

Section - 12

Technical Specification for VSAT (if applicable)

12.1 Scope Of Work

The work covered under this specification comprises of the following:

Survey, planning, liaisoning & seeking approval from regulatory bodies, design, supply, inland transportation & insurance, preparation of site including installation, testing, commissioning, training to Owner's personnel and maintenance during the warranty period of the VSAT network for providing CUG Voice and Data communication from site locations to MAIN SLDC/RLDC as defined under the different sections of this specification.

The VSAT communication scheme (Extended C Band) is proposed for site locations to main SLDC/ RLDC for connectivity for Power system telemetry (Data IEC-60870-5- 104 & voice) using a third party (VENDOR/CONTRACTOR) Hub to act as a communication media to communicate with MAIN SLDC/RLDC control center from different remote stations.

However, the network may not be restricted only between the sites mentioned in TS addition/alteration of sites may happen.

Any item of work/equipment not specifically mentioned above, but considered essential for the completion of the work in all respects shall be deemed to be included in the scope of the contractor.

12.2 General Network Characteristics

12.2.1 Network Topology

The network shall be based on a shared hub of the licensed VSAT service provider. The network topology is shown in diagram below. The sites shall have the capability to provide a network of data and voice connectivity as specified herein.

12.2.2 Access Requirements

The primary function of the VSAT network is to provide a highly reliable voice and data transport system in support of the National Power Monitoring

Center (NPMC) i.e. Transfer of data in the Closed User Group (CUG).

12.2.3 User Bandwidth Requirements

(a) Data communication shall be 64/128/256 Kbps (duplex) each. The hardware and software of the VSAT equipment shall be ready for upgradation of these channels to 128/256/512 Kbps (Duplex) in the future without any additional cost, however, the additional bandwidth charges shall be negotiated.

(b) License and Annual recurring charges for voice communication shall be included for 2 voice channel

The unit rate quoted by the bidder towards bandwidth charges shall be valid at least for seven years from the date of commissioning.

12.2.4 Functional Description

The network shall provide voice connectivity in Single/ Double hop data connectivity in star configuration.

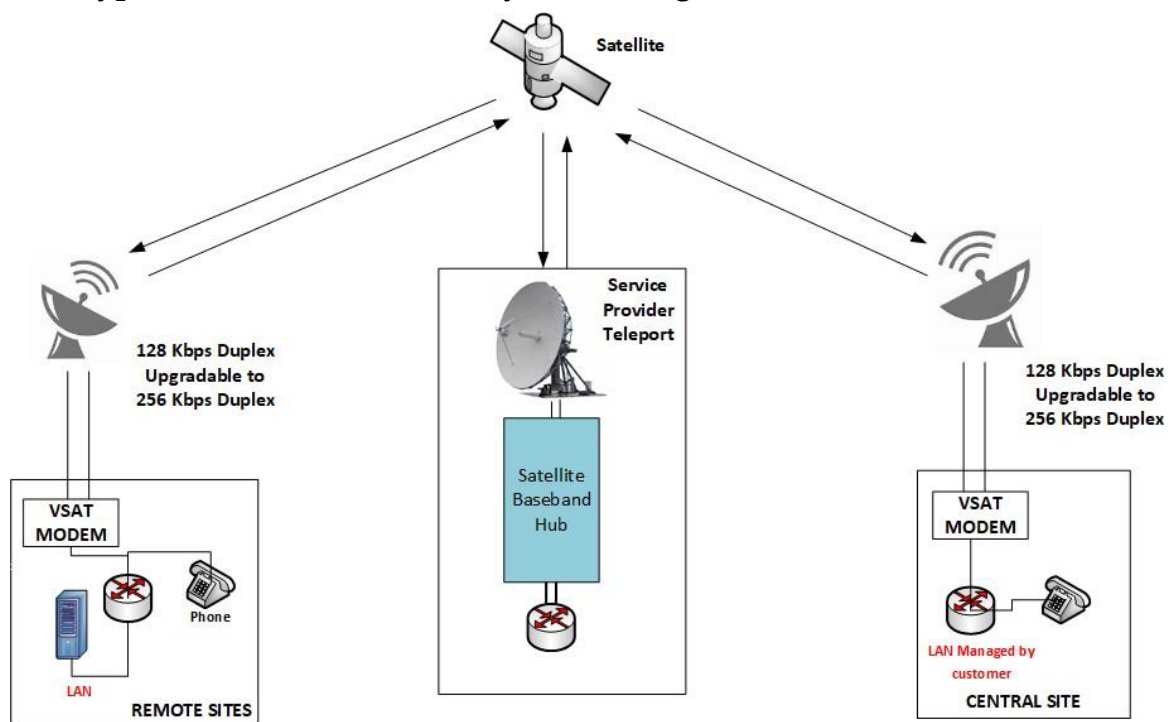
- The locations mentioned above should be able to talk to any other site of the PrKTCL VSAT network supplied and commissioned by the bidder under any separate project.
- Data connectivity shall be provided between SLDC/RLDC and Service Provider Hub

12.3 EX-C band remote VSAT:

Antenna	Specification
Antenna Size (Diameter)	Minimum 1.2
Mount Type	Non- Penetrating mount, Elevation, over Azimuth
Mount Material	Mild Steel (Hot dip Galvanized Or Powder Coated)
Antenna Optics	Prime Focus
Type of Feed	Offset feed
Operating frequency	Extended C Band
Tx Gain (Mid Band)	36.8 dBi
Rx Gain (Mid Band)	33.2 dBi
Antenna Adjustment	Range In Azimuth- 0° to 360° coarse In Elevation 0° to 90° Fine

Wind Loading	Operational -80 Kmph Survival - 200Kmph
Reflector Material	Glass Fiber Reinforced Polyester
Outdoor Unit	Specification
Transmit (Output)	6.725 – 7.025 GHz
Receive (Input)	965-1265 MHz
Output Power	Minimum 2 Watt
DC power requirement	From IDU
Environmental specification of ODU	
Temperature Range	- 20 to +50 C (operating) - 30 to +60 C (storage)
	Irrespective of how all the above-mentioned features are controlled within the system, the entire solution should work without any performance degrade, from remote site to our central site and vice versa

12.4 Typical Site wise Connectivity and Configuration



12.5 Role and responsibility

Contractor Responsibility

- a) The scope of work under this contract shall include Supply, Delivery to site, Unloading, Insurance till handing over, Handling, transportation to final locations, supervision on Installation- Termination- Testing and Commissioning including configuration/integration of VSAT communication system for communicating of Gateways/RTU locations in substations under scope of work with VSAT communication system of SLDC/RLDC, so that the telemetry data of the respective site can be reported to the existing SCADA communication server at SLDC/RLDC. If the issue is found in communicating to SCADA system at SLDC/RLDC, the contractor has to be tied up with SCADA Engineer at SLDC/RLDC for resolving the issue. However, PrKTCL will help in coordinating with the SLDC/RLDC as & when required.
- b) The scope includes establishment of Voice communication (VOIP) between site locations and SLDC/RLDC over VSAT network. Two VOIP hardware and one voice channel per location as per BW requirement has to be provided by the contractor. The configuration of supplied VOIP phone for all the site locations, SLDC/RLDC shall be done by the contractor for establish VSAT Communication network.
- c) The contractor shall also be responsible for all supervision works like wiring, cabling, and interconnections from the existing RTU's at the Substations/SCADA at SLDC /RLDC to the VSAT equipment. The contractor should present at the site (remote or local) during the testing and checking of data transmission and voice communication.
- d) The contractor should ensure proper earthing of all the equipment installed under VSAT Communication network.
- e) Power supply requirement: Normally 24V DC is required for IDU etc. For the Router, it may be 240 V AC or 48V DC. DC-DC converter (48V to 24V) for all 4 locations are considered. The same will be provided by the Contractor. Spike guard should be in the converter for voltage surge protection.
- f) **Site Survey:** The Contractor shall carry out survey of all stations before installation to check the site condition, to check the location of placement for installation of IDU as well as ODU unit, to check the proper route for cable laying, to measure the exact cable requirement, the feasibility of using existing power supply source as available at the site, to check the earthing connection point. Survey report would be through a format which is to be submitted & proposed by the bidder and same would be approved by PrKTCL before survey start. The survey should also cover the requirement of Cable (type, length, route) for connection of IDU unit with the existing RTU (for remote locations) and with SCADA server

/Gateway /Router etc (at SLDC /RLDC end) and requirement of prerequisite like space etc is to be intimated during survey.

- g) Proper drawing should be given/submitted for Road cutting, drilling work, civil works if required & should be intimated to the site by the Contractor one month before the execution of work if the work is to be done by the respective site of PrKTCL.
- h) **Power/Communication Cable/Co-axial cable:** All cables(Power supply cable, Communication cable, Co-axial cable) and wires shall be supplied & installed as required for the scheme. The Power cables should be of standard copper conductor, screened as required, and sized according to their current requirements with minimum insulation rating of 1100VAC as per relevant IS standard shall be supplied by the contractor. All connections between the contractor-supplied equipment and employer/owner equipment should be done by the contractor. Power Supply should be given from UPS output to avoid un-interrupt PS and for protection of IDU unit also. The communication cable shall be of shielded twisted pairs and a minimum 0.22sqmm size. Shielded twisted cable shall be used for external cabling for communication purposes from the contractor supplied equipment to owner equipment. Proper cabling, cable dressing, cable tagging/ferruling, conduiting of cable, cable connector should be done/provided by the Contractor.
- i) **Submission of Test Procedures:** The Contractor shall finalise “Installation & Test procedure-SAT” & Factory Inspection Test Plan including scheme with the approval of the employer.
- j) **Inspection and Testing:**
Type test & Routine test reports of all OEM/contractor supplied equipment/material will be submitted as applicable for approval. All items (DRS, Type, model) should be pre-approved by PrKTCL and should be of the best quality type in the industry with a minimum of 7years of life span in working condition where equipment is proposed to be installed.
- k) **Submission of SAT reports:** Site acceptance Test(SAT) commissioning format for the whole scheme (from remote site -RTU site & to Central SLDC /RLDC SCADA) site is to be developed by Contractor and on approval by PrKTCL, same to be followed in all locations. On successful installation and integration of all VSAT communication system equipment with the existing system, the contractor shall arrange/conduct SAT in the presence of PrKTCL/State Utility Engineer if any & submit SAT reports for approval of the employer. The contractor should also conduct the test for spare items/parts/materials/equipment if supplied.
- l) **Documentation-** For all schemes, after commissioning, the contractor

should submit as-built drawing, as-built connection details, cable termination schedule including earthing termination & power supply connection, network topology. After the completion of the work at the respective sites, the contractor should do & get sign in all required documents from the respective site of PrKTCL as well. The Contractor should also submit the material reconciliation report (signed by both contractor & respective site) for all the site.

All technology/architecture/routing method/path/channel/networking scheme etc. will be shared by vendor with PrKTCL as adopted for this scheme.

- m) **Statutory Clearance:** Necessary clearance, License etc from all applicable statutory authority will be taken care by the Contractor.
- n) **AMC:** The scope also includes AMC for 8 years (Including AMC under warranty period/defect liability period) for maintenance of VSAT equipment and BW in all sites. AMC after the defect liability period will start after the completion of 24 months from the effective date. 24 months from the effective date will be considered as defect liability period or warranty period. AMC methodology including remote support & site support should be approved by PrKTCL (after submission by Contractor as per TS) before commissioning of system. It is the responsibility of the vendor to keep authorized representative nearby site location/ region who can attend in case of physical defect to be attended at the site during warranty & AMC period.
- o) During the defect liability and AMC period, if any VSAT equipment along with cable is found faulty or not working, the contractor should replace/repair the equipment/cable free of cost.
- p) The contractor should give the remote support through Teamviewer/Anydesk/any other software whenever there is an issue in the VSAT network system & through video call support or as required when physical access to the site is not possible.
- q) There shall not be any other network or LAN traffic connected to VSAT Network apart from data & voice.
- r) The contractor should provide 99.5 % uptime for VSAT connectivity. Link availability percentage report should be provided every month for all sites.
- s) The contractor should provide Online portal to check the uplink/downlink time/availability etc.
- t) Necessary SACFA/ other DOT/WPC permission/Govt. clearance will be required and will be arranged by the Contractor. Necessary costs may be included.

- u) Any defective found in equipment/item/material should be replaced by a new one of the same model/type/specification.
- v) Road permit should be arranged by the Contractor for the supplying of requirement items/materials/equipment as per the scheme as per new GST regime rule.
- w) Contractor will have to use all required licensed Software & hardware.
- x) Monthly reporting format (VSAT data & voice link availability percentage or similar) will be developed by Contractor which would be sent to respective SLDC/RLDC email during AMC.
- y) Earthing requirement (i.e. connection) points will be clearly mentioned during the survey at initial stage . Further, any spike guard /earthing protection required will be taken up by Contractor under miscellaneous item head of BOQ if required.
- z) High quality DC - to DC converter shall be provided for all locations. The type model shall be suggested by the Contractor for approval.
- aa) All LAN cable to be supplied by Contractor and STP/FSTP (individual shielded and overall shielded cable shall be used).
- aa) Vendor will not share any data of system in use/adopted/approved for PrKTCL with any external agency without approval of PrKTCL. Cyber security norms as required for VSAT system & associated networking shall be fulfilled by the Contractor.

A. PrKTCL/Employer's Scope:

- i) The Power supply for IDU should be given from the existing UPS power supply output available at the site. However, the feasibility of the Power supply should be checked during the survey by the Contractor.
- ii) Providing and maintaining SCADA application and associated hardware at all locations is in the scope of the Employer/Owner.
- iii) Space/platform for placement of IDU, ODU unit and earthing connection point(if required) will be provided by the Employer/Owner. The space has to be decided during joint survey with the Contractor.
- iv) The IP address defined in SCADA site/RTU or Gateway of Remote stations which will be required during the configuration of VSAT network system will be shared by Employer/Owner during the execution of work.

12.6

Typical BOQ Items of VSAT Communication

	Item Description	UOM	Qty
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1	Equipment - 1.8 Meter Ext-C Band Antenna, 5 Watt BUC, VSAT modem, RF cables (upto 30 meters pair) and integration material	No.	
2	Equipment - 1.2 Meter Ext-C Band Antenna, 2 Watt BUC, VSAT modem, RF cables (upto 30 meters pair) and integration material.	No.	
3	Routers		
a	Router with 1 WAN port and 4 Routable LAN Ports	Nos	
b	Router with 2 onboard FE/GE & 1*FE/GE NIM	Nos	
4	VOIP phone (1+1) PER LOCATION	SET	
5	DC-DC Convertor (48V to 24V)	No.	
6	Installation & commissioning	No.	
7	Yearly Satellite BW 128 Kbps (Duplex) EXT-C- service link charges	No.	
8	Yearly Satellite BW 256 Kbps (Duplex) EXT-C- service link charges	No.	
9	SATALITE BANDWIDTH -VOIP CHANNEL	CHANNE L	
10	VAS -Proactive monitoring Services (a) Site up/down monitoring portal (b) Auto email or SMS alert for site going down (c) Fault ticket raise/close Web Portal with auto email alerts	No.	
11	AMC charge (Annual charge) during warranty period	Yearly	
12	AMC charge (Annual charge) after warranty period	Yearly	

NOTE-## : THE ABOVE IS THE TYPICAL BOQ ITEMS REQUIREMENT, THE

BIDDER SHOULD QUOTE AS PER BPS . HOWEVER ANY ITEM LEFT TO BE MENTIONED BUT REQUIRED FOR BEST & OPTIMISED PERFORMACE OF SYSTEM SHALL BE OFFERED BY THE BIDDER.