

SL. No	Particulars	Pack Size	Quantity	Rate (NU.)	Total Amount (NU.)	Offered Specification	Manufacturer	Brand	Country of Origin	Remarks
1	Raised Access Floor Panels for Server Room. <u>Technical Specification:</u> Panel Size:- 600mm x 600mm x 35mm; Point Load:- 500Kg; Uniform Load:- 2200Kg per Sq mtr; Panel Top:- HPL laminated Anti-Static; Accessories: • Complete under structure system with required accessories; • 5 mm thick floor insulation below; • Fixing of Ventilated /Perforated Tiles; • Fixing of Air Plugs under each racks; • Vacuum Pump Panel Lifter; • Providing and fixing of Ramp. Floor Height:- 60mm to 120mm adjustable	Package (Approx. 600 sqft.)	1							Sample Required
2	Flase Ceiling with Fire Suppression System. <u>Technical Specification:</u> 600 mm x 600 mm x 16 mm rectangular edge in true horizontal level suspended on locking silhouette Armstrong 15mm grid false Ceiling system with lighting facilities. Supply and installation of automatic fire suppression system with smoke and temperature detectors. The alarm notification system should be GSM based and should send SMS notice to identified mobile numbers besides email and siren.	Package (Approx. 600 sqft.)	1							Sample Required
3	Biometric Door Lock. <u>Technical Specification:</u> Fingerprint/card based door lock system	Nos	1							
4	IP Based KVM Switch. <u>Technical Specification :</u> • 1 6-port KVM over IP switch with rackmount kits. • Should provide minimum of 1 local console and 2 remote users via TCP/IP network. • 8 nos. of PS/2 VGA adapter and 8nos. of USB VGA adapters & Virtual Media		1							



SL. No	Particulars	Pack Size	Quantity	Rate (NU.)	Total Amount (NU.)	Offered Specification	Manufacturer	Brand	Country of Origin	Remarks
5	Precision Air Conditioning. <u>Technical Specification:</u> • 7 Ton Air Cooled Precision ACs complete with Microprocessor based controller with RS485 & SNMP Network card, Scroll compressors, Remote air cooled Condensers with fans and drive motors, High Efficiency Filters, Heater, Humidifier, etc. • Accessories for PAC installation complete including Copper Pipes, GI pipes for drainage, Connectors, flood discharge kits, Valves, stands for Indoor and Outdoor units, power cables, nitrogen gas, Refrigerant Gas (R410A) etc. as deemed necessary. • Installation and commissioning charges including loading, unloading and shifting at site, associated civil, plumbing & electrical works, test charging with nitrogen gas, actual charging with R410a refrigerant gas, warranty and maintenance for 1 year.	Nos	2							Please include rate for the necessary electrical works
6	42 U Rack for Storage of UPS. <u>Technical Specification :</u> 42U Equipment Rack- • 19" rack – 42U, 600mm W, 1200mm D; • DIN41494, IEC 297 and EIA 310-D compliant rack; • Top Cover & Bottom Cover With Cable Entry Provision; • Side Panel Slam Latch with Locking Facility & 1/3 perforated for ventilation; • Front fully perforated honeycomb mesh door with Lock & Key; • Rear fully perforated honeycomb double panel mesh door with Lock & Key; • Adjustable Rear Cable Management channel; • Adjustable leveling feet and castors with breaks; • 4 nos. of 230V AC 90CFM exhaust fans at top; • Front Panel Mounting Hardware.	Nos	1							
7	PDU for Racks. <u>Technical Specification:</u> • 1U horizontal with rack mounting kits; • 10x IEC C13 socket with 1A MCB.	Nos	4							Sample Required



SL. No	Particulars	Pack Size	Quantity	Rate (NU.)	Total Amount (NU.)	Offered Specification	Manufacturer	Brand	Country of Origin	Remarks
8	Router (VPN Capable). <u>Technical Specification:</u> • Minimum of 2 WAN ports, 2 LAN ports and 1 USB 3G/4G Modem Ports from day1; • Static Route, NAT, RIP and OSPF from day 1; • Minimum of 1TB SSD hard drive for content caching from day 1; • WAN Link bonding/aggregation and load balancing, bandwidth monitoring and content caching from day 1; • Required licenses and subscription for min. 3 years.	Nos	1							
9	Unified Threat Management (UTM) Device. <u>Technical Specification:</u> •With firewall, application control, IPS, Anti-Virus, Anti-Bot, Anti-Spyware, URL and Content Filtering and Advanced Threat Prevention capabilities from day 1; • 8nos. of 10/100/1000 Gigabit ports and 2 nos. of SFP ports from day 1; • Minimum of 180GB SSD drive for local log storage & 12GB memory from day one; • Minimum of 25Gbps of Firewall throughput, 5.5Gbps of IPS throughput & 5.5Gbps of IPsec VPN throughput; • Required licenses and subscription for min. 3 years	Nos	1							
10	SAN Storage. <u>Technical Specification:</u> • Dual Controller with 4 nos. of 16Gb/s FC ports per controller; • 8GB Cache; • 24x 300GB 15K RPM SAS HDD; • Support for RAID 1, 5 & 6; • Snapshot, Volume Copy, Remote Copy, De-duplication, Thin Provisioning	Nos	1							



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11	<p>Servers. <u>Technical Specification</u> • 1U Dual Socket Rack Server; • Support up to 8x 2.5-inch Hot Plug Hard Drive; • Minimum of 24 DIMMs with memory expendable up to 1500GB; • Intel C612 Chipset; • 2x Intel Xeon E5-2620, v4, 2.10GHz, 8 Core, 20MB Cache Processor; • 2x 16GB 2Rx4 DDR4-2400 MHz ECC Memory; • 6x 450GB SAS, 12Gb/s, 15K RPM, 2.5-inch Hot Plug Hard Drive configured in RAID5 volume; • Integrated RAID Controller supporting RAID 1, 5, 6, 10 and 50 with 1GB Cache; • 1x Internal DVD-RW Super Multi Optical Drive</p> <p>• Integrated Remote Management Controller with 256 MB memory; • Integrated 4 port, 1Gb Network Interface Card; • 5x USB ports, 1 x VGA port; • 1x 10/100/1000 Mbit/s dedicated management LAN port for Remote Management; • 2x Modular 800W, 94% (Platinum efficiency), 100-240V, 50 / 60Hz Power Supply; • 4x Hot Plug Fan; • Rack mounting kit with cable manager; • 12 months' hardware warranty from the date of successful delivery</p>	Nos	1							



Details of the Project/Works

1. Background

The Client is the Election Commission of Bhutan based in Thimphu.

The Data Center is located second floor of ECB Building, Thimphu. It has an approximate area of 600sq feet partitioned into two rooms. This infrastructure shall be able to host all the required hardware to run the application and also to provide a fault proof environment to run the same. The Data Center should be capable to provide an up time of 99%. It should be designed in a way that it offers scalability over a period of minimum five years. The design should be done with the key consideration for redundancy, scalability and maintainability

2. Scope of Work

- Supply and installation of Raised Access Floor, Ramp and False Ceiling for server room and NOC room including required civil works, modification and adjustment of existing doors, painting, clearing and cleaning as deem necessary.
- Necessary measure should be taken for making the critical server room air tight, fire proof and free from condensation with adequate thermal insulation.
- Supply and install Precision Air Conditioner including required civil, electrical and plumbing works. The outdoor unit should be preferably installed at the basement. Vendor should test charge the PAC with Nitrogen gas for minimum of 72 hours before actually charging with R410A refrigerant gas.
- Supply and installation of automatic fire suppression system with smoke and temperature detectors. The alarm notification system should be GSM based and should send SMS notice to identified mobile numbers besides email and siren.
- Supply and installation of security system for Data Center. The physical access restrictions have to be taken care of through Access Control System. The critical areas have to be monitored through a CCTV surveillance system with the records available in a stipulated time frame.
- Supply and installation of router, UTM and Core switch. Vendor should integrate with the existing network and carryout required backbone cabling from core switch to distribution switches on each floor including termination of optic fibre cable.
- Supply and installation of CAT6 structured cabling required for the server and NOC rooms. It should meet with CAT6 based design system with flexible deployment option.



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- Vendor is required to shift existing equipment from Server and NOC rooms to create necessary space to carry out the required work. Upon completion of interior works inside the data center, vendor should shift the equipment back to server room. Vendor should plan and ensure to shift the critical servers and equipment on weekends or public holiday so that there is very minimal downtime to avoid affecting the business operation of the client.
- Training
- Warranty Support

3. Technical Specification of Equipment

3.1. Access Floor System

- The raised floor system should provide adjustable finished floor height of about 50cm from the existing floor level. The system should have suitable understructure grid of pedestal and stringer assembled.
- Panels should be 600 x 600mm in size and with a maximum flange of 12mm on all four sides (for resting on stringer). It should be fully interchangeable with each other within the range of a specified layout.
- The panels should be able to withstand a minimum unified distribution load of 2200 kgs per sq mt. and a Point Load of 500 kgs.
- The understructure should support an axial load of 2200 kgs without permanent deflection.
- The pedestal head assembly should provide a range of height adjustment up to 50mm with the help of check nut and should be designed as such to avoid any rattle or squeaks.
- Panels should be factory laminated with Anti-Static PVC/Laminate on the top and PVC beading/trimming along the edges.

3.2. Precision Air Conditioning (PAC)

- The Precision Air conditioning should be under floor discharge type of actual 7 TR capacity.
- The PAC should maintain about 20deg C inside temperature, 50% inside RH & Dehumidified air quantity of Min 4700 CFM. The grille outlet temperature should be less than 18 deg C.
- The PAC should be designed specifically for high sensible heat ratio applications, having Sensible Heat Cooling capability of 95%.
- The units to be provided with green refrigerant R410A gas.



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- The PAC should support N+1 redundancy and should have sequencing as an inbuilt feature. In redundant configuration, the PAC should work for equal number of run hours or in case of fault the stand-by unit should auto Start.
- The PAC should have inbuilt microprocessor controller that allows integral management of the Electronic Expansion Valve (EEV) to optimize energy saving, constant air flow during dehumidification and absolute operating stability.
- The PAC should have RS485 serial adapter for data transfer to a central supervisor system with standard protocol or MODBUS protocol or SNMP card for TCP/IP. It should allow integrating with any Building Management Systems via common communication protocols.
- The system should contain scroll compressor, evaporator blower & coil, heater, humidifier, split coil solenoid shut-off type dehumidification cycle, PID based microprocessor and thermostatic expansion valve (TXV), all of which should be contained within the cabinet of the unit. The outdoor unit shall be comprised of condenser fan & motor and multi condenser coil, suitably sized to match low ambient in winter.
- The unit construction should enable to access all the main components of the machine from the front for installation and routine servicing. With this feature, the machines can be installed side by side, or in between cabinets for other technical applications. Outside panels should be coated with grey epoxy-polyester paint, which guarantees the long-term durability of their original features.
- The PAC should have twin scroll compressors in digitally controller tandem enabling the system to work at part load to achieve better efficiency. Electronic expansion valve which precisely modulates the flow of refrigerant & maintains a constant superheat, high COP by maintaining a lower condensing temperatures & dehumidification by constant airflow should be a standard part of the system.
- The PAC should have Aluminum single-inlet centrifugal EC fans with backward curved blades with a low moment of inertia and innovative vane profile. It should have directly-coupled electric motor with thermal protection inside the electric motor winding. Using this type of fan with a highly-reactive fan wheel instead of the one with forward curved blades enables to reach higher useful static pressures.
- The Evaporator Coil/Exchanger should compose of copper tubes mechanically expanded on aluminum fins, complete with a hydrophilic treatment to reduce the surface tension between the water and the metal surface, thus favoring film-wise condensation. It should be situated upstream from the fans to ensure unhindered air distribution and with a stainless steel condensate tray with a flexible conduit for its drainage. Coils should be flat/slant in construction and should be fully accessible from front.



- The Remote Air Cooled Condenser should be a single circuit exchanger with aluminum finned copper tubes, complete with low-speed axial-flow fans, electric power and control board, fully wired and tested at the factory. The body frame should be of CRCA sheet with excellent weather-resistant characteristics. Condensers shall be suitable for 24 hours operation and should be capable of providing vertical or horizontal discharge.
- The Remote Air Cooled Condenser fan should be provided with Fan speed controller that operates based on condensing pressure and should control speed according to varying ambient conditions.
- The Electric Heater should have aluminum-stripped heating elements complete with safety thermostat. It should have arrangement for manual resetting to cut off the power supply and trigger the alarm in the event of overheating.
- The Humidifier should be immersed-electrode type. It should be able to automatically regulate the concentration of salts in the boiler to allow for the use of untreated water. It should have proportional control of the humidifier's operation and the periodic flushing cycle to guarantee perfect efficiency of the system, low energy consumption and greater durability of the components.
- The Air filters should be of EU5 efficiency made of self-extinguishing, artificial-fiber cellular material with metallic frame. It should have Low Airflow and Clogged Filter alarm sensors consisting of two pressure switches for controlling the operating conditions of the fans and the build-up of dirt on the air filters inside the unit.
- Vendor should include all the required accessories as deemed necessary for complete installation and functioning of the system. The PAC should be test charged with nitrogen gas for minimum of 72 hours before actually charging with R410A refrigerant gas. While the PAC should be installed on second floor, the outdoor unit should be kept at basement.
- As a redundant cooling system, the client shall make use of the existing Comfort AC installed in the server room. Vendor is required to installed this comfort ACs as well.

3.3. Environment Monitoring System

The Environment Monitoring System to detect smoke, temperature, humidity and motion inside server room with following features:

- The alarm control system should be able to detect temperature and send alert SMS to listed users whenever the temperature inside the server room crosses the defined lower and upper thresholds.
- Should have built in GSM/GPRS module 850/900/1800/1900 MHz with standard SIM slot.
- Should have on-board wired outputs for siren connection or event indication via LED.



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- Should have on-board wired output for wired zones (for connecting wired sensors).
- Should have built in Wireless 868 MHz to connect to wireless sensors.
- Should be able to connect upto 16 wireless sensors (smoke detectors, magnetic door contact, shock/motion sensor and water/flood sensors, etc) in future.
- Should have built-in motion detection features. Should be able to detect motion up to 10m view.
- Should have inbuilt battery with battery life up to 24 hours
- Should allow to store up to 10 user mobile numbers. System should be able to send SMS alerts to the stored user mobile numbers.
- Should be able to configure the system locally via USB port or remotely using SMS and web cloud service.
- Should be able to arm and disarm the system remotely via SMS text messages.
- Should have microphone and users should be able to call the SIM for covert listening of surrounding.
- Wireless Smoke Detector
 - ✓ Should be able to communicate and integrate with the alarm control system using wireless.
 - ✓ Should have photoelectric sensors and should be able to detect slow smoldering burns/fires
 - ✓ Should have LED indicator
 - ✓ Should have built-in speaker for audio alarm

3.4. Router

- Should have minimum of 2 WAN ports, 2 LAN ports and 1 USB 3G/4G Modem Ports from day 1.
- Should support Static Route, NAT (One-to-One & Many-to-One), IP & Port Forwarding, RIP and OSPF from day 1.
- Should have minimum of 1TB SSD hard drive for content caching from day 1.
- Should have minimum of 1Gbps of Router throughput and 2Gbps of Cache throughput.
- Should allow bonding/aggregating multiple links from different ISPs.
- Should allow Load Balancing on WAN links with intelligent failover, session persistence and per-service load distribution.
- Should allow VPN bonding on multiple WAN Links with Hot Failover between links. In the event of a WAN link failover existing VPN connections should not get terminated.
- Should support Site-to-Site VPN.
- Should support dynamic VPN allowing to establishing VPN behind NAT gateway or firewall without having to use static IP address.



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- Should support Bandwidth monitoring on WAN links.
- Should support web content filtering.
- All required licensing to support above features should be included from day 1. All subscription licenses should be included for minimum of 3 years.

3.5. UTM

- Proposed UTM should be an integrated Next Generation Firewall platform and should include firewall, application control, IPS, Anti-Virus, Anti-Bot, Anti-Spyware, URL and Content Filtering and Advanced Threat Prevention capabilities in a single appliance from day 1.
- The appliance should have minimum of 8nos. of 10/100/1000 Gigabit ports and 2 nos. of SFP ports from day 1.
- Proposed appliance should be modular & should have minimum one expansion slot for future expansion requirement.
- Should have minimum of 180GB SSD drive for local log storage & 12GB memory from day one.
- Should have minimum of 25Gbps of Firewall throughput, 5.5Gbps of IPS throughput & 5.5Gbps of 3DES/AES IPsec VPN throughput.
- Should support minimum of 200,000 new connections per second & 17 million concurrent sessions.
- The Firewall should support authentication protocols like Active Directory, LDAP, smart cards and X.509 digital certificates.
- Should allow granular definition of firewall rules based on source & destination addresses, protocols, applications, contents, time & schedules, users, etc.
- Should have inbuilt function to identify and categorize applications, URLs, HTTPS inspection, Malware content sites, IP and/or user based policies.
- The solution should have the capabilities to block, permit, allow & log based on application categories, protocols, URL contents, etc. with time schedule.
- Should be able to scan & secure SSL encrypted traffic passing through gateway. Should perform inspection to detect & block malicious content downloaded through SSL.
- Should have inbuilt management system with log analysis and granular reporting functions.
- Should provide analysis of traffic pattern using graphs and charts.
- Vendor should include required licenses for all of the above features for minimum of 3 years.

3.6. Core Switch



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Annexure 1

- Should have 24x 10/100/1000BaseT plus 4x 10Gig SFP+ ports supporting 1/10Gig Fibre Modules from day 1. Should support QSFP+ (40Gbps) or Upgrade to 40G in future.
- Should have dual redundant power supply from Day 1. Vendor may propose internal or external power supply. In case of external power supply vendor should provide all the required cables and accessories.
- Should support stacking of minimum of 4 units of switches in a stack. Should support Long Distance Stacking enabling stack members to be placed at different locations.
- Should support min of 160Gbps of stacking bandwidth per switch.
- Should have min of 280Gbps of switching capacity.
- Should have min of 210Mpps Switching throughput.
- Should have min of 2GB RAM and 256MB Flash Memory.
- Should support for 13K Jumbo frame.
- Should support both IPv4 and IPv6.
- Latency should be less than 4 micro seconds for 1G ports and less than 3 micro seconds for 10G ports.
- Should have Static Routing, RIP, VRRP & OSPF supporting both IPv4 & IPv6 activated from day1.
- Switch should support Rapid Ring Protection / Resiliency technology with failover between links under 50ms.
- Should have inbuilt Loop Detection and Loop Protection feature.
- Should support Active – Active Clustering using VSS or equivalent technology. The proposed VSS or equivalent technology should support high availability for both Layer 2 and Layer 3 (RIP, RIPng, OSPF, OSPFv3) including for IP Multicasting (PIMv4, PIMv6) for CCTV video and VoIP applications.
- Vendor should provide industry standard RADIUS Server either as a feature or Add-On Module on the core switch or may propose external RADIUS Server. In case of vendors proposing 3rd party RADIUS server solution, all the required hardware, Operating System software and licenses should be included.
- Proposed RADIUS server should be Standard-based and vendor-agnostic, interfacing seamlessly with network switches and wireless access points from different vendors.
- The RADIUS server should support EAP - TLS, TTLS, PAP and MD5 authentication protocols. It should allow for 802.1X based device authentication, MAC based authentication and Certificate based authentication.



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- Should have out of band 10/100/1000 Ethernet management port and console management port.
- Should support industry standard CLI and web based GUI interface for management.
- Should have inbuilt Optical Fiber Diagnostic Monitoring, Active Fiber Monitoring to detect tempering of active fiber and Cable Fault Locator which provides wire map, cable length and fault information of the UTP cables connected to the switch ports.
- The Core switch should act as Central Management Platform for all the network switches using SDN or equivalent technology. It should provide a single point of access for management, configuration roll out, firmware roll out and troubleshooting of all switches in the network. All required central management software and license to be included.

3.7. KVM Switch

- 16-port KVM over IP switch with rackmount kits.
- Should provide minimum of 1 local console and 2 remote console via TCP/IP network.
- 8 nos. of PS/2 VGA adapter and 8nos. of USB VGA adapters
- Virtual Media allows administrators to assign CD/DVD/USB drives of local PCs to remote servers enabling to effectively install software, transfer files or boot remote server from CD/DVD/USD drives of local PC.
- Should integrate with Active Directory for both local and remote access.



PC