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NEW DELHI – 110 001.**

F. No 14 (3) 2009-10-EI-P (TV)

Dt. 28.01.2010

To

M/s -----

Subject: SITC of C Band DSNG VAN.

Dear Sir,

The following enclosed Amended Specifications are here by authorized.

Yours faithfully



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**PRASAR BHARATI
(BROADCASTING CORPORATION OF INDIA)
DIRECTORATE GENERAL: DOORDARSHAN**

**Spec: No: SATD/1.8m_400W_VAN_C_DSNG_July/2009
(Amended in Jan 2010)**

**SPECIFICATIONS
FOR SITC OF
Vehicle mounted C-band DSNG (1+1) System**

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**PRASAR BHARATI
(BROADCASTING CORPORATION OF INDIA)
DIRECTORATE GENERAL: DOORDARSHAN**

Spec: No: SATD/1.8m_400W_VAN C DSNG July/2009 (Amended Jan 2010)

Specification for SITC of Vehicle mounted C-band DSNG System

This specification lays down the performance characteristics of Vehicle mounted C-band DSNG system *in 1+1 mode*. The Vehicle mounted C-band DSNG unit comprises encoder, modulator (QPSK), C-band Block up converter, 400W TWTA (1:1) outdoor unit, 1.8 Mtr – 2 Mtr vehicle mounted motorised antenna with associated accessories like wave guides, Inter facility Links, Digital PLL LNBCs, 3 Port Feed, Dummy load, FLT and measuring equipment such as Spectrum Analyzer & Monitoring set etc with one vehicle.

The specification mainly gives the representative requirements with MPEG-4 MPEG-2 DVB-S2 (HP@L4 (only for two DSNG), MP@ L3, 422P @ ML & MP@ML) standards.

The scope for Vehicle mounted C-band DSNG system is detailed in specifications as given below:

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1 INTRODUCTION

The scope of this includes Supply of the complete Vehicle mounted C-band DSNG system. These specifications envisage providing a digital uplink facility in 1+1 configuration. The digital chain consisting of Encoder, Digital Modulator and Upconverter as a 1+1 system feeding to 400W outdoor type TWTA (1+1) and 1.8 Mtr to 2 Mtr vehicle mounted motorized PDA system.

1. The supplier should give the Block diagram and Rack layout plan of interior for the complete system including size and weight of each component in the form of a table.
2. Output of the TWTA should be taken to an antenna of 1.8 Mtr to 2 Mtr through a flexible low loss corrugated wave-guide of suitable length. The antenna should be provided with a 3 port linear feed (1 uplink port and 2 downlink ports (i.e. both Vertical and Horizontal) along with C-band Digital LNBC, IRD & IFL (Interconnection Facility Links) etc. along with adjustments for azimuth, elevation and polarization. One TLT from C-band (5.925 GHz to 6.425 GHz) to L band is required for monitoring of uplink signal through an IRD
3. One lightweight, low noise Petrol /Diesel Gen Set is required for equipment load. Gen set should be installed in the vehicle in separate compartment with proper thermal isolation and proper cross ventilation to ensure reliable operation. Noise generated should be less then 65 dB A at 1 meter. The firm should specifically quote the Gen set noise at 1-meter distance. The Petrol/ Diesel Gen Set should conform to BIS specifications and manufactured in India.
4. Service centres of Genset for servicing and supply of spares should be available in major cities throughout India.
5. The DSNG unit should also have input, output audio & video monitoring.
6. A Hand held Spectrum analyser (3GHz), handheld satellite tracker and one WFM (Digital) should be supplied with the unit.
7. The system offered should contain all the accessories like flux gate compass, Inclinometer, GPS receiver, Beacon Tracking Receiver, necessary tools for integration / installation and maintenance.
8. The equipment with shock absorber mounted sub frame should be made of lightweight alloy. Rubber gasket between sides of the rack and sub frame should be provided. All connectors should be of MIL grade.
9. **The total weight of the complete system (in 1+1 configuration) including UPS, and Gen set along with Vehicle Driver & Technical staff should not cross 80% of rated Laden weight of the Vehicle. The Tenderer should submit a certificate in this respect from the manufacturer of the Vehicle.**
10. The equipment should be mounted in an ergonomically and orderly fashion. Easy access should be available to the PDP board.
11. The entire system designing should be able to withstand a rough handling during transportation, set -up, dismantling and packing.
12. The system design should take care of operator safety as a prime consideration.
13. (a). Each equipment rack should have the protection facilities like internal earth leakage and short circuit protection, over temperature alarm, residual current alarm, high volt alarm etc.
(b). The power Distribution Panel should have the protection facilities like internal earth leakage and short circuit protection, over temperature alarm, residual current alarm, high volt alarm etc.

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(c). Every rack should have Mains Distribution units with sequential delayed output start up, output status LED and IEC-3 pin against each equipment

14. The offer should include supply of four sets of detailed technical manuals for operation and maintenance of all the equipment, including the relevant circuit diagrams
15. Technical compliance (from OEM) of each parameter including features with supporting documents should be given. Any offer with non compliance of this requirement is likely to be summarily rejected
16. A detailed acceptance test report procedure should be given with the offer.
17. Training should be given to four Doordarshan Engineers in operation and maintenance of the system at the manufacturers / integrators works.
18. Technical offer should include **antenna system type approval certificate from reputed international organisations like NOCC or INTELSAT or EUTELSAT etc.**
19. The complete project will consist of Supply, Installation, Testing and Commissioning (SITC) of the DSNG Vehicle mounted System including NOCC clearance. The project will be carried out on turnkey basis.
20. It will be the responsibility of the Tenderer to ensure after-sale service and guarantee/warranty for the equipment from the manufacturers.
21. The Tenderer must necessarily enclose authorisation for sale, guarantee & warranty from the actual manufacturer with regard to the equipment, which is not manufactured by them, along with their offer. The firms should submit supporting documents that all the equipment supplied to Doordarshan against the present tender would be serviced to the extent of guarantee/warranty under the tender.
22. Tenderer/firm should have a proven record and should have carried out such projects in the past. They should enclose the list of such turnkey works done by them in the past for the consideration of Doordarshan. The offer(s) from the firms, who are not having work experience in SITC of complete integration of DSNG / DSNG OB van / Digital TV up linking E/S, will not be considered.
23. Tenderer will have to give demonstration of individual electronic equipment or sub system if required and asked for, by Doordarshan within 15 days of the request.
24. The specifications given are representative in nature and system will be selected on the basis of completeness only.
25. Tenderer can offer any option either with stand alone encoder & stand alone modulator or encoder cum modulator.
26. Tenderer can offer any option either with BUC in HPA or BUC & HPA as separate units.

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2. Specification for Compression Equipment

2.1 HD Encoder

2.1 System Requirements	
2.1.Design Standards	
The system shall be designed to meet the international standards for digital broadcasting by satellite known as the MPEG-4 standards (HP@L4, selectable without any hardware changes. It should be possible to provide programme specific information, service name, language description and other related routine data. The system should have a security scheme (encryption) BISS Mode 1 and BISS-E, so as to eliminate open access to the transmitted service.	
4:2:2 is required for HD MPEG-4 (H.264) and SD MPEG-2	
4:2:0 is required for HD MPEG-4 (H.264) and SD MPEG-2 & MPEG 4(H.264)	
HD Encoder 2.1.1 Basic Configuration	
The basic requirement is for a 1+1 system. Each system shall be complete and fully wired and installed in equipment cabinets to simplify the installation and commissioning process.	
HD Encoder 2.1.1.1 Digital Compression & RF Segment	
HD Encoder 2.2 MPEG-4 Digital Video Encoder Specifications	
The Encoder should support following features: (as per EN 300 421 standards)	
1. BISS Mode 1 and BISS-E	
2. Low delay	For MPEG-2 - 100msec MPEG-4 - Bidder has to specified for Their product
HD Encoder 2.2.1 Video Inputs	
Video Input - The encoder shall be capable of accepting HD SDI and embedded HD SDI inputs.	
HD Encoder 2.2.1.2 Serial Digital Input Specifications	
Parameter	Specification
(a) Serial Interface	SMPTE 292M, 1.485 Gbit/s (10bit),
(b) Format	1080i and 720p
(c) Connector	BNC female
(d) Input Level	800 mV p-p nominal +/- 10%,HD-SDI input
(e) Return Loss	better then 15 dB, 5 MBPS-1.5Gbit/s
HD Encoder 2.2.1.3 Video Compression Parameters	
Parameter	Specification
(a) Video Resolutions (PAL)	1080x1920/ i 25 720 x 1280/ p 50
(b) Profiles and Levels	HP@L4, (H.264 Part 10) with embedded audio
(c) Video Bit-rate	3.0 to 15 Mbps for 4:2:0 Profiles. 5.0 to 30 Mbps for 4:2:2 Profiles.
(d) Temporal Processing	To support low delay mode.

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(e) Coding of Interlaced Video	Adaptive Field/Frame Processing supported
(f) Spatial Redundancy	Discrete Cosine Transform (DCT) Reduction
(g) Chrominance Format	4:2:0 and 4:2:2 (also refer 2.1 above)
(h) Aspect Ratio	16:9
HD Encoder 2.2.2 Audio Inputs	
The encoder shall be capable of accepting analog , AES/EBU or AES/EBU embedded digital inputs.	
HD Encoder 2.2.2.1 Analog Audio Input Specifications (deleted)	
Parameter	Specification
HD Encoder 2.2.2.2 AES/EBU Digital Audio Input Specifications	
Parameter	Specification
(a) Sample Rates	SAMPLE Rate- 48KHz
(b) Serial Interface	AES/EBU format
(c) Connector	XLR / with adapter for XLR
(d) Format, No. of Input	AES/EBU, 4 channels
HD Encoder 2.2.2.3 Embedded Serial Digital Audio Input Specifications	
Parameter	Specification
(a) Serial Interface	
(b) Format	AES/EBU, 4 channels
(c) Connector	BNC female
HD Encoder 2.2.2.4 Audio Compression Technique	
Parameter	Specification
(a) Audio Encoding Method	MPEG1 layer 2, Digital LC-AAC, HE-AAC V1 (with capability for at least one 5.1surround sound encoding)
(b) Data rate	MUSICAM MPEG audio coding standard layer 2 64-256 kbps (MPEG-1, layer 2 Audio) 64-128 kbps (MPEG-4 AAC Encoding) 48-128 kbps (MPEG-4 HE-AAC Encoding)
HD Encoder 2.2.3 DATA INPUT	
OPTIONAL	
HD Encoder 2.2.3.1	
Auxiliary Data Multiplexing	
The encoder shall be capable of the transmission of broadcast data signals along with video and audio.	
HD Encoder 2.2.3.2 Asynchronous Serial Data Input Specifications (Optional)	
Parameter	Specification
(a) Physical Interface (Connector)	9 pin subminiature 'D' type, female
(b) Electrical Interface	RS-232C or IP
(c) Data Rate	up to 38.4 kb/s, asynchronous
HD Encoder 2.2.3.3 Synchronous Serial Data Input Specifications (Optional)	
Parameter	Specification
(a) Physical Interface (Connector)	15 pin subminiature 'D' type, male
(b) Electrical Interface	RS-422
(c) Data Rate	up to 2048 kb/s, synchronous

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2.1 SD Encoder

SD Encoder_2.1 System Requirements	
SD Encoder_2.1.Design Standards	
<p>The system shall be designed to meet the international standards for digital broadcasting by satellite known as the MPEG-4 / DVB-S2 standards (MP@ L3, 422P @ ML & MP@ ML, selectable without any hardware changes. It should be possible to provide programme specific information, service name, language description and other related routine data. The system should have a security scheme (encryption) BISS Mode 1 and BISS-E, so as to eliminate open access to the transmitted service.</p> <p>4:2:2 is required for SD MPEG-2 only. 4:2:0 is required for SD MPEG-2 & MPEG 4(H.264)</p>	
SD Encoder_2.1.1 Basic Configuration	
<p>The basic requirement is for a 1+1 system. Each system shall be complete and fully wired and installed in equipment cabinets to simplify the installation and commissioning process.</p>	
SD Encoder_2.1.1.1 Digital Compression & RF Segment	
SD Encoder_2.2 MPEG-4 Digital Video Encoder Specifications	
The Encoder should support following features: (as per EN 300 421 standards)	
1. BISS Mode 1 and BISS-E	BISS Mode 1 and BISS-E
2. Low delay	For MPEG-2 - 100msec ✓ For MPRG-4 - Bidder has to specified for Their product
SD Encoder_2.2.1 Video Inputs	
<p>The encoder shall be capable of accepting composite analog, SDI and embedded SDI inputs.</p>	
SD Encoder_2.2.1.2 Serial Digital Input Specifications	
Parameter	Specification
(a) Serial Interface	SMPTE 272M, 270 Mb/s(10 bit) with embedded audio
(b) Format	ITU(R)-601
(c) Connector	BNC female,75 ohm
(d) Input Level	800 mV p-p nominal +/- 10%, SDI input
(e) Return Loss	better than 15 dB, 10 – 270 Mbps
SD Encoder_2.2.1.3 Video Compression Parameters	
Parameter	Specification
(a) Video Resolutions (PAL)	720 x 480, 720 x 576, 704 x 576, 544 x 576,480 x 576, 352 x 576,
(b) Profiles and Levels	MP@ L3, 422P @ ML
(c)Video Bit-rate	1 to 10 Mbps for 4:2:0 Profile. 1 to 25 Mbps for 4:2:2 Profile.
(d) Temporal Processing	I, B, Br, B, P frames structure for MPEG-4 I, B, B, P frames structure for MPEG-2

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	To support low delay mode.
(e) Coding of Interlaced Video	Adaptive Field & Frame Processing support
(f) Spatial Redundancy	Discrete Cosine Transform (DCT) Reduction
(g) Chrominance Format	For MPEG-2, 4:2:0 & 4:2:2 selectable. For MPEG-4, 4:2:0 Only (Refer 2.1 above)
(h) Aspect Ratio	4:3
SD Encoder_2.2.2 Audio Inputs	
The encoder shall be capable of accepting analog, AES/EBU or AES/EBU embedded digital inputs.	
SD Encoder_2.2.2.1 Analog Audio Input Specifications (Deleted)	
SD Encoder_2.2.2.2 AES/EBU Digital Audio Input Specifications	
Parameter	Specification
(a) Sample Rates	
	48.0-kilo samples/second
(b) Serial Interface	AES/EBU format
(c) Connector	XLR / with adapter for XLR
(e) Format, No. of Input	AES/EBU, 4 channels
SD Encoder_2.2.2.3 Embedded Serial Digital Audio Input Specifications	
Parameter	Specification
(a) Serial Interface	
(b) Format	AES/EBU, 4 channels
(c) Connector	BNC female
SD Encoder_2.2.2.4 Audio Compression Technique	
Parameter	Specification
(a) Audio Encoding Method	MPEG1 layer 2, (with capability for at least one 5.1 surround sound encode) LC-AAC, HE-AAC V1
(b) Data rate	MUSICAM MPEG audio coding standard layer 2 64-256 kbps (MPEG-1, layer 2 Audio) 64-128 kbps (MPEG-4 AAC Encoding) 48-128 kbps (MPEG-4 HE-AAC Encoding)
SD Encoder_2.2.3 DATA INPUT	OPTIONAL
SD Encoder_2.2.3.1 Auxiliary Data Multiplexing	
The encoder shall be capable of the transmission of broadcast data signals along with video and audio.	
SD Encoder_2.2.3.2 Asynchronous Serial Data Input Specifications (Optional)	
Parameter	Specification
(a) Physical Interface (Connector)	15 Pin D type or MPE (RJ45) connector
(b) Electrical Interface	RS-232C or IP
(c) Data Rate	up to 38.4 kb/s, asynchronous

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SD Encoder_2.2.3.3 Synchronous Serial Data Input Specifications (Optional)	
Parameter	Specification
(a) Physical Interface (Connector)	15 pin subminiature 'D' type, male
(b) Electrical Interface	RS-422
(c) Data Rate	up to 2048 kb/s, synchronous

2.3 MODULATOR

2.3 DVB-S2 Satellite QPSK Modulator Specifications	
2.3.1 ASI Inputs	
Parameter	Specification
(a) No. of Inputs	2 nos.
(b) Compliance	DVB-S2, 302307 Should be capable of emitting signals using following modes: 1. Backward compatible mode. 2. Constant Coding and Modulation (CCM).
(c) Inputs bit-rate	upto 65 Mbps
(d) Byte stuffing modes	Byte & Signals Packet Burst modes.
(e) Connector	BNC
2.3.2 Forward Error Correction and Modulation Scheme	
Parameter	Specification
(a) FEC Coding(LDPC)	1/3,2/5,1/2,3/5,2/3,3/4,4/5,5/6,8/9,9/10
(b) Spectrum Roll off factor	25% and 35% selectable
(c) Modulation Format	QPSK & 8PSK
(d) Transmission Rates	(d1) Variable, 1.0 to 35 M symbols / sec (For stand alone Modulator) (d2) Variable, 1.0 to 15 M symbols / sec (For Combined Encoder and Modulator)

2.3.3 IF Output Interface Specifications(In case of 70 Mhz Upconverter)

Parameter	Specification
(a) Output Frequency Range	52 to 78 MHz tunable
(b) Synthesizer Step Size	1 kHz, step
(c) Frequency Stability	< + 1Khz (all causes over 10 years)
(d) Output Impedance	75 ohms unbalanced
(e) Connector	BNC, female
(f) Output Return Loss	>20 dB (50 – 90 MHz)
(g) Output Level Range	-20 to 0 dBm
(h) Level Step Size	0.1 dB, steps
(i) Spurious Outputs	<-65 dBc/4KHz@-10dBm
(j) Synthesizer Phase Noise	Meets requirements of IESS-308
(k) CW mode	Selectable
(l) Noise floor (C/ No)	< -120 dBc/Hz
(m) Spectrum sense	Normal/Inverted

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2.3.4 L-Band Output Option (In case of L band BUC)

S.No.	Parameters	Specification
1.	Frequency	950 to 1500 MHZ, step size 125 KHz
2.	Return loss	> 10 dB
3.	Compliance	EN 302307
4.	Output Connector	SMA(F)
5.	L band output impedance	50 ohm
6.	output level	- 20 to + 5dBm
7.	1 dB compression output	+10 dBm
8.	Output Gain	0 dBm + 5 dBm
9.	Output Gain step size	0.1 dB
10.	Phase Noise 10 Hz	< -30dBc/Hz
	100 Hz	< -60dBc/Hz
	1 KHz	< -70dBc/Hz
	10 KHz	< -80dBc/Hz
	100 KHz	< -90dBc/Hz
11	Spurious	<-60 dBm, and <-55 dBc/4KHz

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3.1 SPECIFICATION FOR UP CONVERTERS (In case of 70 MHz Mod.)

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|---------------------------|---|---------------------------------|
| 1. Input Frequency | : | 70 + 18 MHz |
| 2. Output B/W | : | +/- 18 MHz |
| 3. Frequency Steps Size | : | Synthesized 125 KHz |
| 4. Input Power | : | -20 dBm nominal |
| 5. Output Frequency range | : | 5.925 GHz to 6.425 GHz |
| 6. Frequency Accuracy | : | +/- 200 Hz |
| 7. Frequency Stability | : | +/- 1000 Hz from 0 to 50 Deg. C |
| 8. Output Power | : | 15 dBm |
| 9. Gain Adjustment | : | 25 dB |
| 10. Phase Noise | | |
| 10 KHz | : | -80 dBc per Hz |
| 100 KHz | : | -90 dBc per Hz |
| 1 MHz | : | -110 dBc per Hz |
| 11. Spurious | : | -65 dBc modulated |
| | : | -70 dBc unmodulated |

OR

3.2 Block Upconverter (In case of L band Modulator)

S.No.	Parameter	Specification
1	Type	Single conversion
2	Output Frequency	5.925 to 6.425 GHz
3	Input Frequency	950 to 1500 MHz
4	Impedance	50 ohms
5	VSWR	1.5:1 maximum
6	Non-damage	+15 dBm minmum
7	External reference characteristics	
a	Location	Input center conductor or reference connector
b	Frequency	10 MHz
c	Level	-5 to + 5 dBm
8	Output characteristics	
a	Impedance	50 ohms
b	VSWR	1.3:1 maximum
c	Power output (1 dB compression)	+10 dBm minmum
d	Power Attenuator	0 to 20 dB in 1 dB step size
9	Transfer characteristics	
a	Noise figure	15 dB typical (with minimum attenuation)
b	Gain	26 ± 1 dB at 23 degree C
c	Gain flatness	±0.2 dB/any 40 MHz, ±0.25 dB/any 80 MHz, ±0.5dB/RF-band

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10	Gain stability	
a	Constant temperature	±0.25 dB/24 hours
b	Attenuation control	32 dB / 0.1 dB step remote control or 0 to 10 volts DC
11	Group delay	
a	Slope (any 80 MHz segment)	0.0125 ns/MHz
b	Parabolic (any 80 MHz segment)	0.000625 ns/MHz ²
c	Ripple (any 80 MHz segment)	0.5 ns
d	Total	1 ns peak-to-peak over RF-band
12	Spurious output	
a	Signal related	65 dBc minimum
b	IF signal second harmonic (Ka- band models)	-55 dBc maximum at 0 dBm output power
c	Signal independent (in band)	-100 dBm maximum
d	Signal independent (out-of-band)	-70 dBm maximum
e	Image rejection	-60 dB minimum
f	Second harmonic output (P1 dB)	-40 dBc maximum
g	Intermodulation distortion	With two in band output signals at 0 dBm, third order intermodulation products are less than 46 dBc
13	Mute	60 dB minimum

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4. SPECIFICATION FOR HIGH POWER AMPLIFIER

The high power amplifier is to be used for the final power amplification of the digital RF signal in C band, to be fed to the antenna after proper processing through filters etc. **Amplification has to be carried out in two stages i.e SSIPA and TWTA.**

S.N.	Parameter	Specification
1	Frequency Range standard other frequency coverage available	5.925 - 6.425 GHz
2	Output Power Saturated Power (Typical) Rated Power(P1dB) @ Amplifier Flange	56.00 dBm (55.00 dBm)
3	Gain	
3 a	Small Signal, minimum	46 dB, at rated power output
3 b	Small Signal, maximum	52 dB, at rated power output
3 c	Small Signal Gain Variation Over	0.5 dB pk max any 40 MHz Band 2.5 dB pk max across 800 MHz band standard 4.5 dB pk-pk across any 500 MHz, with BUC option
3 d	Slope, maximum	±0.02 dB/MHz max. (±0.04 dB/MHz max. with BUC option)
3 e	Stability, 24 Hr maximum	±0.25 dB/24hr max.
3 f	Stability, Temperature	±1.0 dB over operating temp. range;

4	Gain control	20 dB
5	Intermodulation with two equal signals	-24 dBc or better with two equal carriers at total power level 7 dB OBO(4 dB OBO with linearizer)
6	Harmonic Output, maximum	-60 dBc max.
7	AM/PM conversion at 6 dB below rated output power	2.5 Degree/dB Maximum
8	Group Delay, maximum (a) Linear (b) Parabolic (c) Ripple	0.01 ns /MHz (linear) over any 40 MHz band 0.005 ns /MHz ² over any 40 MHz band 0.5 ns p-p over any 40 MHz band
9	Phase Noise, maximum	10 dB below IESS 308 continuous mask (3 dB with BUC option)
10	phase noise continuous AC fundamentals related	-50 dBc (-33 dBc with BUC option)
11	Sum of spurs (370 Hz to 1 MHz) -	-47 dBc (-39 dBc with BUC option)
12	VSWR	
a	Input, maximum	1.2:1 max. (1.5:1 max. with BUC option)
b	Load VSWR full specs compliance continuous operation	1.5 max 2.0:1 max
c	Output, maximum	1.3:1 max.
13 a	Power Supply - operating voltage	180 to 245 V AC, Single Phase
13 b	Frequency	47 to 53 Hz single phase
13 c	Power factor	0.95 (Min.)
13 d	Power Consumption	1500 watts. max
14	Spurious (Max.) Receive Band (3.7 to 4.2GHz) Transmit Band (5.7 to 6.2 GHz)	-120 dBW / 4 KHz -65 dBW / 4 KHz
15	Controls	HV on, Fault reset, heater standby
16	Monitoring Digital	HV on, Heater timeout, standby, summary fault, Helix current/ Arc fault, Helix current latched fault, Over voltage fault, Temp fault, Fan lock
17	Monitoring Analog	Helix current, TWT Temp. RF output
18	Altitude	3000 Meter AMSL
19	Shock vibration	Air transportation and Mechanized Material handling e.g. Fork lifts
20	Cooling	Forced Air

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5. Specification for 1.8 Mtr –2 Mtr Uplink Antenna.

5.1 INTRODUCTION

This antenna would be used to uplink TV signals & it is required for uplinking digital channels through 400W TWTA, hence the feed handling capacity should be as given in the specifications below.

1. It should have at least 1 Uplink port and 2 downlink ports (i.e. both for Vertical & Horizontal Pol.)
2. Antenna should be made of lightweight carbon composite fiber material.
3. Antenna should have lightweight Aerodynamic enclosure housing for protection of antenna reflector and HPA and for high speed movement of vehicle.
4. The antenna should conform to latest CCIR recommendations, ITU-R Rec. 580- 5, satisfying the $29 - 25 \log(\theta)$.

5.2 ANTENNA SPECIFICATION FOR THE C BAND ANTENNA .

- | | |
|----------------------------|---|
| 1. Size | : 1.8 Mtr to 2 Mtr (nominal circular equivalent) |
| 2. Mount | : Elevation - Azimuth |
| 3. Frequency of operation | |
| Transmit | : 5.925 GHz to 6.425 GHz. |
| Receive | : 3.6 GHz to 4.2 GHz |
| 4. Gain | : |
| Transmit | : 39.0 dB (Min.) for 1.8 Mtr / 41.0 dB (Min) for
2 Mtr @6 GHz |
| Receive | : 34.0 dB (Min.) for 1.8 Mtr/ 36 dB (Min) for
2 Mtr @ 4 GHz |
| 5. Off-axis gain | |
| Transmit | : 29-25 Log θ , (100 λ /D) Deg θ <20 Deg. &
: -3.5 dBi 20 Deg θ <26.3 Deg |
| 6. Polarisation Type | : Linear Orthogonal, |
| 7. Polarisation Adjustment | : +/-90 Deg. fine (Calibrated graduation, absolute) |
| 8. Azimuth Adjustment | : +/-180Deg. (including +5 ⁰ fine adjustment)
(Calibrated graduation, relative) |
| 9. Elevation Adjust | : 10 Deg to 80 Deg. (including +5 ⁰ fine adjustment)
(Calibrated graduation, absolute) |
| 10. Cross Polar Isolation | : 35 dB relative to co-polar gain within 1 dB
Contour. |
| 11. VSWR | |
| Transmit | : 1.3: 1 |
| Receive | : 1.3: 1 |
| 12. Port to port isolation | |
| Transmit to receive | : 40 dB (100 db with TRF) |
| Receive to transmit | : 30 dB |
| 13. Wind Speed | |
| Operational | : 60 KMPH |
| Survival | : 100 KMPH.(in deployed condition) |
| 14. Pointing Stability | : < +/- 0.2 deg. |
| 15. Wave guide Flanges | : Tx CPR137 and Rx CPR 229 |

5.3 ANTENNA CONTROLLER

1. An antenna controller shall be provided and mounted within the vehicle to allow full control of the antenna from within the vehicle.
2. The antenna controller should also control the automatic stow and deploy function. Manual over ride should be provided.
3. The antenna controller should be approved by OEM of antenna.
4. Offer can include both stand alone BTR & ACU or integrated tracking receiver.
5. The antenna controller should include embedded software for the antenna tracking and satellite acquisition, peaking facility in conjunction with a GPS receiver and fluxgate compass mounted on the roof of the vehicle. The antenna controller should also operate with an **L band Beacon receiver for tracking** all known satellite beacons or traffic carriers with 256kb/s.
6. The controller should have the following specifications

Position Display Accuracy (Azimuth, elevation & polarization): $\pm 0.1^\circ$

Angular control Rates: Fast 1 degree per sec, slow 0.1 degree per sec

Polarisation: Fast 1 degree per sec, slow 0.1 degree per sec

Angular control: Fast 1 degree slow 0.1 degree

5.4 SPECIFICATION FOR BEACON RECEIVERS

1) Functional Description

The L band Beacon Receiver should be capable of tracking all known satellite beacons or traffic carriers up to 256kb/s. The receiver should offer the best dynamic range and measuring accuracy and should be suitable for conventional unmodulated beacons such as those on the Intelsat and Eutelsat satellites. The beacon receiver should be designed for operation of antenna controllers.

2) Technical Specification

a. Input Specifications

- i. Input Range : 950MHz to 1750MHz
- ii. Input Level : -30 to -65 dBm
- iii. Control : PC control via RS232 or IP Interface

b. Tracking receiver specifications

- i. Tuning step size : 25 KHz
- ii. Resolution Bandwidth: 120Hz
- iii. Detection Bandwidth : ± 15 KHz
- iv. Beacon Power measurement accuracy:
 - i. < -80 dBm : ± 5 dB
 - ii. < -60 dBm : ± 10 dB
 - iii. < -40 dBm : monotonic

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5.5 ANTENNA CONSTRUCTION & MOUNTING

Antenna and HPA in the towed down condition should be in a covered enclosure to protect it from all Indian weather conditions. It should be aesthetically and aerodynamically suitable for smooth movement of the vehicle.

- i) The antenna system should be suitable for mounting on vehicle and when stowed down it should have a low profile on the vehicle. Protrusion of antenna should not be more than the maximum vehicle width.
- ii) Aerodynamic housing for high speed movement of van.
- iii) The design of the antenna should allow for **automatic stow and deploy of the antenna from a controller** mounted with in the vehicle. User-friendly manual override should be provided. Time taken to complete the manual deployment should be within 30 minutes.
- iv) An L Band Beacon receiver offering the best dynamic range and measuring accuracy and capable of tracking all known satellite beacons or traffic carriers up to 256 Kb/s should also be installed to improve the antenna tracking for orientation, acquisition and optimization towards the satellite.
- v) Laptop controlled GPS based antenna tracking system should be provided.

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6. (A) SPECIFICATION FOR LNBC (DIGITAL PLL C-band)

These LNBCs are to be used for the reception of digital video/audio signals through the satellite:

1. Input frequency range	3.7 GHz to 4.2 GHz
2. Local Oscillator frequency	5.150GHz
3. L.O. Stability	± 10 PPM
4. L.O. Phase noise	Better than 70 dBc/Hz @ 1KHz Better than 80 dBc/Hz @ 10KHz Better than 90 dBc/Hz @ 100KHz
5. Output frequency	950 MHz to 1450 MHz
6. Conversion gain	55 dB
7. Gain response	Better than ± 1 dB/40 MHz and 3.5 over 500MHz
8. Output level at 1dB compression point	6 dBm (Minimum)
9. Output Connector	F connector
10. Input VSWR/Output VSWR	Better than 2.5:1
11. Noise Temp.	Better than 30 deg K
12. Power supply requirement	Should work between + 15V to +24V with current consumption of about 350 mA max. CPR229
13. Input flange	

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6. (B) SPECIFICATION FOR TEST LOOP TRANSLATOR (TLT)

1. Input Frequency: 5.925 GHz to 6.425 GHz
2. Output frequency: L band
3. Conversion loss: less than 15 dB
4. Amplitude response: +/- 0.25 dB over any 40 MHz ; +/- 1.0 dB over complete output frequency band.
5. Level Control: 25 dB
6. Return loss (input/output): 15 dB
7. Input/ output isolation: 60 dB minimum
8. Phase noise: 100 Hz = -60 dBc/Hz
1 KHz = -80 dBc/Hz
100KHz = -90 dBc/Hz

7. MPEG 2/MPEG 4/DVB Prof. IRD Specifications

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. IRD should be able to descramble BISS mode 1 and BISS-E signals. Also the IRD should be able to store at least 20 channels in memory.**

7.1 RF Parameter Specifications

Parameter	Specification
(a) Input Frequency Range	950 - 1750 MHz
(b) No. of Inputs	1 nos.
(c) Tuning Step Size	125 kHz, maximum
(d) Satellite Frequency Band	C- & KU-Band, selectable
(e) Input Impedance	75 Ohms
(f) Input Connector	F-Type female
(g) Input Power Range	-30 to -65 dBm per carrier
(h) Image Rejection	>30 dB
(i) Input Return Loss	7 dB, minimum
(j) Noise Figure	20 dB, maximum
(k) AFC Tuning Range	± 5 MHz
(l) De-Modulation Method	DVB-S QPSK, DVB-S2 8PSK demodulation
(m) Variable Symbol Rates	1.0 to 44.5 M symbol/Sec for (DVB-S) 1.5 to 30 Msymb/sec. (minimum) for (DVB-S2)
(n) Convolutional Inner FEC Rates selectable	R= 1/2, 2/3, 3/4, 5/6, 7/8(DVB-S option QPSK) R= 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 (DVB-S- 2, QPSK), R= 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 (For DVBS2, 8PSK)
(o) IF Filter Bandwidth	Automatic Selection (dependent on Symbol Rate).

7.2 Audio and Video Decompression Parameters

Parameter	Specification
(a) Video Resolution (all resolutions shall be capable of I, P & B frame decoding) (other standard resolution should be selectable)	For HD 1080x1920/1440/ i 25 , 720x1280/ p 50 and for SD 720 x 576. 704 x 576. 544 x 576. 480 x 576. 352 x 576.
(b) Video Decompression Type	HP@L4, MP@ L3, 422P @ ML & MP@ML (H.264 Part 10)
(c) Television Standard	PAL-B (EN50083-9)
(d) Audio Decompression Type	MPEG-1 Layer-II audio (Stereo/ Musicam. i.e. Single Mono. Dual Mono. Stereo. and Joint Stereo) Digital AAC (HE. LE Mode) AC-3 passes through Firm has to demonstrate. as and when asked, as part of technical evaluation of Tender.

7.4 Video Output Specifications

a) The IRD shall have one composite video output, one SD-SDI and one HD-SDI

b) There should be a genlock input (Firm has to demonstrate during the demo, as and when asked as part of technical evaluation of Tender.

7.4.1.1 Analog Video Output Specifications

Parameter	Specification
(a) Connector Type	BNC (75 Ohms)
(b) Quantity	1 Nos. of analog composite PAL-B CCIR Standard
(c) Level	1.0 V p-p +/- 5%

7.4.1.2 Digital Video Output Specifications (SD-SDI)

Parameter	Specification
(a) Serial Interface	270 Mb/s & SMPTE 272-1994 (10 bit)
(b) Connector Type	BNC (75 Ohms)
(c) Quantity	1 Nos. of DIGITAL output compliant to ITU-R BT.656 Standard
(d) Level	800mV p-p for SDI As per ITU-R BT.601 (part A)

Note: ASI to SDI decompression should take place directly, i.e. not through Analog to Digital converter.

7.4.1.3 Digital Video Output Specifications (HD-SDI)

Parameter	Specification
(a) Serial Interface	SMPTE 292M, 1.485 Gbit/s (10bit),
(b) Connector Type	BNC (75 Ohms)
(c) Quantity	1 Nos. of DIGITAL output compliant to 1080i and 720p
(d) Level	800mV p-p for SDI As per ITU-R

7.4.2 Video Performance Specifications

Parameter	Specification
(a) Frequency Response	within 2 dB at 5 MHz
(c) Chroma-Luma Delay	±30 ns, maximum
(d) Field Time Distortion	< 2%
(e) Line Time Distortion	< 1%
(f) Short Time distortion	< 2%
(g) Differential Gain	< 4%
(h) Differential Phase	< 2°
(i) Signal to Noise Ratio	>55 dB (luminance weighted)

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7.4.3 VBI Signal Reinsertion Specifications

Parameter	Specification
(a) VBI Formats Supported	WST VITC
(b) Range of VBI Lines	Field 1 lines 7 to 22 (PAL) and corresponding lines of Field 2
© Synchronization with video	With in ± 1 frame
(d) Preservation of line numbering	VBI data shall be reinserted on the Original line number

7.5 Audio Output

7.5.1 Analog Audio

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

Means shall be provided to combine the left and right channels on the IRD output to produce a mono output from stereo transmissions to accommodate those sites not equipped for stereo transmission.

7.5.1.1 Analog Audio Output Specifications

Parameter	Specification
(a) Output Impedance	600 Ω (balanced)
(b) Number of Outputs	4, configurable as Stereo, Joint Stereo, Single mono, Dual mono.
(c) Connector Type	XLR Male Socket or with suitable XLR Adapter (i.e. no terminal block)

7.5.2 Digital Audio Output Specifications

Parameter	Specification
(a) Output Level	2 to 7 volts
(b) Output Format	AES/EBU
(c) Load Impedance	110 Ohms
(d) Connector Type	XLR male Socket or with suitable XLR adapter (i.e. no terminal block)
(b) Number of Outputs	2, Stereo Channels

7.5.2.1 Audio Performance Specifications

Parameter	Specification
(a) Peak Output Level	+ 18 dBm into 600 Ω balanced
(b) Clipping Level	S/W Selectable to be provided (demo has to be given)
(c) Sampling Rates	32, 44.1 and 48 KHz
(d) Frequency Response	40 Hz to 20 kHz ± 2 dB
(e) THD	<0.3 % at 1 kHz
(f) Dynamic range	80 dB (ITU-R/Arm weighting)
(g) Cross talk at 1 kHz	60 dB, full scale (20 Hz to 20 kHz)
(i) Signal to noise ratio	55 dB (min) at 0 dBm

7.6 LNB Power Supply & Control

- | | |
|--------------------------------|---|
| (a) LNB Voltage | + 13 V (Vertical)/ 18 V (Horz) polarizations switching or 19 V fixed. |
| (b) Power Consumption | 400 mA. (Max.) |
| (c) Over Current protection | Fold back current limiting. |
| (d) LNB Power Supply & Control | Receive Polarization Control by electrical Command Via LNB-IF feeder (High & Low band switching Pulse for KU-Band operation). |

7.7 **Size**
Mount 19" Rack Mount

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7.9 Audio/ Video monitoring with 5" to 6" TFT monitors

To monitor the audio and video quality multiple Monitor with corresponding Audio Bar Graph panels are required.

7.9.1 Specifications for Monitors

- | | |
|------------------------------------|----------------------------------|
| 1. Display (Viewing Area) | 5" or more |
| 2. Resolution (Pixels) | 480H x 234V (min) |
| 3. Dot Pitch | 0.171mm x 0.264mm (min) |
| 4. Brightness | Better than 250cd/m ² |
| 5. Aspect ratio | 4: 3 |
| 6. Composite Video I/P per monitor | One |
| 7. Video Input | SDI Embedded and Analog |

7.9.2 Specifications for Dual Stereo Bar-Graph (Two Stereo Audio per channel) (5.1 Surround Sound HE-AAC for HD video \$\$)

- | | |
|---------------------------------------|--|
| 1. Input Source Type | AES/ EBU and Analog |
| 2. Frequency Response | 20Hz to 20kHz + 0.5dB |
| 3. Level Meter stereo channel viewing | >25 Segment level display, High resolution |
| 4. Standard Scale | -30 to +15dB |

\$\$ Bar Graph should be able to Show 6 mono audio channels decoded by IRD / STB in case of 5.1 Surround Sound audio.

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8. Physical, Environmental & Mechanical Specifications

8.1 Power Supply

All Equipments shall operate from a wide range of power supply voltages without interruption or damage. Every rack should have Mains Distribution units with sequential delayed output start up, output status LED and IEC-3 pin for all equipment

Parameter	Specification
(a) Voltage Range	180 to 245 VAC
(b) Frequency	49-51 Hz

8.2 Environmental Specifications

Indoor

Parameter	Specification
(a) Operating Temperature	0°C to 45°C
(b) Storage Temperature	-20°C to 75°C
(c) Humidity	0 to 95% non-condensing
(d) Altitude	0 to 3000 m

Outdoor

Parameter	Specification
(a) Operating Temperature	-20°C to 55°C
(b) Storage Temperature	-20°C to 75°C
(c) Humidity	0 to 100% non-condensing
(d) Altitude	0 to 3000 m

8.3 Mechanical Specifications

Parameter	Specification
(a) Construction	Modular, equipment racks with shock absorbers. The front and back panel should have sufficient space for easy access or Racks should have facility to pull the rack after loosening of fasteners at the bottom of racks.
(b) Cooling	Internal circulation fans

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9. VEHICLE


9.1. 1. The vehicle should be complete with:

- i) Roof mounted motorised antenna and HPA.
- ii) Equipment bays for satellite up linking, monitoring and test equipment.
- iii) Power distribution, metering and internal lighting.
- iv) Silent generator and On-line UPS with built in AVR of appropriate capacity.
- v) Stowage area in the rear and both sides of the vehicle for various cable drums and misc. equipment.
- vi) Stabilization jacks.
- vii) Almirah / Storage space for storing manuals.
- viii) Generator should have sufficient cross ventilation both natural and forced, and should have good heat isolation with the equipment area.
- ix) The interior of the van should be fitted with aesthetically designed & adequate quantity of compact fluorescent light (CFL) fittings to give proper illumination needed for operation. Spotlights in ceiling above main desk should be provided in wall by the side of the door.
- x) Antenna should have protection from all sides and necessary protection should be made for housing the HPA at the roof of vehicle near PDA.
- xi) **The vehicle top should be capable of bearing weight of antenna and HPA. The vehicle manufacturer certificate should be enclosed along with the tender.**
- xii) The van should be fitted with engine driven Air conditioners of sufficient tonnage capacity to provide adequate cooling necessary for maintaining 22^o C in peak summer days with full equipment ON and one operator inside. Air duct from the fan unit should be modified for routing the cool air from the bottom of equipment rack.
- xiii) **Air conditioner should use CFC free refrigerant gas.**
- xiv) Body color with logo should be got approved from Doordarshan.
- xv) **The vehicle must be heat insulated so that the air-conditioning is effective.**
- xvi) Antenna should have protection from front & back on top of vehicle.
- xvii) Provision for 100 mtrs Beldon 1505A Video cable and Audio cable with connectors on drum.

9.1.2 Alarms and Indications

- i) Azimuth indication should be available at driver seat for easy parking of vehicle.
- ii) Rear view Monitor should be provided at the driver's seat with a camera on top of the vehicle.
- iii) Day /Night vision sensor should be available in Camera
- iv) Proximity sensors should be provided in the vehicle with audible alarm in diver's cabin.
- v) Alarm panel should be provided on Dashboard of the vehicle. This panel should have indicators to indicate "DISH UP" and "JACKS DOWN". Vehicle should generate audible warning signal (with reset switch), if vehicle is moved while "DISH UP" and/or "JACKS DOWN" condition.
- vi) Power supply status indication (visual) should be available in the operational area.
- vii) Antenna stowage alarm should be provided.

9.2 Construction:


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1. The chassis of the van should have load bearing capacity to withstand the weight of inbuilt A/C units, various cable drums, DSNG equipment, packaging boxes, Silent Diesel/ Petrol Gen set, UPS with built in AVR, power distribution, furniture, equipment racks, personnel and the weight of the Van body itself. The additional load carrying capacity, if required should be specified after consultations with vehicle manufacture along with a certificate from manufacturer. **The total weight of the complete system (in 1+1 configuration) including UPS, and Gen set along with Vehicle Driver & Technical staff should not cross 80% of rated Laden weight of the Vehicle. The Tenderer should submit a certificate in this respect from the manufacturer of the Vehicle.**
2. The layout of the van should be such that all the monitoring, satellite transmission (DSNG), air-conditioning, power supply equipment, various equipment racks along with the technical and operational furniture etc., are accommodated easily without any hindrance in the operational area.
3. **A/C Air circulation should be arranged in such a way that cool air reaches to all equipments.**
4. Since the Vehicle has to carry a large number of sophisticated and costly equipment, utmost care should be taken while selecting the chassis and designing the body of the van. Therefore, vehicle customization shall include all aspects including structural analysis, system Design, coach building, equipment installation, and field-testing. **Shock absorbers should also be provided on the mounting of equipment wherever necessary so as to avoid them from being damaged during the vehicle movement.**
5. Body size and height of the van should conform to local Transport Authority regulations. The successful bidder is required to complete the formalities of registration of vehicle with the appropriate transport authority in India.
6. Special Attention will be required for thermal and sound insulation of the walls, ceiling and floor operational area.
7. The van should have equipment as given in the EQUIPMENT LIST. All the equipment envisaged should be accommodated inside the van leaving enough space for operation crew. TWTA should be installed inside the PDA aerodynamic Housing on Top of the vehicle.
8. All the equipment racks housing sensitive equipment should have shock mounts to prevent the damage of equipment during the van movement.
9. Lay out drawing of the equipment, racks, Air conditioning, power supply, video and audio schematic etc. is to be submitted by bidders. The successful bidder will be required to prepare the final layout of the van and its equipment and will get it approved from Doordarshan before start of fabrication/assembly.
10. Complete details of equipment inside the racks with shock absorbers should be given along with the proposal.
11. **The equipment layout should be such that the van should have balanced and equal load on all wheels during operation and in motion with all the equipment.**
12. All connectors, switches, limit switches etc should be of good quality and meant for rugged use.
13. Only **Beldon 1505A** video cable should be used in the wiring of the van.
14. Type and Material of the Racks should be mentioned alongwith photographs.
15. Vehicle should be provided with aesthetically designed smooth wall with no exposed fastener.
16. Generator and cable drum space at the back, with audio, intercom, and video connectors providing Audio/Video input to box (water tight) the DSNG equipment. Monitoring outputs should also be available at the back.

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17. Ladder in the rear end for approaching the roof top.
18. Movable spotlight in the rear of the vehicle for viewing purposes.
19. Wooden chocks for Van wheels.
20. Light underneath shelf for proper illumination.
21. Proper space in the back of racks.
22. Lightweight corded PVC flooring (colour to be approved by DD) to operational area.
23. Bottom of the Vehicle should be provided with two coats of anti corrosion paint or Black rubber paint.

9.3 VEHICLE CUSTOMIZATION

- 9.3.1 **TYPE:** Similar to, MAHINDRA "SCORPIO" or TOYATA "Fortuner" or superior model fitted with five speed gear box 4x4 wheel driven. Power should be more then 105 PS/rpm. It should use Diesel as fuel.

Emission standard: (Euro/ Bharat Stage-II or Stage-III whichever is applicable in Delhi and metros, whichever is stringent at the time of supply).

- a. Engine Driven Air conditioner.
- b. Fixed Placement or on sliding rail for Genset.
- c. Four wheel drive and power steering.

- 9.3.2 **CHASSIS:** With wheel base of 2500 mm or better

- 9.3.3 **DIMENSIONS (IN MM):**

(a) over all width with body 1600 to 2000, (b) overall length 4400 or more, (c) overall height with out antenna 1930 or less and (d) ground clearance 175 or more.

- 9.3.4 **STABILISING JACK SYSTEM:**

- a. Vehicle battery operated support jacks electrically operated or Hydraulic jacks.
- b. Supply and installation of 4 way stabilizing system. Includes sensor wiring, back to alarm panel and 4 jacking blocks.

9.4 POWER SUPPLY

- a. Provision for 50 m power supply cable with DS6 euro connector with drum should be provided in the rear of the vehicle.
- b. For standby operation a silent Petrol/Diesel Gen set 6.0 KVA or more, capable of taking the entire electrical load of the van is to be included in the offer by all the bidders. The noise generated by DG should not exceed 65 dB (A) at 1 meter from enclosure surface. It should carry ISI mark & meet BIS specification (IS: 1000 1). Generator compartment should have proper thermal isolation to reduce air conditioning load and noise level. There should be a proper air duct for inlet and outlet for cooling air.

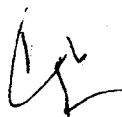
- c. One On-line UPS with built in AVR (of 5.0 KVA or more as per the design requirement with 20 % overhead margin) with a minimum backup of 20 minutes for equipment and internal lighting (essential) load should also be included in the offer.
- d. The offer should also include aesthetically designed, high quality power distribution panel(s) with change over switch, separate circuits & switchgears for equipment racks, internal lighting and air conditioning according to the estimated load requirements.

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10. General Requirements

1. The Supplier should give a certificate for providing spares and maintenance support for the system for the next five years from original equipment manufacturer.
2. Authorization certificate for sale of DSNGs from the original manufacturers of all major equipment should be submitted along with tender.
3. All the essential items, which the manufacturer feels are necessary to complete the equipment/chain for the full exploitation of all the features of the equipment offered, should be quoted.
4. Equipment from renowned and well-known firms of the industry with proven track record only will be accepted. The tenderer should enclose a list of organizations to which the same equipment as is in this tender has been supplied.
5. System/equipment (motor controllers etc.) should be offered along with its frame/housing and other accessories, which are necessary to meet the specifications/requirement, and for the full exploitation of the equipment features.
6. The system/equipment should be mountable in industry standard racks.
7. Cost of all the equipment, which is necessary to complete the configuration to meet the specifications/requirement, should be very clearly specified and included for commercial evaluation.
8. The system offered should be complete in all respects, even if missed in the specification.
9. The offer, incomplete in any respect, is liable to be rejected.
10. If required, one sample of system/sub system complete in all respects along with operators & technical manuals may be required for technical evaluation.
11. Sufficient services centres should be available across the country (India) for all the offered equipment including the Generator/UPS.
12. **The firm should have supplied DSNG for satellite uplink in India or abroad and should have been in this field for the last 3 years.**
13. **Firm will have to show at least one ready DSNG supplied to any other customer (*may be with other make of PDA, HPA or Compression system*) to ensure workmanship of van construction equipment racks, wiring etc. during the evaluation of tender.**


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11. GENERAL
1. COMPLIANCE

- (a) A point-by-point compliance statement from the principal manufacturer in respect of all the points, sub-points and paras laid down in this specification from page 1 onwards is to be enclosed along with the offer. Mere signature on a copy of our specification shall not be accepted as a compliance statement. Page no. of location of data sheet should be given in page no. column. One copy of compliance statement and Bill of material should also be given on CD-ROM.
- (b) Compliance statement in the format as indicated below only shall be accepted.

Sr. No. of DD specs.	DD specs.	Compliance (Yes/No)	Performance fig. of equipment offered.	Deviations, in case of non-compliance	Optional items if any required to make the system Compliant to DD specs.	Features in the system offered Which exceed DD specs.	Page No.	Remarks
1	Scope							
2	General							
3	Essential features (a)----- (b)-----							

- (c) The manufacturer should also record the performance figures of the equipment offered in the quote for which the compliance statement is enclosed.
- (d) The compliance statement should be supported by highlighted record of these in the technical literature/data sheets enclosed with the tender and a clear reference to the attached supporting document should be given in the remarks column against each & every specs. Any offer without proper supporting document of each & every specs and containing only a commercial hand out/pamphlet will be rejected.
- (e) The data sheets should be included as desired in para 11 (1) (d) of this specification.
- (f) Any deviation from the specification detailed in the compliance statement is to be highlighted separately.
- (g) Offers without the proper & duly completed compliance statement are likely to be rejected with the sole responsibility of Tenderer and no further claim/correspondence will be entertained.

2. Ordering Information

One soft copy of ordering information/Bill of material should be provided along with the quote (in the form of MS Excel work sheets).

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3. DOCUMENTATION

Offer should include the supply of four complete (including manuals for options, if any) set of documents (in original) of operation and maintenance (i.e. two with the equipment with each unit, one additional set for Design Directorate and one each for respective zonal offices). All the documents should also be supplied in CDROM with each set of document. The CDROMs supplied should have full features of find & search of Microsoft. Cost if any may be included in the offer. One set of the above manuals for each equipment should be enclosed along with the tender for technical evaluation. Offers without the manuals for evaluation are liable to be rejected.

4. GUARANTEE

i) The equipment shall be guaranteed against any manufacturing defects for a period of two year from the date of supply or 18 months from date of commissioning, whichever is later.

ii) Any parts failing during the guarantee period shall be repaired/replaced free of charge by the supplier at site i.e. no transportation charges would be paid by DD for transporting the defective / repaired items if required to be removed from site during the guarantee period.

iii) Guarantee period is to be extended corresponding to the outage period if the failure rectification takes more than 15 days time.

5. SPARES

1. Necessary spares required for the maintenance of the equipment offered should be quoted separately. The cost of spares shall not be taken into account for deciding lowest tenderer.
2. A complete **recommended spare list** with quote should be offered, along with the bid.
3. Supplier should give a certificate for providing spares and maintenance support for this system for the next five years.

6. ACCESSORIES

1. All essential accessories like cables, connectors and power cord etc. should be included in the offer. Optional accessories should be quoted separately.

7. INSPECTION

1. All the equipment to be supplied against the supply order for this tender shall be subjected to inspection at New Delhi / manufactures facility by Doordarshan.
2. ATP is to be provided by the Tenderer for approval by Doordarshan before inspection.
3. Firm should make only one DSNG initially and put up for design approval. Subsequent DSNGs may have to be assembled after taking into account the feed back given based on the approval of first DSNG.

12. EQUIPMENT LIST

The quantities indicated are provisional (for one system). Bidder should quote for quantities as required to complete the system.

Sr. No.	DESCRIPTION	QTY per Unit	Make	Model
1	Vehicle mounted 1.8 Mtr to 2 Mtr, motorized Antenna System	1Set		
a	Lightweight 1.8 to 2meter segmented antenna with mount system	1		
b	C-band 3 port feed (Tx range: 5.925 GHz to 6.425 GHz.)	1		
c	Transmit reject filter	2		
d	Interconnecting cables	1 set		
e	System tools	1		
f	Fluxgate Compass	1		
g	Inclinometer	1		
h	Antenna control unit along with software	1 set		
i	BTR (Beacon Tracking Receiver)	1		
j	Global Positioning System (GPS) with laptop for antenna control and monitoring	1		
k	Essential Additional Item (if any) to complete the antenna System	1 set		
l	Waveguide as per requirement	1 set		
m	NOCC Clearance	1 job		
2	HIGH POWER AMPLIFIER			
a	400 watt (350watt flange) C-band TWT amplifier with SSIPA (outdoor unit) (in 1+1 mode)	1 set		
b	Linearizer for 400 watt C-band TWT amplifier	2		
c	Amplifier Redundancy controller and ganged I/p O/p switch	1 set		
d	Essential Additional Item (if any) to complete the HPA System	1 set		
3	a Upconveter (incase of 70 MHz Mod) or BUC (incase of L-band Mod)	2		
b	Upconveter Redundancy Switch (controller)	1		
c	Essential additional items (if any) to complete Up converter system	1set		
4	Digital Equipment *			
a	Encoder (for SD MPEG-4 & MPEG-2)	2		
b	BISS-E scrambling (H/W & S/W) for Encoders	2		
c	4:2:2 option for encoder	2		
d	Modulator	2		
e	Essential additional items (if any) for Encoder& Modulator	1 set		
5	Receiving Setup equipment	1 Set		
a	IRD (Integrated Receiver Decoder) (4:2:0 and 4:2:2) with BISS-E	2		

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		De-scrambling Facility and SDI output			
	b	LNBC (3.625 GHz to 4.2 GHz.)	2		
	c	Essential additional item (if any) to complete the receive set up	1 set		
	6	Monitoring Set up consisting of			
	a	C-band Uplink frequency to L Band Down Converter (TLT)	1		
	b	DUAL Picture TFT monitor with size 5" to 6" (which can fit in the 19" rack) with SDI, CCVS, AES EBU inputs)	1		
	c	Dual AES and Dual Analogue Audio Monitor with bar graph & Speakers (which can be fit in the 19" rack below the TFT monitor) (Two stereo Audio per video) (AAC 5.1 for HD DSNG)	1		
	d	Waveform Monitor Hand held for HD-SDI input (similar to WFM 5000 or equivalent)	1		
	e.	SDI equalizer (up to 200 meter length) (MIRANDA, KRAMER, GVG, or equivalent.)	2		
	f.	SDI / (AES/EBU) input matrix switcher 4X4 (for Video with associated Audio) (LEITCH, NETWORK, Kramer or equivalent)	1		
	g.	Colour bar and tone generator (Tektronix, KRAMER , R&S or equivalent)	1		
	h	4x2 SDI router (HD-SDI compatible) (Similar to Leitch, Kroma etc)	1		
	i	Audio (analogue and Digital) Embedder (similar to Miranda, Crystalvision . Snell & Wilcox etc.) (2 AES/ EBU channels per card)	2		
	j	Essential additional item (in any) to complete the monitoring set up	1 set		
	k	L band to 70 Mhz Block down converter	1		
	7	Measuring Equipment			
	a	Handheld Spectrum Analyzer (100KHz to 3GHz with standard Accessories), which should be able to resolve the Telemetry of INSAT series of satellite in C-band (Down converted to L band.) (Noise floor should be better than -105 dB at 1khz RBW) (With LCD Display)	1		
	b	Digital Multimeter (DMM 4.5 digits) (Fluke or Agilent or equivalent)	1		
	c	Handheld satellite tracker	1		
	8	Maintenance Tool Kit	1 Set		
	a	Set of Tools for maintenance including soldering station (similar to Weller make)	1set		
	b	Flexible wave guide (0.5+ 0.5=1 meters) (Additional)	1		
	c	Tool box (Hard case type)(which can be housed in the Vehicle) As per list	1 set		
	d	Essential Additional items (if any) for maintenance work	1set		
	9				
	a	Light weight low noise Petrol /Diesel Genset of 6.0 (min.) KVA (Honda, Yamaha Or Equivalent.)	1		
	b	UPS of 5.0 KVA or more Capacity (APC, Tata Libert, Delta or equivalent)	1		

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	c	Essential additional item (if any) to complete the UPS system	1 set		
10	a	System Integration & System Engineering	1 set		
11		Manuals & CDs (with licensed software) of all The Equipments offered			
	a	CD ROM for all the software required in the System	4 set		
	b	Operation / User Manual	4 set		
	c	Maintenance/ Service Manuals (wherever applicable in case of select equipments)			
	d	Software upgrades within three year of installation should be supplied free of cost.			
12		Training			
	a	Training for Doordarshan Engineers in India (one week)	1 job		
13		Wireless Intercom System (4 Lines), approximately 100 meter operation which does not require license.(similar to clearcom etc)	1		
14		Any other item to Complete the specifications, Installation and commissioning of the system.			
15		Vehicle			
	a	Vehicle			
	b	Customization of Vehicle			
	c	Registration of Vehicle			
	d	Essential additional item (if any) to complete the Vehicle			

Two DSNGs will have 1 set of HD-MPEG-4 Encoders in 1+1 mode in addition to SD encoders. (Other 4 DSNGs should have blank space for 2 encoders of 1 RU each for future upgrade as and when required)

16		Digital Equipment *			
	a	Encoder (1+1) (for HD MPEG-4)	1 set		
	b	BISS-E scrambling (H/W & S/W) for Encoders	2		
	c	Hard case for Transportation	2		

HD and SD encoders should be supplied as separate units in separate hard case, so that HD encoders can be shifted to other DSNGs in case of requirements.

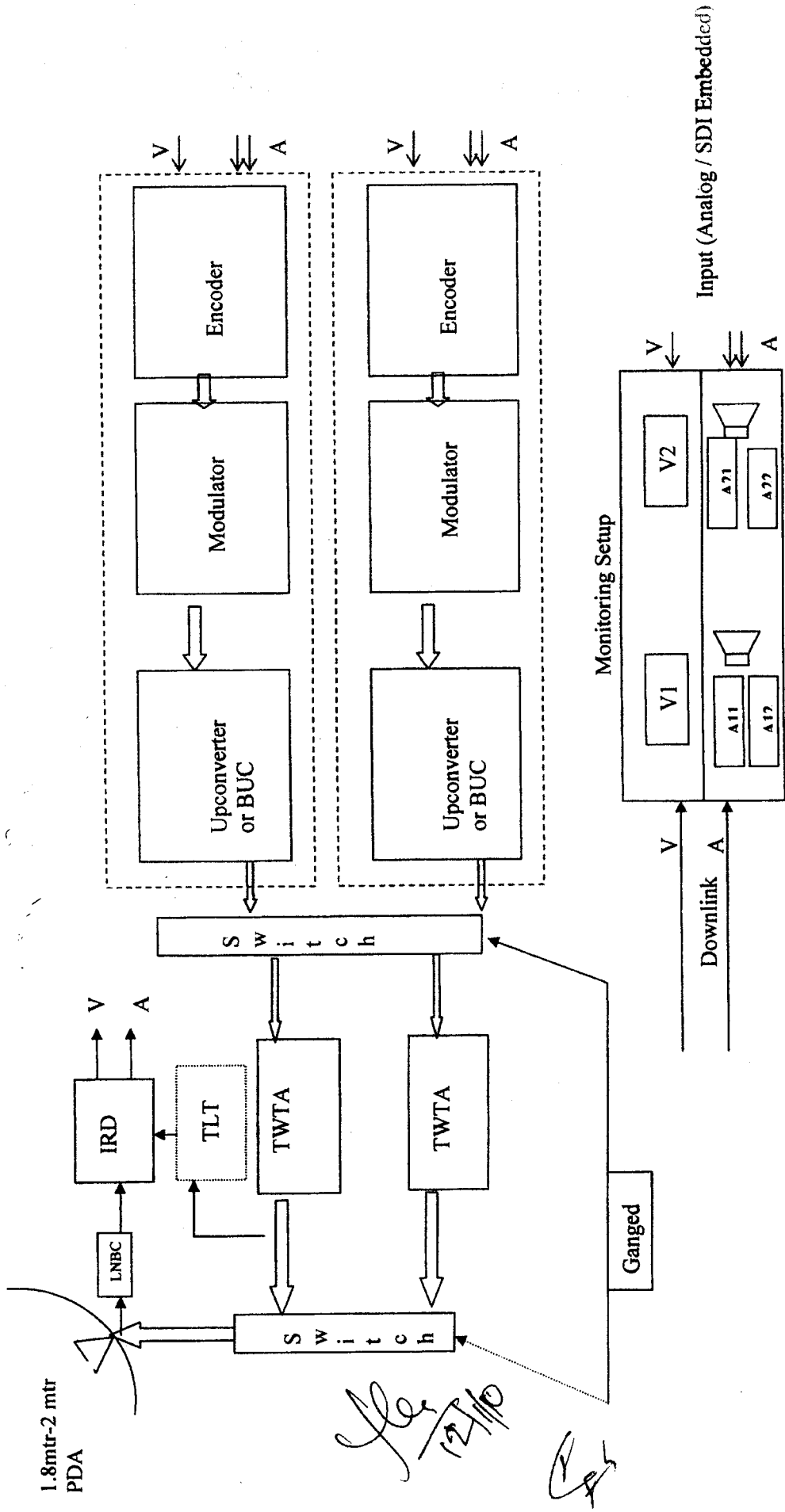
Note: All software backups should be supplied on CDs. Software upgrades within three year of installation should be supplied free of cost. Doordarshan should be registered as a ultimate user at the time of purchase of all software licenses.

1. Any incomplete proposal is liable to be rejected.
2. The prices for Software & Hardware wherever required should be given along with the equipment.
3. All the relevant options of all the equipments to utilize the equipments to its full capacity must be quoted.

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BLOCK SCHEMATIC DIAGRAM OF C-BAND DSNG VAN



Handwritten signature and date:
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 [Signature]

Input (Analog / SDI Embedded)