



Republic of the Philippines

DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Atmospheric, Geophysical and Astronomical Services
Administration (PAGASA)

TERMS OF REFERENCE

for the

“SUPPLY, DELIVERY, INSTALLATION, TESTING, AND COMMISSIONING
OF ONE (1) LOT END TO END TELECOMMUNICATION NETWORK
USING IP OVER VSAT”

A. BACKGROUND

This Project seeks to acquire a reliable data transport system that is needed for the timely and efficient transfer of real-time weather and climate products and other related data to and from the PAGASA main center in Quezon City with back-up facility in Mactan City, Cebu.

Specifically, the Project requires a reliable broadband integrated telecommunications Wide Area Network (WAN), as part of its Information Technology and Telecommunications infrastructure to enhance communication among its HQ (Hub/NOC), Regional Stations, Remote Stations/Offices, Radar Stations, Synoptic Stations and other Weather Monitoring Stations.

The technology solution must be satellite-based, end-to-end Internet Protocol (IP) over VSAT network (IPoS) that is capable of inter-connecting PAGASA's eight (8) Regional Stations (PRSDs), twelve (12) Flood Forecasting and Weather Centers (FFWC), fifty-one (51) Synoptic Stations, twenty-three (23) Agromet Stations, fifty-five (55) Weather Camera Stations, and High Frequency Radars (HFR), to two (2) Hubs/Network Operation Centers (NOCs) located at the PAGASA Central Office (WFFC), Quezon City and PAGASA-Mactan-Cebu Station, Cebu. This component must be a fully-managed platform through mostly standard C-Band but with other frequency band as well for non-time critical systems which will be detailed hereunder. Overall, the above technology solution that will be offered must have good look and clear angle anywhere within the Philippines.

B. APPROVED BUDGET FOR THE CONTRACT (ABC)

The Approved Budget for the Contract is **Three Hundred Fifty Million Pesos (P350,000,000.00)** inclusive of VAT and all applicable government taxes and the 3-year transponder subscription.

C. BIDDER'S QUALIFICATIONS

For purposes of determining the Eligibility of prospective bidders to participate in the bidding of this Project, the documentary requirements prescribed under *Section 23* of the 2016 Revised Implementing Rules and Regulation (IRR) of RA 9184, and the specific qualification requirements under this Terms of Reference (TOR) must be complied with accordingly.

Specifically, this instant Project requires, among others, that the prospective bidder:

1. must be in the IT (Information Technology) business in the field of Satellite Telecommunications and IT solutions services including systems integration for at least **ten (10) years** at the time of the opening of bids;
2. must be an experienced Telecommunications Operator, Internet Service Provider or Network Solution Provider and possesses a strong background and experience in providing broadband satellite connectivity services with international/multinational companies and/or government institutions as clients;

3. must have an excellent knowledge and understanding in satellite technology systems, network and experience in Enterprise IP hybrid (VSAT/Optic Fiber) integrated network design and implementation; and
4. Must have completed an IT service contract that is similar in nature and complexity to the Project to be bid within the period of 10 years and the value of which must be at least fifty (50%) of the ABC. For this purpose, the contract that is similar in nature shall be defined as those involving satellite telecommunications or digital satellite broadcast and IT services contract deployment with reputable firms within the Philippines or abroad.

D. BID PROPOSAL CONTENTS

1. Prospective bidders must clearly state compliance and respond accordingly to specific instructions to bidders and required specifications under this TOR and submit all the documentary requirements prescribed under this Project. The submission of documentary requirements must be properly arranged in order and with label.
2. Prospective bidder shall likewise specify the number of days or schedules within which to complete the delivery of all the goods and services required under the Schedule of Requirements.
3. Descriptive literatures, unamended brochures, categorical statements and/or manufacturer's certification for all major hardware and software being offered shall be submitted to support the prospective bidder's statement of compliance. Plans, drawings, and diagrams/configurations, if necessary shall likewise be provided.

These details will allow the **Bids and Awards Committee** to fully evaluate and determine their compliance and responsiveness to every requirements of the Project to be bid.

4. In addition, the following documents shall form part of the technical proposal to be submitted by the prospective bidders:
 - a) The proposed network system diagrams including civil and electrical works to be applied to the Project. (Subject for approval by the Procuring Entity)
 - b) The required transponder bandwidth for the project including LINK BUDGET CALCULATIONS thereof.
 - c) The proposed transponder capacity calculation taking into consideration possible future requirements.
 - d) Methodologies for implementation of the services, including the performance assurance and the high level design illustrating how the topology should be implemented.
 - e) Statement of availability of key personnel or network professionals and technical team who will be involved and assigned to the Project, including during the operation and maintenance of the VSAT network offered. The same shall be accompanied by their respective Bio-data/Resume, copy of their valid PRC ID, Certificate of Employment and proof of their network systems competency, such as but not limited to, diplomas and certificate of training.
 - f) Proposed Bandwidth Allocation Plan

5. On their financial proposals, prospective bidders are required to indicate in therein, the Detailed Cost Breakdown of the rates and prices of all items/components of the Goods and/or Services described in the Schedule of Prices, including cost of all applicable taxes. For this purpose, it is expected that the detailed costs for the supply, delivery, installation, etc. of the remote and hub stations, training costs, and the monthly recurring charges for the lease of transponder, costs for the relocation of old equipment, among others, for the proposed solution shall be clearly indicated.

E. TECHNICAL SPECIFICATIONS

1. COVERAGE:

- 1.1 The proposed solution shall specifically cover PAGASA's:

- 8 Regional Stations,
- 12 Flood Forecasting and Warning Centers (FFWC),
- 51 Synoptic Stations,
- 23 Agromet Stations,
- 55 Weather Camera Stations,
- 29 High Frequency Radars (HFR), and
- 2 Hubs/NOCs

The detailed list of sites is hereto attached as **Annex "A"**.

- 1.2 The proposed solution shall include secondary support equipment such as AVR, UPS, lightning, ground and surge protection system, equipment racks, mounting and other necessary support equipment and facilities.

- 1.3 The proposed solution shall be broken down in accordance with the manner of transmission, *viz*:

- i. For data transmission to Hubs:

- 51 Synoptic and 23 Agromet Stations to Hubs
- 55 Camera Stations and 29 HFR to HUBs
- PRSDs to HUBs
- FFWCs to HUBs

- ii. For processed data distribution from HUB

- Hub to 51 Synoptic Stations
- Hub to 23 Agromet Stations
- Hub to PRSDs
- Hub to FFWCs

- 1.4 The proposed solution should be able to function efficiently with bandwidth optimization and WAN Acceleration functions.

2. SYSTEM SPECIFICATIONS:

The proposed system shall have the following minimum specifications:

- 2.1 PAGASA requires the implementation of a fully-managed broadband IP over VSAT connectivity solution.

2.2 The technical compliance regarding the integration with PAGASA's system will be the successful transmission to and from the hub/remote station of all data required in accordance with all parameters set.

2.3 The VSAT connection solution shall be composed of three (3) parts:

2.3.1 Engineering design, supply, installation, testing and commissioning of satellite and network equipment including accessories, and integration with PAGASA weather monitoring system.

This shall include a command center for monitoring and control of satellite network and network equipment. Each NOC shall have the following:

- One (1) hub for the satellite;
- One (1) network management server (NMS);
- Two (2) high end workstations; and
- One (1) 42" LED display monitor.

This set must be available at the PAGASA-CO NOC and the PAGASA-Mactan-Cebu NOC, respectively. The PAGASA-CO NOC shall have an active monitor and resources management capability being the primary hub. In the event that the latter breaks down, the PAGASA-Mactan Cebu NOC should work as the primary hub and should have full monitoring and resource management capabilities until switchover to the QC NOC takes place.

2.3.2 Engineering design, supply, installation, testing, and commissioning of weather camera stations including accessories and integration with PAGASA weather monitoring system.

This part shall be primarily used for the transmission of captured images (1 snapshot every five (5) minutes). The old existing camera equipment will be properly pulled-out and turned over to PAGASA and will be used as spares.

The dismantling and pulling-out of the old camera system shall be the responsibility of the supplier, including its transportation from the specific station to the PAGASA main office. Other relative matters shall be discussed during the kick-off meeting and during the implementation of the project.

2.3.3 Operations, maintenance, and support services.

This part of the project shall include the following:

- Transponder bandwidth / space segment lease.
- Provisioning of spares and service units including RMA support.
- Services of qualified local manpower who shall support PAGASA's NOC operation and conduct preventive maintenance services and provide onsite support when necessary.
- 24/7 Call center manned by technically-capable personnel who shall handle requests, inquiries, reports and other technical concerns from PAGASA.
- Basic operations training.
- Periodic Preventive Maintenance Services.

- 2.4 As earlier mentioned, the VSAT network is expected to provide end to end connectivity of PAGASA's eight (8) Regional Stations (PRSDs), twelve (12) Flood Forecasting and Warning Center (FFWC), fifty-one (51) Synoptic Stations, twenty-three (23) Agromet Stations, fifty-five (55) Camera Stations, twenty-nine (29) High Frequency Radar (HFR), to two (2) Hub/NOC.

STAR, MESH, or HYBRID TOPOLOGY can be used with the consideration of most efficient transponder utilization. The Network Operations Center (NOC)/VSAT Hub and 2nd NOC must be located in PAGASA's headquarter in Quezon City and in Mactan, Cebu respectively. Both the hub stations and remote sites will be fully managed by the PAGASA main NOC and the 2nd NOC will have access to monitor the network and manage resources such as the bandwidth.

- 2.5 The proposed VSAT solution shall operate in C-band except for the Weather Cameras, which may operate in other frequency bands. For the Camera Stations, the prospective bidder shall provide technical justification/analysis in the form of calculations, white paper or any binding document that will ensure high link performances minimizing attenuation on the system.
- 2.6 The **3-year transponder subscription** shall commence immediately upon the completion and acceptance of the entire system. The access technology/protocol for outbound and inbound traffic should be the best technology available at a lesser cost to the government.
- 2.7 The proposed VSAT solution shall include the latest and most recent IP over satellite solution/technology, such as Adaptive Coding and Modulation (ACM), TCP IP Acceleration, DNS caching, effective QoS and effective compression for multimedia traffic (voice, video and data), turbo codes, etc.
- 2.8 Brand new equipment must be delivered and installed to all stations. The existing equipment shall be configured to the new system and shall serve as back-up system.
- 2.9 The bidder shall ensure the full compliance, integration, and interconnection of its technical proposal with the PAGASA's weather monitoring system, network and infrastructure.
- 2.10 The bidder must provide a proposed Bandwidth Allocation Plan that would permit progressive expansion of bandwidth in each site, and in which the starting bandwidth and the maximal bandwidth will be clearly specified in conjunction with existing and planned traffic per site.
- 2.11 Provide a comprehensive cost for the space segment, and the cost of shared bandwidth for all sites.
- 2.12 The preliminary bandwidth allocation per site is specified in **Annex "A,"** hereof.
- 2.13 PAGASA requires that the winning bidder meets the criteria for the VSAT network as summarized in table below:

SUMMARY OF SLA FOR VSAT Network

SLA indicator	Required SLA Value
VSAT Network and remote link availability:	99.9%
VSAT round trip on a single satellite hop circuit:	Less than 650 ms
Packet Loss:	Less than 0.4 %
Pack Jitter:	Less than 2 ms
Mean time to repair:	Max of 1 hour

3. EQUIPMENT SPECIFICATIONS:

3.1. SATELLITE/TRANSPONDER:

Satellite Orbital Location	+/-30deg of 120Deg East
Life Span	Min. 15 Years
Age	Not more than 5 years
Coverage/Footprint	Nationwide including Kalayaan Group of Islands
EIRP	Min of 40dBW
Frequency	C-band (5850-6425MHz/3625-4200MHz)
Polarization	Horizontal/Vertical

The Prospective Bidder shall:

- a. Provide the required transponder bandwidth for the project including LINK BUDGET CALCULATION.
- b. Provide a contiguous transponder bandwidth.
- c. Provide an additional transponder capacity on the same transponder and satellite for possible future requirement.
- d. Agree to reduce the subscribed bandwidth upon request at any time during the implementation of the project due to the revision of the link budget, new technology and network resizing.
- e. Consider 1.8m antenna or smaller for non-time critical systems due to space limitation.
- f. Provide technical details including satellite information (satellite name, proposed transponders, launched year, satellite orbit, coverage, EIRP & G/T contours, footprint, status) for link budget validation.

3.2. RF / ANTENNA:

Antenna Gain:	
Satellite Operator Certified:	All antenna should be certified by the partner satellite operator
Mounting:	NPN/Penetrating
Polarization:	Linear
Survival (wind):	200Km/Hr or better
Operational(wind):	80Km/Hr or better
Baseband frequency:	L-Band/IF
RF Hub/B-Hub Remote	Full Redundant: automatic failover of ODU wherein 2 BUCs and LNBS installed with a failover switch Single
RF NMS Hub/Backup Hub:	IP/RS232-485

3.3. BASEBAND:

Interface	
RF-Base band:	L-Band/IF
Network:	Ethernet 100/1000 Full Duplex
Network Protocol:	IP
Network Management:	Centralized w/ Back-up Remote Access capable

3.4. CAMERA:

Software:	Standard, non-proprietary
Power/Back-up Power:	Solar, UPS, AVR
Space:	Pole Mounting or similar
Configured TRANSMISSION:	One (1) snapshot/picture every five (5) minutes 24/7 with a resolution of 640 X 480.
Viewing Angle:	90 degrees maximum angle coverage. The camera station shall provide details such as coordinate and elevation together with the snapshot sent. The GPS tagging may come from the camera or the communication module.
IR Filter:	Automatic Day/Night IR Filter
Resolution:	Selectable image resolutions (pre-sets)
Image Tagging:	Timestamps and GPS location
Environmental:	Can withstand harsh rugged weather conditions

3.5. Network Management Server (NMS) – Desktop Computer

Processor:	6th Generation Intel Core i7-6700 Processor (8M Cache, up to 4.0 GHz)
Operating System:	Windows 10 Pro 64-bit English
Memory:	1 DIMM 16GB, 2133MHz, DDR4 up to 64GB
Hard Drive:	2TB 7200 rpm Hard Drive
Video Card:	NVIDIA GeForce GTX 960 with 2GB GDDR5 Graphics Memory or higher
Wireless:	802.11ac + Bluetooth 4.2
Monitor:	23" Monitor WQHD or 4K UHD
Peripherals:	Keyboard and mouse
With license key (Installer) with USB OS recovery	

3.6. High-End Workstation (Desktop PC)

Processor:	6th Generation Intel Core i7-6700 Processor (8M Cache, up to 4.0 GHz)
Operating System:	Windows 10 Pro 64-bit English
Memory:	1 DIMM 16GB, 2133MHz, DDR4 up to 64GB
Hard Drive:	2TB 7200 rpm Hard Drive
Video Card:	NVIDIA GeForce GTX 960 with 2GB GDDR5 Graphics Memory or higher
Wireless:	802.11ac + Bluetooth 4.2
Monitor:	23" Monitor WQHD or 4K UHD
Peripherals:	Keyboard and mouse
With license key (Installer) with USB OS recovery	

3.7. LED Display

- 42" LED TV, Smart Energy Saving, Full HD 1080p, USB DivX HD, Intelligent Sensor
- HDMI (1), DVI-D (1), Display Port (1) with HDCP for all input
- Power Supply: 100-240V~, 50/60Hz
- Power Consumption- Normal : 115W

3.8. UPS

- Output Power Capacity: 550 Watts/1100 VA
- Max Configurable Power: 550 Watts/1100 VA
- Nominal Output Voltage: 230V
- Output Connections:(2) IEC 320 C13 (Battery Backup) (4) Universal Receptacle (Battery Backup)
- Fifteen (15) minutes backup time
- Nominal Input Voltage: 230V

3.9. POLE MOUNTING FOR CAMERA

- Stainless Steel, 2" diameter (minimum)
- Steel NEMA outdoor cabinet for tropical applications, white or gray color
- Stainless mounting bracket, clamps and bolts and nuts
- Stainless hose clamps
- Mounting adaptors shall be tropicalized

4. MISCELLANEOUS REQUIREMENTS

The requirements for the solution shall include the following:

- 4.1 Provision of performance assurance tool which will enable the PAGASA to monitor, control, configure, manage, and evaluate the performance of the solution.

- a. Said tool must be able to measure and provide results for WAN services such as but not limited to the following:
 - Link status
 - Availability of links for up to one-year log
 - One-way delay
 - Round trip delay
 - Jitter
 - Packet loss
 - Link throughput
 - Bandwidth utilization
- b. The tool should also have the capability of automated bandwidth and capacity management and generating summarized and detailed reports.
- c. The system shall be configured with the approved bandwidth allocation plan utilizing DSCPC, among others. Bandwidth traffic should automatically change and return to its default setting once required changes has normalized. All traffic changes and link status shall be reported by the network management system (NMS) provided in the NOCs.

5. FACTORY ACCEPTANCE TESTING AND TRAINING

Prior to the delivery of the system being offered, a Factory Acceptance Testing (FAT) and training shall be facilitated/conducted by the winning bidder.

- a. The Factory Acceptance Testing (FAT) shall be conducted at the country of origin of the equipment offered. The purpose of the test is to verify the performance of the system *vis-à-vis* the specifications and functional requirements of the Project. Any defect or deviation discovered during the factory acceptance test shall be rectified by the manufacturer accordingly.

The FAT shall be conducted in five (5) calendar days, exclusive of travel time, to be attended by seven (7) PAGASA personnel. All related expenses, such as but not limited to, the round trip air fare, transportation, and Daily Subsistence Allowances (DSA) of the PAGASA participants throughout the said activity shall be borne by the winning bidder. The Daily Subsistence Allowance (DSA) shall be in accordance with the latest schedule issued and promulgated by the International Civil Service Commission (ICSC).

All test procedures and required inspections shall be defined in a draft FAT Protocol to be provided to PAGASA not later than 60 days prior to the planned FAT.

Prospective bidders shall acknowledge PAGASA's right to accept or reject any item that is found not in accordance with the required specifications.

- b. A 5-day Factory Technical Training (FTT), exclusive of travel time, shall also be conducted/facilitated by the winning bidder to be attended by ten (10) technical personnel of PAGASA. The PAGASA representatives shall be trained specifically on the telecommunication network software-hardware configuration/setup and other related subject matters.

All related expenses, such as but not limited to, the round trip air fare, transportation, and Daily Subsistence Allowances (DSA) of the PAGASA participants throughout the said activity shall be borne by the winning bidder. The Daily Subsistence Allowance (DSA) shall be in accordance with the latest schedule issued and promulgated by the International Civil Service Commission (ICSC).

- c. Costs and other related expenses that will be incurred in the conduct of the Factory Acceptance Testing and Factory Technical Training shall be detailed accordingly by the bidder in its Financial Proposal. Failure to provide said information shall be a ground for the outright rejection of the bidder's proposal.

6. ON-SITE TRAININGS

- a. A 3-day Operations & Maintenance (O&M) Training shall also be conducted by the winning bidder at the five (5) PAGASA Regional Services Divisions (PRSD) namely: the Northern Luzon PRSD in Tuguegarao City; NCR-PARSD in Metro Manila; Southern Luzon PRSD in Legaspi City; Mactan-Cebu PRSD in Cebu; and, Mindanao PRSD in El Salvador City.

The O&M training course shall cover operation and maintenance, technology, systems, services, installation, electronics troubleshooting and standard operating procedures. Additional training subject matters deemed necessary may be introduced therein and shall form part of the training syllabus. Detailed/Comprehensive hand-outs for each training topics especially on the interpretation and analysis of different products shall also be provided.

The training shall cover the connectivity of how PAGASA observation equipment are interfaced into the network and its basic trouble-shooting technique. The participants shall be composed of PRSD station personnel and six technical personnel from the Central Office.

Venue for the On-site Training, preferably, where the participants will be booked/lodged, shall be arranged by the supplier in coordination with the End-user Unit of the Project.

All related expenses for the conduct of said activity, such as but not limited to, the round trip air fare (if applicable), local transportations, Daily Subsistence Allowances (DSA) of the participants and training materials shall be borne by the winning bidder.

- b. A 1-day Hands-on training shall likewise be conducted by the winning bidder at each Synoptic, Agromet and River Center sites for station personnel on how to operate / use the system and its familiarization. Basic trouble shooting technique shall be provided to station personnel in order to capacitate them in the identification of common problems and its immediate solution.
- c. Certificate of Training shall be provided to the participants at the end of the course.
- d. Certificate of Compliance for each training conducted must be secured by the supplier which shall form part of the supplier's deliverables prior to the issuance of Certificate of Completion and Acceptance by PAGASA.
- d. Costs and other expenses attached to the conduct of On-site Trainings shall be detailed accordingly by the bidder in its Financial Proposal.

7. SOFTWARE LICENSES

Perpetual licenses on all software products shall be provided upon completion and turn-over of the Project. The same shall form part of the Project documentation to be submitted by the supplier.

8. WARRANTIES

- a. Prospective bidders shall include in their bid a 3-year warranty on all works and equipment to be delivered. An unconditional statement or certification to this effect from the manufacturer thereof shall be submitted as part of their proposal.
- b. Prospective bidders shall likewise warrant their strict compliance with the Terms and Conditions of this Terms of Reference and the contract in the event of award thereof.
- c. Prospective bidders shall also warrant the provision of a 24/7 technical support with:

Communication support facility:

- E-mail /Telephone /mobile /sms
- Online Support / Chat Support

Escalation:

- PAGASA NOC
- 24/7/SUPPORT
- Technical group

Periodic Maintenance Schedule:

- A draft Periodic Maintenance (quarterly, semi-annually and annually) program of the system shall be submitted by the prospective bidder as part of its bid proposal.

The draft proposal of the winning bidder for the Project shall be subject for review and approval of PAGASA.

- d. The prospective bidder shall also warrant that it will neither assign, transfer, pledge, nor subcontract any part or interest thereof without prior notice to PAGASA.

9. GENERAL SCOPE OF WORK

The works and services to be performed under this contract shall generally consist of but not limited to the following:

- a. Upon notification of award and prior to the execution of the contract, the winning bidder shall be required to submit all final designs required for the implementation of the Project. The same shall be subject for review and approval of PAGASA.
- b. Upon execution of the contract and subsequent issuance of the Notice-to-Proceed (NTP), a Kickoff meeting between the supplier and PAGASA representatives and satellite operators shall be immediately conducted.
- c. Conduct of technical survey and inspections on-site in preparation for the integration of various PAGASA data gathering systems.
- d. Pre-installation preparation including plans approval, civil and electrical works.
- e. Conduct of Factory Acceptance Test and Training.
- f. Delivery, installation and testing of equipment on-site.

Note: Grounding system shall be provided and should be bonded to the existing PAGASA grounding system. Grounding resistance should be $\leq 1\Omega$.

- g. Commissioning and acceptance on per station level.
- h. Integration with various PAGASA data gathering systems.
- i. Conduct of On-site Trainings.
- j. System-wide commissioning and acceptance upon installation and deployment to all stations.
- k. Submission of documentations.

10. **CONTRACT PERIOD AND PLACE OF DELIVERY**

The contract period for the Project shall be for eighteen (18) months commencing from the date of receipt by the winning bidder of the Notice to Proceed (NTP). All equipment/items must be delivered on-site in accordance with the schedule of requirements.

SCHEDULE OF DELIVERABLES

I. HUB: NOC – PAGASA-CO, Quezon City and PAGASA-Mactan, Cebu:

Item No.	Description	Qty	Unit	Total	Delivered, Weeks/ Months
	Outdoor Unit :				
1	Antenna, Feedhorn, ODU/BUC/LNB, wave guide	2	units		
2	Transmitter	2	units		
3	Surge Protector	2	units		
4	Lightning Protection and Grounding System	2	units		
5	Pedestal foundation	2	units		
	Indoor Unit :				
6	IDU/ Modem	2	units		
7	Cabinet Rack	2	units		
8	Maintenance Terminal (Laptop PC)	2	units		
9	UPS/AVR	2	units		
10	Power Supply Cabinet	2	units		
11	Surge Protection and Grounding System	2	units		
12	Network Management Server (PC) ICore7, 23” LED monitor, keyboard, mouse, UPS	2	sets		
13	Network Management System Software	2	units		
14	High-end workstation, ICore7, 23” LED monitor, keyboard, mouse, UPS	4	sets		
15	LED Display, 42-inch, wall mount	2	units		
16	Transponder subscription	3	yrs.		

2. VSAT for Field Stations: PRSD (4), Synoptic (51), Agromet (23), River Centers (12)

Item No.	Description	Qty	Unit	Total	Delivered, Weeks/ Months
	Outdoor Unit :				
1	Antenna, Feedhorn, ODU/BUC/LNB, wave guide	90	units		
2	Transmitter	90	units		
3	Surge Protector	90	units		
4	Lightning Protection and Grounding System	90	units		
5	Pedestal foundation	90	units		
	Indoor Unit :				
6	IDU/ Modem	90	units		
7	Cabinet Rack	90	units		
8	UPS	90	units		
9	Power Supply Cabinet	90	units		
10	Surge Protection and Grounding System	90	units		

3. VSAT for Weather Cameras : 30 sets (integrated)

Item No.	Description	Qty	Unit	Total	Delivered, Weeks/ Months
	Weather Camera System :				
1	Antenna, Feedhorn, ODU/BUC/LNB, RF cable	30	units		
2	Transmitter	30	units		
3	Lightning-Surge Protection and Grounding System	30	units		
4	Pedestal foundation	30	units		
5	Weather proof camera on stainless pole and mounting accessories	30	units		
6	Modem	30	units		
7	Equipment cabinet/rack	30	units		
8	Solar Power Supply System (for remote installations)	30	units		
9	UPS (for commercial power supplied stations)	25	units		
	(contractor to provide best design for power supply requirements)				
	Note: (Weather cameras co-located with other field stations amounts to 25. These cameras shall be accommodated in the station's VSAT equipment.)				

4. VSAT for HFR Stations - (29 sets)

Item No.	Description	Qty	Unit	Total	Delivered, Weeks/ Months
	Outdoor Unit :				
1	Antenna, Feedhorn, ODU/BUC/LNB, wave guide	29	units		
2	Transmitter	29	units		
3	Surge Protector	29	units		
4	Lightning Protection and Grounding System	29	units		
5	Pedestal foundation	29	units		
	Indoor Unit :				
6	IDU/ Modem	29	units		
7	Cabinet Rack	29	units		
8	UPS	29	units		
9	Surge Protection and Grounding System	29	units		

5. Acceptance Testing and Trainings

Item No.	Description	Qty	Unit	Total	Delivered, Weeks/ Months
1	Factory Acceptance Testing and Training	1	lot		
2	On-site Trainings	1	lot		