GOVERNMENT OF INDIA
(Ministry of Home Affairs)
DIRECTORATE GENERAL
CENTRAL RESERVE POLICE FORCE
EAST BLOCK-7, SEC-1, R.K. PURAM, NEW DELHI-110066

Email:- comncell@crpf.gov.in Tele Fax:011-26107493

No. B.V-7/2018-19-C (HMSC) Dated, the 24th Oct'2018

To

1. DIG (Comn), ITBP
   Block No. 2, CGO Complex
   Lodhi Road, New Delhi-03
2. DIG (Comn), NSG
   Meharam Nagar
   Palam, New Delhi-37
3. DIG (Comn), SSB
   East Block-V, R.K Puram
   New- Delhi-66
4. AIG (Comn), CISF
   Block No. 13, CGO, Complex
   Lodhi Road, New Delhi-03
5. DIG (Prov), BSF
   Block No. 10, CGO Complex
   Lodhi Road, New Delhi-03
6. Liaison Office, Assam Rifle
   Room No-171, North Block, MHA
   New Delhi -01

Subject: **QRs/TDs of Hubless Man-Portable Satellite Communication System.**

Please find enclosed here with QRs and TDs in respect of Hubless Man-Portable Satellite Communication System as per Annexure-A & Annexure-B respectively duly approved by the competent authority for further necessary action.

Encl: (QRs & TDs of Hubless Man-Portable Satellite Communication System)

24/X

{P.R.Jha, DC (Comn)}
For DIGP (Equipment)
Directorate General, CRPF

No. B.V-7/2018-19-C(HMSC) Dated, the 24th Oct'2018

Copy to:-

SO(IT), MHA, North Block with request to host the QRs and TDs of Hubless Man-Portable Satellite Communication System on MHA website. Soft copy is being sent through email also.

24/X

{P.R.Jha, DC (Comn)}
For DIGP (Equipment)
Directorate General, CRPF

QRs OF HUBLESS MANPORTABLE SATELLITE TERMINAL

APPX-'A'

Frequency range:-

	RF(GHz)	IF(MHz)	LO (GHz)
Standard KU	14.0-14.5	950-1450	13.05
Extended KU	13.75-14.5	950-1700	12.8

1 Trial Directives of BUC:-

Parameters	Specifications
Input/output frequency	As per the Frequency table above
Output power P-1dB W(dBm)	40 W
Gain	70dB nominal
Gain flatness	± 2dB typical
Gain stability over temperature	± 2dB
Gain control range	up to 16 dB
Inter-modulation product	-25 dBc max (3dB total back off from rated power)
Spurious	-55dBc max
Frequency stability over temperature:- Internal reference External reference	±0.05 PPM As per external 10 MHz reference
Phase noise:-	
100 Hz	-63dBc/Hz max
1KHz	-73dBc/Hz max
10KHz	-83dBc/Hz max
100KHz	-93dBc/Hz max
I/P VSWR	1:5:1 max
O/P VSWR	1:3:1 max
Operating power requirement:- Operating voltage	48 VDC
Power consumption (Watts)	
25 W model or 40 W model or 50 W model (As per user requirement)	205 W 275 W 280 W
Interfaces	
IF input interface	N or Qn Type
Output interface	WR 75G or internal transceiver interface.
System Health	Should be displayed

Parameters	Specifications
Monitor & control	
Monitor	Lock/unlock status
Control Interface	Temperature and RF output power reading. SSPA on/off, gain adjustment Via PC: RS 232/485 (TCP-IP option available) Via modem: FSK option available Via hand-held terminal: RS232 option available
Redundancy	External redundancy controller require
Input reference	
Frequency reference	10 MHz to be supplied external via L-band cable (internal reference option available)
Level	-5 to +5 dBm
Environmental conditions	
Operating Temperature	-30° to +55°C
Storage Temperature	-40° to +70°C
Humidity	0 to 100%
Features	
Monitoring & controlling	Through RS-232/485 TCP/IP and FSK
Terminal for M&C	Hand held
Weather proof packaging	IP-65

1.2 LNB in KU band

Parameters	Specifications
Noise figure	< 1dB
Gain	33 dB typical
VSWR (I/P & O/P)	≤ 2.5:1
LO (Local Oscillator)	Auto switchable
LO selection	22 KHz tone ON/OFF or input voltage
Spurious	-55 dBc
Image rejection	6 dB min
Operating Temperature	-30° to +55°C
Operating humidity	0 to 100
Storage temperature	-40° to +70°C
Operation altitude	15000 ft
Frequency range	10.70 to 12.75 GHz
Output frequency range	950 to 1700 GHz
Voltage	+12 to 24 V DC
Current	≤ 500mA
RF I/P connector	WR 75
RF O/P connector	Commercial available

1.3 Satellite Antenna:-

Parameters	Specifications
Frequency	Receive: 10.7-12.75 GHz Transmit: 13.75-14.5 GHz
Input/output frequency (MHz)	950-1700
Cross Polarization Isolation	
On axis	Rx mode-35.0 dB Tx Mode- 35.0 dB
Within 1.0 dB beam width	Rx mode-30.0 dB Tx Mode- 30.0 dB or better
Tx-Rx isolation	≥ 35 dB
VSWR	≤ 1.25:1
Antenna gain @ mid band	Rx ≥ 40.5 dBi (± 0.2 dB), Tx ≥ 41.5 dBi (± 0.2 dB)
Power handling	100W CW
Output waveguide flange interface	Commercial available
G/T 20°C elevation	17 dB/°K
Polarization	Liner (vertical & horizontal)
EIRP capability	> 51.3 dBW
Radiation pattern	As per ITU-R S-580-6
Wind speed	70 Km/h or better operational
	200 Km/h survival
Rain fall	180 mm/h operational, 360 mm mm/h survival
Operating temperature	-30° to +55°C
Storage temperature	-40° to +70°C
Weather proofing	IP 65
Humidity	100 %
Antenna	
Antenna platform	Motorized elevation over azimuth
Overrides	Manual AX/El
Antenna Control System	
System interface	Built in intelligent control software for automatic satellite acquisition. Laptop user interface via Ethernet or Wi-Fi for advance antenna control. One button slow system
Power supply	220 V AC ± 10%, 47-53 Hz, +24/+48 V DC
BUC & LNB	Antenna provide DC voltage to BUC & LNB
Antenna controller display	Monitoring of Rx signal level in voltage, polarization angle, IP address
QUAD band LNB	Quad band LO selection via antenna software embedded on terminal

Parameters	Specifications
Mechanicals	
Reflector material	Carbon fiber antenna.
Total weight	Total weight 90 Kg to be carried in max. 3 rugged carrying box .Each box should not be more than 30 kg.
Azimuth angel	±90° operational range (the rotational range covers 180° 0.1° resolution)
Elevation travel	10°-85° 0.1° resolution
Polarization range	180° (± 90°) 0.1° resolution
Features	
GPS	Integrated GPS should be available
Ethernet or Wi-Fi interface.	For connection with laptop and palmtops.
Quad pod legs	To keep antenna well above running water and sand.
Auto leveler	Enables auto leveling of antenna over rugged terrain and un even ground.
De-icing kit	Should be available in case of snow accommodation
Auto search	Should lock the satellite signal within 2 Minutes
Antenna size	0.9/1.2 meter

1.4 Modem:-

Parameters	Specifications
Mechanical and environmental:-	
RJ-45, 10/100 base T Ethernet interface.	
RS-232 asynchronous serial or LAN port or RS 530 to ACU interface	
AC power, IEC-320 interfaces, 50/60 Hz.	
Operational Temperature	+5 °C to +50 °C.
Storage Temperature:	-10° to 50° C
Humidity:	Upto 95 % non-condensing
ODU Interface	
Transmit	950-1850 MHz L-band with 2.5 KHz steps; selectable on/off +24 V DC @ 2.7 Amp
Receive	950-1850 MHz L-band 2.5 KHz steps; selectable on/off +24 V DC @ 0.3 Amp
Features	
1. Data rates upto 20.0 Mbps 2. Standalone or network mobile 3. Web GUI with traffic statistic 4. Automatic channel switching 5. Traffic filtering 6. Connectivity management 7. Adaptive bandwidth on demand (ABOD) 8. IP features and routing functions High performance broad band IP multiple 2-way service for mesh and multi-star networks V-Sat links.	
Network Topology	Star or Mesh or Hybrid (As per user requirement)

APPX-'E'

1.5 Network Management and Control System (NMCS):-

(A). NMCS Software:-

Description	Specifications
Transponders	Multi transponders supported
Transponder range	30 MHz and up
Terminals	Scalable as per user requirement
Hub receivers	As per the designed
Outbound channel, signaling and traffic	1
Supported multicast Tx channel	1 per site
Hub outbound	1
Connection request rate	Upto 20 per second
Simultaneous NMS GUI client connection	1 min.
Terminal polling rates	Upto 1 terminal/second
Event storage history	1000 events, archived daily
CDR storage capacity	1 year, achieved daily

Parameters	Specifications
(B). NMCS Server:-	
Enclosure	Standard 19" 2U-redundant Configuration 1U-nonredundant configuration or better
Processor	Dual Intel quad core Xeon 2.0 GHz and above, 1333 MHz FSB-2X6 MB L2 cache or better
Memory	Minimum 4 GB 667 (800) MHz
Removable media device	DVD ROM or better
Storage device	Redundant: 146 GBx3 7200 rpm SCSI,RAID 5 Non redundant: 146 GB 7200 rpm SATA or better
NIC	Dual port GB NIC
Power supply	Input: 100-250 V AC Output: 460 Watt Dual PS required for redundant configuration
Operating system	RH enterprise Linux enterprise 5.x or equivalent
Standard application software	HTTP Web server, SQL database server, configuration, GUI applet, operations GUI applet.

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Assam Rifles

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Rajeev Rai Bhatnagar, IPS
DG, CRPF

TDS OF HUBLESS MANPORTABLE SATELLITE TERMINAL

All parameters/specifications mentioned in QRs will be checked by the BOO by ascertaining/verifying following checks in the presence of vendor/supplier/manufacturer. In case of any discrepancies/problems, the vendor /rep of firm will demonstrate the features to the BOO of the Force concerned. Further, if proper testing instrument for testing these parameters is not available with user organization, firm will provide the same.

1. Physical checks:- In this category, specifications of the equipment will be checked physically as per QRs.
2. Functional checks:- The vendor will show all the features/configuration of the equipment functioning on ground to the BOO during trials.

APPX-'A'

Frequency range:-

	RF(GHz)	IF(MHz)	LO(GHz)
Standard KU	14.0-14.5	950-1450	13.05
Extended KU	13.75-14.5	950-1700	12.8

1.1 Trial Directives of BUC:-

Parameters	Specifications	Trial Directives
Input/output frequency	As per the Frequency table above	BOO will check practically.
Output power P-1dB W(dBm)	40 W	BOO will check practically.
Gain	70dB nominal	Firm will produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM certificate.
Gain flatness	± 2dB typical	
Gain stability over temperature	± 2dB	
Gain control range	up to 16 dB	
Inter-modulation product	-25 dBc max (3dB total back off from rated power)	
Spurious	-55dBc max	
Frequency stability over temperature:- Internal reference External reference	±0.05 PPM As per external 10 MHz reference	
Phase noise:-		
100 Hz	-63dBc/Hz max	
1KHz	-73dBc/Hz max	
10KHz	-83dBc/Hz max	
100KHz	-93dBc/Hz max	
I/P VSWR	1:5:1 max	BOO will check practically
O/P VSWR	1:3:1 max	BOO will check practically
Operating power requirement:- Operating voltage	48 VDC	BOO will check practically

Parameters	Specifications	Trial Directives
Power consumption (Watts)		
25 W model or 40 W model or 50 W model (As per user requirement)	205 W 275 W 280 W	BOO will check practically
Interfaces		
IF input interface	N or Qn Type	BOO will check practically.
Output interface	WR 75G or internal transceiver interface.	
System Health	Should be displayed	
Monitor & control		
Monitor	Lock/unlock status	BOO will check practically.
Control Interface	Temperature and RF output power reading. SSPA on/off, gain adjustment Via PC: RS 232/485 (TCP-IP option available) Via modem: FSK option available Via hand-held terminal: RS232 option available	
Redundancy	External redundancy controller require	BOO will check practically.
Input reference		
Frequency reference	10 MHz to be supplied external via L-band cable (internal reference option available)	BOO will check with the help of standard testing and measuring instrument.
Level	-5 to +5 dBm	
Environmental conditions		
Operating Temperature	-30° to +55°C	Firm will produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM certificate.
Storage Temperature	-40° to +70°C	
Humidity	0 to 100%	
Features		
Monitoring & controlling	Through RS-232/485 TCP/IP and FSK	BOO will check practically.
Terminal for M&C	Hand held	
Weather proof packaging	IP-65	Firm will submit OEM certificate.

1.2 Trial Directives of LNB in KU band:-

Parameters	Specifications	Trial Directives
Noise figure	< 1dB	BOO will check practically.
Gain	33 dB typical	
VSWR (I/P & O/P)	≤ 2.5:1	
LO (Local Oscillator)	Auto switchable	
LO selection	22 KHz tone ON/OFF or input voltage	
Spurious	-55 dBc	
Image rejection	6 dB min	
Operating Temperature	-30° to +55°C	Firm will produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM certificate.
Operating humidity	0 to 100	
Storage temperature	-40° to +70°C	
Operation altitude	15000 ft	
Frequency range	10.70 to 12.75 GHz	BOO will check all the parameters practically with the help of standard testing and measuring instrument.
Output frequency range	950 to 1700 GHz	
Voltage	+12 to 24 V DC	
Current	≤ 500mA	
RF I/P connector	WR 75	BOO will check practically.
RF O/P connector	Commercial available	BOO will check practically.

1.3 Trial Directives of Satellite Antenna:-

Parameters	Specifications	Trial Directives
Frequency	Receive: 10.7-12.75 GHz Transmit: 13.75-14.5 GHz	BOO will check practically.
Input/output frequency (MHz)	950-1700	
Cross Polarization Isolation		
On axis	Rx mode-35.0 dB Tx Mode- 35.0 dB	Firm will submit OEM certificate.
Within 1.0 dB beam width	Rx mode-30.0 dB Tx Mode- 30.0 dB or better	
Tx-Rx isolation	≥ 35 dB	
VSWR	≤ 1.25:1	BOO will check practically.
Antenna gain @ mid band	Rx ≥ 40.5 dBi (± 0.2 dB), Tx ≥ 41.5 dBi (± 0.2 dB)	BOO will check practically and firm will submit OEM certificate.
Power handling	100W CW	
Output waveguide flange interface	Commercial available	
G/T 20°C elevation	17 dB/°K	
Polarization	Liner (vertical & horizontal)	
EIRP capability	> 51.3 dBW	
Radiation pattern	As per ITU-R S-580-6	
Wind speed	70 Km/h or better operational	Firm will produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM certificate.
	200 Km/h survival	
Rain fall	180 mm/h operational, 360 mm mm/h survival	
Operating temperature	-30° to +55°C	
Storage temperature	-40° to +70°C	
Weather proofing	IP 65	
Humidity	100 %	
Antenna		
Antenna platform	Motorized elevation over azimuth	Board will check practically.
Overrides	Manual AX/EI	Board will check practically.
Antenna Control System		
System interface	Built in intelligent control software for automatic satellite acquisition. Laptop user interface via Ethernet or Wi-Fi for advance antenna control. One button slow system	Board will check practically.
Power supply	220 V AC ± 10%, 47-53 Hz, +24/+48 V DC	Board will check practically.
BUC & LNB	Antenna provide DC voltage to BUC & LNB	Board will check practically.

Parameters	Specifications	Trial Directives
Antenna controller display	Monitoring of Rx signal level in voltage, polarization angle, IP address	Board will check practically.
QUAD band LNB	Quad band LO selection via antenna software embedded on terminal	Board will check practically.
Mechanicals		
Reflector material	Carbon fiber antenna.	Board will check practically/physically.
Total weight	Total weight 90 Kg to be carried in max. 3 rugged carrying box .Each box should not be more than 30 kg.	Board will check practically.
Azimuth angel	±90° operational range (the rotational range covers 180° 0.1° resolution)	Board will check practically or firm will also submit OEM certificate.
Elevation travel	10°-85° 0.1° resolution	
Polarization range	180° (± 90°) 0.1° resolution	
Features		
GPS	Integrated GPS should be available	Board will check practically.
Ethernet or Wi-Fi interface.	For connection with laptop and palmtops.	
Quad pod legs	To keep antenna well above running water and sand.	Board will check practically.
Auto leveler	Enables auto leveling of antenna over rugged terrain and un even ground.	Board will check practically.
De-icing kit	Should be available in case of snow accommodation	BOO will check practically.
Auto search	Should lock the satellite signal within 2 Minutes	BOO will check practically.
Antenna size	0.9/1.2 meter	BOO will check practically.

1.4 Trial Directives of Modem:-

Parameters	Specifications	Trial Directives
Mechanical and environmental:-		
RJ-45, 10/100 base T Ethernet interface.		BOO will check practically.
RS-232 asynchronous serial or LAN port or RS 530 to ACU interface		
AC power, IEC-320 interfaces, 50/60 Hz.		BOO will check practically.
Operational Temperature	+5 °C to +50 °C.	Firm will produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM certificate.
Storage Temperature:	-10° to 50° C	
Humidity:	Upto 95 % non-condensing	
ODU Interface		
Transmit	950-1850 MHz L-band with 2.5 KHz steps; selectable on/off +24 V DC @ 2.7 Amp	BOO will check practically and firm will also submit OEM certificate.
Receive	950-1850 MHz L-band 2.5 KHz steps; selectable on/off +24 V DC @ 0.3 Amp	
Features		
1. Data rates upto 20.0 Mbps 2. Standalone or network mobile 3. Web GUI with traffic statistic 4. Automatic channel switching 5. Traffic filtering 6. Connectivity management 7. Adaptive bandwidth on demand (ABOD) 8. IP features and routing functions High performance broad band IP multiple 2-way service for mesh and multi-star networks V-Sat links.		Firm will demonstrate all the feature of MODEM to the BOO and explaining the use fullness and applicability of the features.
Network Topology	Star or Mesh or Hybrid (As per user requirement)	BOO will check practically.

1.5 Trial Directives of Network Management and Control System (NMCS):-

(A). NMCS Software:-

Description	Specifications	Trial Directives
Transponders	Multi transponders supported	Firm will demonstrate all the feature of NMCS Software to the BOO.
Transponder range	30 MHz and up	
Terminals	Scalable as per user requirement	
Hub receivers	As per the designed	
Outbound channel, signaling and traffic	1	
Supported multicast Tx channel	1 per site	
Hub outbound	1	
Connection request rate	Upto 20 per second	
Simultaneous NMS GUI client connection	1 min.	
Terminal polling rates	Upto 1 terminal/second	
Event storage history	1000 events, archived daily	
CDR storage capacity	1 year, achieved daily	Firm will explain to the BOO the format in which called data is recorded and also will explain the storage feature of the CDR.

(B). NMCS Server:-

Enclosure	Standard 19" 2U-redundant Configuration 1U-nonredundant configuration or better	BOO will check practically.
Processor	Dual Intel quad core Xeon 2.0 GHz and above, 1333 MHz FSB-2X6 MB L2 cache or better	BOO will check practically.
Memory	Minimum 4 GB 667 (800) MHz	
Removable media device	DVD ROM or better	
Storage device	Redundant: 146 GBx3 7200 rpm SCSI,RAID 5 Non redundant: 146 GB 7200 rpm SATA or better	
NIC	Dual port GB NIC	BOO will check practically.
Power supply	Input: 100-250 V AC Output: 460 Watt Dual PS required for redundant configuration	BOO will check with help of standard testing and measuring instrument.

Description	Specifications	Trial Directives
Operating system	RH enterprise Linux enterprise 5.x or equivalent	BOO will check practically.
Standard application software	HTTP Web server, SQL database server, configuration, GUI applet, operations GUI applet.	

R.S.Dhaka, WO/RM
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