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

****

Specification for the Mobile Digital Satellite News Gathering (DSNG) Equipment & Measuring Equipment for NBH,AIR, DELHI

ADD. DIRECTOR GENERAL-E	:	ADG-E (NZ) AIR&DD
SPECIFICATION NO	:	SCD/SPEC/CES-DSNG_DELHI
DATE OF APPROVAL	:	19/10/2022
NO OF PAGES	:	25
APPROVAL FILE NO.	:	1/1/2022/SCD/SPEC/CES-DSNG_DELHI

SUMMARY OF CONTENTS:-

PRASAR BHARATI

DIRECTORATE GENERAL: ALL INDIA RADIO

(PLANNING & DEVELOPMENT UNIT)

****

No.: SCD/SPEC/CES-DSNG_DELHI

Subject: Specification for the Mobile Digital Satellite News Gathering (DSNG) Equipment & Measuring Equipment for NBH, AIR, DELHI.

1. INTRODUCTION:

Name of the Project/ Scheme:

Procurement of Mobile DSNG Terminal & Measuring Equipment for NBH, AIR, DELHI.

DSNG System:

The DSNG Terminal 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 Representative block diagram of DSNG set up is placed at Annexure-A at page no.-27.

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 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 equipments/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 NBH, AIR, New Delhi.

ITEMS REQUIRED FOR 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.	50 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& B-5
5.	Lap Top required for Digital Equipments	1 No.	B - 6
6.	Inter-facility links including Wave guides, couplers, cables and other accessories for Antenna connection	1 Set	B - 7

	to SSPA		
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.	DSNG Van	1 No.	B – 9
9.	Wired racks for equipment	1 Set	B -10
10.	Portable Petrol Generator with Stabilizer (4 KVA)	1 No. each	B -11
11.	Miscellaneous items for system integration	1 Set	B -12
12.	UPS 3 KVA (Rack Mount Type)	1 No.	B-13
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 (NBH,AIR,New Delhi)

Sl. No.	Item	Quantity	Reference
1	Digital Satellite Receivers with LNBCs	2 no. each	Section B-8(b)
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-14 (i)
2.	GPS Meter	1 No.	Section B-14 (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 ADG-National Zone, AIR& DD, New Delhi.

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.

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 (At Section 'B')
b) General requirements (At Section 'A')

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, if required by Technical Evaluation Committee.

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 **O**peration **&M**aintenance of the equipment at NBH, AIR, New Delhi.

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.

5.7 Manual:

Total 5 Sets Original copy of manuals [Two nos. for van, One for Directorate (SCD: DG AIR), One for Zonal Office (NZ) &One for STI (T)].

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.

5.8 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 ±10%, single phase, 50 Hz ± 4%

5.9 Delivery Period

The delivery period for SITC and handing over the complete installation shall be 5 months of all the items from the date of A/T including NOCC clearance or 5 months from the date of Decision Letter (DL) from WPC in respect of RF equipment whichever is later.

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 : ≥35 dB ii) Receive : ≥30 dB
f)	Antenna G/T with 35°LNBC	15 dB are better
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	≥ 25 dB
j)	Feed mounting/ configuration	Prime focus/ offset
k)	VSWR (Return loss) a) Transmit ports b) Receive ports	 ≤ 1.30 : 1 ≤ 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	± 90°
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. 50 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	40 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 0º to 50º Celsius
h) Input VSWR	≤ 1.3 : 1
i) Output VSWR	≤ 1.3 : 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	-25 dBc or better
p) Monitoring	RF output sample port
q) RF input connector	N female
r) Gain	≥ 46 dB
s) RF output	CPR137
t) Operating temp. range	0º to 50º C

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 ± $1x10^{-9}$ 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	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 (≤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
y)	Operating temp	0º to +50º C

4. AUDIO BASE BAND DIGITAL ENCODER

S.No.	Parameter	Specification
1.	Audio Input No. Of Channel	Analog and digital AES/EBU compatible as standard professional, which can be selectable in stereo channel. One 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 256 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 (TS) Input port (at least 1 MBPS Stream)	Mux with one stereo Audio (Analog and Digital) at S No.1
10	Output	DVB-ASI and UDP Multicast IP TS
11	Input power	230 VAC nominal, 50 Hz
12	Operating temperature	0 to + 50° C

5. DIGITAL IF MODULATOR

Modulator is to be DVB S/S2 Compliant	
ASI Inputs	2nos.
Compliance	1. Backward compatible mode.(Should be capable of operating on DVB-S ,DVB-S2 and 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:10%,15%, 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

6. LAPTOP

Reputed make Laptop shall be provided .It should be mounted in the rack with slide in provision. It shall be used for control and setting of the operational parameters for Digital modulators, Upconverters and SSPA on the uplink side and Digital satellite Receivers on the downlink monitoring side.

The laptop should be loaded with the latest operating system i.e. Window 10 or higher etc. licensed in the name of consignee. Recovery CD media including all driver is also to be provided.

Laptop shall be loaded with NMS from Original Equipment Manufacturer (OEM) for both R.F. Trans Receive equipment and Audio Base-band equipments as indicated in Bill of Material.

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	≤ 35°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 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

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 ± 0.5dB

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. DSNG Van

One medium size electric cum petrol 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 electric cum petrol 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.

10. 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.

11. LIGHT WEIGHT PORTABLE PETROL GENERATOR WITH STABLIZER

i) Output Rating	4 KVA
ii) Output	230 VAC; single phase; 50Hz (optional additional output :12 Vdc ≥ 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

12. 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.

13. UPS (RACK MOUNT TYPE)

a)	Type	On line, sine wave
b)	Power rating	3 KVA/2100 watt, Single phase
c)	Battery back up	> 10 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.

14. MEASURING EQUIPMENT

i) SPECTRUM ANALYZER

1.	***FREQUENCY***	
	a) Range	100 KHz to ≥ 6.7GHz
	b) Tuning Resolution	1 Hz
	c) Span	10 Hz to full range; 0 Hz (for Zero Span)
	d) Accuracy	1 x 10^{-6} or better

2.	***BAND WIDTH***	
	a) Resolution BW	10 Hz to 3.0 MHz in 1-3 Steps
	b) Video BW	1 Hz to 3.0 MHz in 1-3 Steps
3.	***SWEEP TIME***	
	a) Zero Span	up to 600 s
	b) Non Zero Span	200 ms to 600 s
	c) Sweep Trigger	Free Run, External ,Video
4.	***AMPLITUDE***	
	a) measurement range	**D**isplayed **A**verage **N**oise **L**evel to + 30 dBm.
	b) Input Attenuator	0 dB to 60 dB in 5/10 dB Step Size.
	c) Max. input	+30 dBm
	d) DANL	Better than -150dBm
	e) Overall Accuracy	± 1.5 dB (or better)
	f) Disp. per Division	1 dB to 15 dB
	g) Measurement Units	
	i) Log	dBm, dBmV, $dB_{\mu V}$
	ii) Linear	mV, µV, µW, nW
6.	**DISPLAY**	High resolution LCD color display
7.	**DEMODULATED Output**	AM and FM on internal speaker/connector
8.	***DIRECT MEASUREMENT FUNCTIONS***	Adjacent Channel Power Ratio, Occupied Bandwidth, C/No, C/N
	Marker Functions	Standard, Delta, Marker to Peak etc for measurement of level etc.
9.	***Memory***	Should have provision for storing ≥ 200 Setups/Traces in Internal / External memory (Flash card).
10.	***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
11.	***GENERAL***	
	a) USB 2.0 or equivalent	For Data transfer to & from PC.
	b) RF Input	N female, 50Ω
12.	a) Operating temp. range	0º to + 50º C
	b) Power requirement	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 ± 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) Lap top

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 equipment's :

(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.

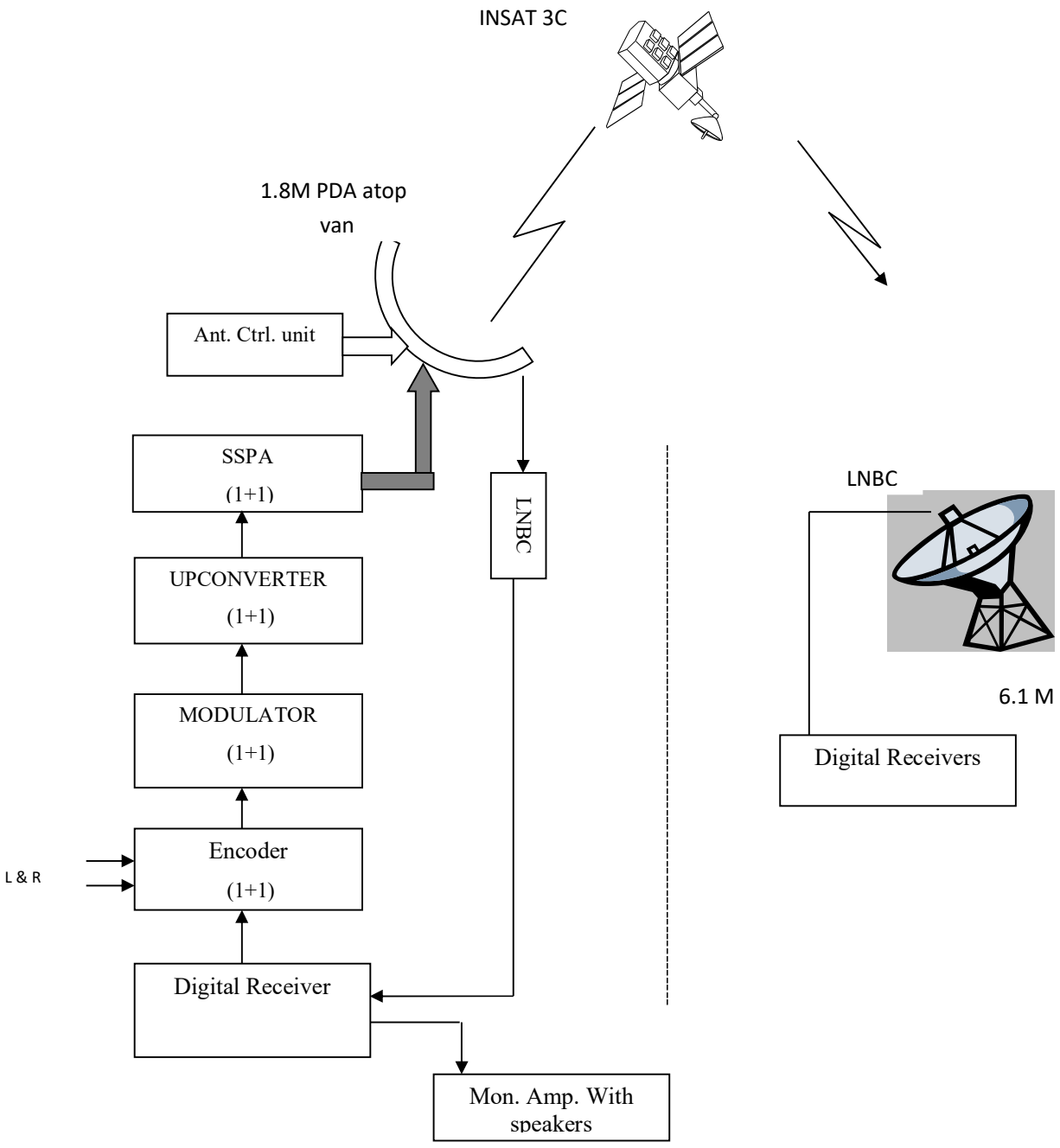
4.7 In addition all the manuals/ drawings will be inspected for completeness.

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-1


INSAT 3C
1.8M PDA atop van
Ant. Ctrl. unit
SSPA (1+1)
UPCONVERTER (1+1)
MODULATOR (1+1)
Encoder (1+1)
L & R
Digital Receiver
Mon. Amp. With speakers
LNBC
LNBC
6.1 M
Digital Receivers
DSNG VAN at OB site
Earth station/ Hub