereo |
| i) | Sampling rate | : | 48 KHz |
| j) | End to End stability (from input of encoder in the uplink to receiver output in the downlink). | : | ±0.5 dB, 20 Hz-20 KHz, w.r.t. input and output levels at 1 KHz, no gain adjustment |
| k) | End to End gain (from input of encoder in the uplink to receiver output in the down-link) | : | ± 0.5 dB at 1 KHz, no adjustment |
| l) | Total Harmonic Distortion (THD) | : | ≤ 0.2% at 1 KHz for +8 dBu output from the receiver. |
| m) | Signal to Noise Ratio | : | ≥ 90 dB at 1 KHz for +12 dBu output from the receiver |
| n) | Cross talk Isolation between the two Channels | : | ≥ 80 dB w.r.t. +12 dBu output from the receiver at 1 KHz |
| o) | Auxiliary data channel | : | ≥ 4.8 kbps |
| p) | Interface for aux. | : | Asynchronous, RS-232 |
| q) | Operation | : | Encoder & Decoder independently |
| r) | Digital I/O | : | Transformer Coupled, balanced |

- s) Power supply : 230VAC $\pm 10\%$, 50Hz $\pm 4\%$
- t) Operating temp. range : 0°C to +50°C

5. DIGITAL IF MODULATOR

The Digital modulator should conform to the standard and specification of the existing digital radio networking system in AIR Network. It should be possible to control/set modulator through front panel as well as through PC. **One no. modulator shall have to be submitted to AIR within one month of opening of technical bids for testing compatibility in the existing setup.**

- a) Type of Modulation : QPSK
- b) IF Frequency : 52 to 88 MHz continuously adjustable in ≤ 10 Hz step.
- c) Output level : 0 to -20 dBm adjustable in ≤ 0.1 dB step.
- d) Channel coding : a) Viterbi 1/2, 3/4 selectable
b) Sequential 1/2, 3/4, selectable
- e) Spurious : ≤ -50 dBc (in band); ≤ -45 dBc (out of band)
- f) Data rate : 64, 128, 192, 256, 384 kbps (programmable)
- g) Interface : V.35
- h) IF impedance : 75 ohm
- i) Data clock source : Internal, external
- j) Data clock stability : 1×10^{-6} or better
- k) Configuration : 1 + 1 in hot-standby with auto c/o unit
- l) Power supply : 230VAC $\pm 10\%$, 50Hz $\pm 4\%$
- m) Operating temp. range : 0°C to +50°C

6. LAPTOP

Laptop shall be rack mountable.(sliding) and shall be of reputed make. It shall be used for control and setting of the operational parameters for Digital modulators, Upconverters and SSPA on the uplink side and Digital SCPC Receivers on the downlink monitoring side.

- a) **CPU:** Intel(R) Core 2 Duo Processor, 1.8 GHZ or latest version.
- b) **RAM:** minimum 2 GB
- c) **HDD:** 160 GB Hard Drive,
- d) **Optical Drive:** Internal 8X DVD+/-RW Combination Drive
- e) **Net work interface card:** 10/100 Base T NIC card
- f) **Operating System:** Pre loaded Genuine licensed Windows Vista(TM) or latest. Recovery CD media including all drivers etc. Fully loaded configuration. License in the name of consignee.
- g) **Display:** 15" Widescreen .
- h) **Modem:** Min. 56Kbps
- i) **Ports:** i) Serial Comm: 1 Nos or more (RS 232)
ii)USB 2.0: 3 No's or more
- j) **Battery Pack:** Lithium-ion.
- k) **Media reader:** Integrated media reader, touch pad.
- l) **External mouse:** Optical
- m) **Standard Features:** At least 3 Hrs battery backup, A/C power adopter/charger.
- n) **Laser jet printer** of reputed make.

7. INTER FACILITY LINKS

The tenderer should quote for Wave guides, couplers, adaptors, cables and other accessories required for Antenna connection to the output of SSPA. All these accessories should be professional standard and compatible with the system. Technical specifications and detailed quantity should be mentioned in the offer.

8. MONITORING SYSTEM FOR ANALOG AND DIGITAL UPLINK

The monitoring system is required for subjective monitoring and for measurements on the downlinked signals from the satellite in C-band (3.7 - 4.2 GHz). The monitoring system should have C-Band reception facility as detailed below.

a) Professional Grade C-BAND LNBC (Make & Model to be specified)

| | | |
|----|-------------------|------------------------------|
| a) | Input frequency | 3700 – 4200 MHz |
| b) | Input impedance | 50 Ω |
| c) | Input connector | WR 229 G Flange |
| d) | Output frequency | 950 - 1450 MHz |
| e) | L.O. Stability | PLL, better than ± 2 PPM |
| f) | Noise temperature | $\leq 35^\circ\text{K}$ |
| g) | Conversion gain | ≥ 55 dB |

| | | |
|----|---------------------------------|---|
| h) | Phase Noise 1 KHz 100 KHz | -60 dBc/Hz -80 dBc/Hz |
| i) | Output impedance & Connector | 75 Ω ; F (Female) |
| j) | Power supply | + 15 V to + 24 VDC through output connector |

b) DIGITAL SATELLITE RECEIVER WITH L- BAND INPUT

The digital receiver should conform to the standard & specs of the existing digital radio networking system. It should be possible to control/set receiver through front panel as well as through laptop. One no. digital receiver shall have to be submitted to AIR within one month of opening of technical bids for testing compatibility in the existing setup.

| | | |
|-------|--|--|
| i) | Input a) Freq. Range b) Freq. Step Size c) Impedance d) Signal Level | 950 – 1450 MHz Resolution \leq 25 KHz Local (remote control optional) 75 Ω -25 dBm to -70 dBm |
| ii) | Demodulation | QPSK |
| iii) | Channel change time | < 1 sec |
| iv) | FEC decoding | a) Rate 1/2, 3/4 Viterbi b) Rate 1/2 Sequential (Selectable Rate preferred) |
| v) | Audio coding | ISO/MPEG-I/Layer-2 |
| vi) | Data rates (Selectable) | 64, 128, 192, 256 & 384 kbps (QPSK) |
| vii) | Modes | Mono, Dual mono & Joint stereo |
| viii) | Audio output a) Impedance b) Level (Maximum) c) T.H.D. (@256kbps; 1 KHz) d) Audio signal bandwidth e) Frequency response f) Signal to Noise ratio g) Dynamic range h) Cross-talk ratio i) Audio output channels j) Digital audio output | \leq 600 Ω + 12 dBu (adjustable) \leq 0.2% (at +8 dBu output) 20 Hz to 20 KHz 1.0 dB(p-p) (20 Hz to 20 KHz) @ 0 dBu O/P. \geq 75 dB (at 256kbps, Eb/No \geq 9 dB, +12 dBu) \geq 80 dB \geq 75 dB w.r.t. +12 dBu input in Encoder Two mono/one stereo AES/EBU standard professional |
| ix) | Threshold Eb/No | \leq 5.5 dB (QPSK) |
| x) | B.E.R. Immunity at 128 kbps, QPSK, Vit 1/2 at Eb/No 5.5 dB. | 1×10^{-5} for no subjective loss in quality |
| xi) | Audio Sampling Rate | 48 KHz |

| | | |
|-------|--|--|
| xii) | Auxiliary data channel a) Data rate b) Interface | ≥ 4.8 Kbps RS – 232 |
| xiii) | Supply for LNBC | Provision for +15V to +24VDC power supply to compatible LNBCs through centre conductor |

c) STEREO AUDIO MONITORING EQUIPMENT

The Tender shall include a hi-fi 10+10 W professional stereo monitoring amplifier and matching professional stereo speakers system with AES/EBU & Analog inputs.

Stereo Monitoring Amplifier with quality speakers

Power output: 10+10W for L & R channel.
Input: AES/EBU & Analog
Frequency response: 20 Hz to 15 kHz ± 1dB
Distortion: ≤ 0.5%
AC Power: 230V ±10%, 50 Hz±4%

Equipment should be 19" rack mountable.

d) INTER-CONNECTING CABLES, CONNECTORS AND ACCESSORIES

Interconnecting cables, power supply cables, connectors and other accessories required for the monitoring system should be included in the tender.

9. SATELLITE PHONE

Satellite Phone/Mini-M terminal must be INMARSAT approved. Copy of the certificate is required to be submitted along with tender. **The activation shall be arranged by the tenderer.**

| S.No. | Parameter | Specification |
|-------|---------------|---|
| a) | Function | Voice, Data, Fax, hand free, SIM card dialing |
| b) | Display | LCD |
| c) | Key board | 12 alpha numerical keys |
| d) | Power | 10-24 volts with AC/ DC adopter |
| e) | Interface(s) | RJ-11, SIM card interface |
| f) | Frequency | 1626.5 to 1660.5 MHz (transmitting) 1525.0 to 1559.0 MHz (receiving) |
| g) | Antenna | Patch type, EIRP +13dB W with the cable length of at least 30 M. |
| h) | Optional | Cable type antenna |
| i) | Features | Robust, light weight, portable, compact size |
| j) | Environmental | -10 °C to 55°C, 40°C 95% humidity (non-condensing) |

10. DSNG Van

One medium size vehicle preferably is required for mounting the DSNG Antenna and Equipment. The body of the vehicle will need to be modified to suit the requirements for housing the equipment racks, uplink equipment, power supply equipment, cable & accessories, antenna and petrol generator etc. Appropriate provision for sitting of operating personnel and internal fittings etc. would have to be made. The price should include the spare wheel and tool kit as in practice. The price of the vehicle should be inclusive of insurance, lifetime road tax and registration etc.

The length, width and height of the vehicle should be such that with 1.8 meter uplink antenna mounted over its roof top, it should meet all mandatory requirements for its registration throughout India. When the vehicle is positioned on OB spot the antenna would be unfolded and deployed to required satellite look angle orientation. No portion of the antenna should protrude out on the top of the vehicle.

Furthermore total weight, on and inside the vehicle should be managed in such a way that it meets all mandatory requirements for its registration throughout India.

The vehicle should be four wheel drive, diesel engine and should have suitable hydraulic jacks mounted along sides of all its four wheels for lifting its position at OB site approximately 1 inch up from the ground level.

A schematic diagram showing complete dimensions of the vehicle with rack lay out of the equipment/electronics items mounted inside the vehicle and antenna atop the vehicle must be submitted along with the technical bid.

The vehicle should have heater, ventilation & AC powerful enough for vehicle as well as equipment cooling.

11. WIRED RACKS FOR EQUIPMENT

All the above equipment should be installed in the wired racks along with requisite jack -strip & other item. The rack must be properly fitted in the van itself. The suitable shock absorbing arrangements shall be made to save the entire equipment from jerks and shocks during travel.

12. LIGHT WEIGHT PORTABLE PETROL GENERATOR WITH STABILIZER

- i) Out put Rating : 4 KVA
- ii) Out put : 230 Vac; single phase; 50Hz
(optional additional output :12 Vdc \geq 7 A)
- iii) Rated power factor : Minimum 0.8
- iv) Output Stability Through AVR
- v) Engine Type : 4 Stroke
- vi) Fuel Capacity : At least 15 liters
- vii) Continuous operation :: At least 5 hours.
- viii) Start Mode : Self-Start (provision for manual as well)
- ix) Displays : Fuel level, output voltage & current

13. ACCESSORIES FOR SYSTEM INTEGRATION

Interconnecting cables, power supply cables, connectors, magnetic compass on tripod stand, inclinometer and other accessories required for the integration of the complete DSNG system should be included in the tender.

14. UPS (RACK MOUNT TYPE)

| | | |
|----|-----------------------|---|
| a) | Type | On line, sine wave |
| b) | Power rating | 3 KVA/2100 watt, Single phase |
| c) | Battery back up | > 5 minutes (full load) |
| d) | Type of battery | Sealed Maintenance Free |
| e) | Input Voltage | 180 – 270 Vac, 230 Vac (Nominal); 50 ± 3 Hz, 1Φ |
| f) | Output voltage | 230V ± 2%, 50 Hz, single phase |
| g) | Efficiency | ≥ 85 % |
| h) | Type approval | ISO certified, standard, reputed make |
| i) | Metering & Indicators | Meters/LCD Display should be there to monitor input/output voltage & current etc., must have all types of alarm indicators, LED bar/ LCD indications for Load and Battery charge/discharge. |

15. MEASURING EQUIPMENT**i) SPECTRUM ANALYZER**

| | | |
|----|--|--|
| 1. | FREQUENCY a) Range b) Tuning Resolution c) Span d) Accuracy | : 100 KHz to ≥ 6.7GHz : 1 Hz : 10 Hz to full range; 0 Hz (for Zero Span) : 1 x 10 ⁻⁶ or better |
| 2. | BAND WIDTH a) Resolution BW b) Video BW | : 10 Hz to 3.0 MHz in 1-3 Steps : 1 Hz to 3.0 MHz in 1-3 Steps |
| 3. | SWEEP TIME a) Zero Span b) Non Zero Span c) Sweep Trigger | : up to 600 s. : 200 ms to 600 s : Free Run, External ,Video |

| | | |
|-----|---|--|
| 4. | AMPLITUDE a) measurement range b) Input Attenuator c) Max. input d) DANL e) Overall Accuracy f) Disp. per Division g) Measurement Units i) Log ii) Linear | : Displayed Average Noise Level to + 30 dBm. : 0 dB to 60 dB in 5/10 dB Step Size. : +30 dBm : Better than -150dBm : ± 1.5 dB (or better) : 1 dB to 15 dB dBm, dBmV, dB _μ V mV, μV, μW, nW |
| 5. | SPECTRAL PURITY a) 10 KHz offset from carrier b) 100KHz offset from carrier | <i>SSB Phase Noise</i> : -98 dBc/Hz : -100dBc/Hz |
| 6. | DISPLAY | High resolution LCD color display |
| 6. | DEMODULATED Output | AM and FM on internal speaker/connector |
| 7. | DIRECT MEASUREMENT FUNCTIONS Marker Functions | : Adjacent Channel Power Ratio, Occupied Bandwidth, C/No, C/N : Standard, Delta, Marker to Peak etc for measurement of level etc. |
| 8. | Memory | : Should have provision for storing ≥ 200 Setups/Traces in Internal / External memory (Flash card). |
| 9. | Calibration and Self Test | : In-built diagnostics system for self-tests and calibration routines for the instrument to remain within defined tolerances and maintain its accuracy of measurement |
| 10. | GENERAL a) USB 2.0 or equivalent b) RF Input | : For Data transfer to & from PC. : N female, 50Ω |
| 11. | a) Operating temp. range b) Power requirement | : 0° to + 50° C : 230 V AC ±10%, single phase, 50 Hz ± 4% |

ii) GPS RECEIVER

This system is required for finding out the exact six figures geographical co-ordinates (Longitude and Latitude), Height Above Mean Sea Level of sites and to accomplish mapping. The equipment shall be user friendly and based upon latest state of art design using microprocessors.

SPECIFICATIONS:

- a) **TRACKING CAPABILITY** -continuous and updates position every sec.
- b) **ACCURACY** :Position : 20m
- b) GPS Receiver should be able to down load & upload the required data & maps from the computer to GPS memory.
- c) **ACQUISITION TIME** : Less than 60 seconds initially, Less than 1 second in warm condition

Electronic compass feature: Accuracy \pm 2 degree

Standard accessories: memory card, interconnecting cable etc. to be provided.

SECTION - 'C'

DRAFT ATP FOR DSNG

1 INTRODUCTION

This document describes the Acceptance Test Procedure (ATP) for testing the various units of the DSNG 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

The items to be tested first individually and then integrated are as follows:-

- a) **Individual Items**
 - i) Solid State Power Amplifier (SSPA).
 - ii) Up-converter.
 - iii) Digital Encoder and Modulator.
 - iv) Monitoring System comprising of LNBC, and Digital Receiver.
 - v) Spectrum Analyzer.
 - vi) GPS receiver.
 - vii) Satellite Phone.
 - viii) Lap top Computer.
- b) **Integrated Setup**
 - i) Other peripheral equipment such as Vehicle, Petrol Generator, UPS and Air-conditioning equipment etc.
 - ii) Complete integrated setup from Audio input point to modulator, up-converter, and SSPA including receiving setup from Antenna in receiving mode to LNBC, Demodulators and Analog O/P.

3 TEST EQUIPMENT

- a) All requisite test equipment conforming to the required standard for testing and commissioning shall have to be provided by the supplier.
- b) List of the test & measuring equipments :

(This is a tentative list. Additional equipment may be specified by the indenter if needed).

- i) Spectrum Analyzer (>8 GHz range)
- ii) Power Meter with sensor & Attenuator etc.
- iii) Frequency counter
- iv) Signal Generator
- v) Noise figure meter with noise source.
- vi) Digital Modulation Analyzer
- vii) Plotter
- viii) PC with Printer
- ix) Any other equipment and standard reference source/setup necessary for measurements.

- x) Directional coupler, inter-connecting cables, Attenuators, combiner, Dividers etc. as may be necessary for the tests.

4. TESTS REQUIRED TO BE CARRIED

(NOTE: This is only a tentative list, Additional items of tests may be specified by the indenter if needed)

4.1 S.S.P.A.

- i) Functionality test for individual SSPA and in (1+1) configuration.
- ii) Power output check
- iii) Gain check
- iv) Gain flatness check
- v) Frequency response
- vi) I.M.P.
- vii) Spurious
- viii) Any other tests to check the conformity to the specs.

4.2 UP-CONVERTER :

- i) Functionality test for individual up-converter and in (1+1) configuration
- ii) Output frequency check
- iii) Output level and stability check
- iv) Frequency stability
- v) Spurious check
- vi) Phase Noise check
- vii) Any other test to check the conformity to the specs.

4.3 DIGITAL ENCODER/MODULATOR

- i) Functionality test for individual units and in (1+1) configuration
- ii) I.F. Range
- iii) O/P Frequency stability and accuracy
- iv) O/P level stability
- v) Coding standard, data rates check
- vi) Digital modulator check
- vii) All Base-band measurements alongwith receivers
- viii) Return loss.
- ix) Spurious Check
- x) Any other test to check the conformity to the specs.

4.4 MONITORING SYSTEM

- i) Functionality check for individual monitoring and Digital demodulator.
- ii) Test for LNBC - output frequency level, L.O. stability, Noise Temp., phase and spurious noise, gain etc.
- iii) Test for Digital Demodulator/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.

4.5 INTEGRATED SETUP

- a) After the individual tests the equipment will be installed and integrated to work as DSNG 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) EIRP Capability
 - ii) EIRP Stability
 - iii) Radiation conformity to Standard specified
 - iv) Emissions conforming to International Standard for Satellite transmission.
 - v) Overall uplink/down-link check and performance measurements to meet the specs.
 - vi) Any other tests necessary to check the conformity to specs.
- c) Antenna radiation pattern conformity to ITU-R standard shall be arranged by the supplier from NOCC/DOT before the completed installation is offered for acceptance for commissioning by AIR.

4.6 PERIPHERAL EQUIPMENT

All peripheral equipment shall be tested for the various functionalities prescribed and conformity with the specification.

- 4.7 In addition all the manuals/ drawings will be inspected for completeness.

5. GENERAL

- i) Based on above supplier is required to give a detailed ATP document giving procedure for tests of individual item as well integrated setup. This should include test setup, equipment details, inter-connection diagram and the Format for test reports
- ii) The indenter will examine the same and then it will be finalized after mutual discussion.

ANNEXURE-A

