TECHNICAL SPECIFICATIONS

Solicitation No. RSU-2024-03-032
ABC: PhP1,600,000,000.00

Digital Resiliency Development Program

ITEM NO.	UNIT	ITEM DESCRIPTION	QTY	STATEMENT OF COMPLIANCE
1	Lot	**1. Project Summary** The Digital Resiliency Development Program envisions the creation of an advanced technological hub that is dedicated to innovation and advancement for RSU which includes, among others, agricultural advancement in San Andres Extramural Campus (Agpudlos), aqua-culture advancement in Santa Fe. Campus, and ICT modernization in other campuses. It will serve as the focal point for collaboration, experimentation, and education in the realm of technological advancement, and smart and precision agriculture and aqua-culture. **Key elements of the program:** 1. Technological Integration. The campus will be equipped with an array of sensors, IoT devices, and precision farming equipment that will enable real-time monitoring of crops, soil conditions, weather patterns, and more. These technologies will facilitate data-driven decision-making for optimizing resource allocation and enhancing production and harvest. 2. Data Analytics. Machine learning models will be developed for more efficient and sustainable agricultural practices. Advanced data analytics will play a pivotal role in transforming actionable insights for disease outbreak prediction, irrigation scheduling optimization, and personalized cultivation strategy recommendation. 3. Interdisciplinary Research. The campus will serve as a platform for collaboration between agronomists, engineers, data scientists, environmentalists, and other experts. Interdisciplinary research projects will explore innovative approaches to farm management, pest control, commodity improvement, and more, fostering a holistic understanding of agricultural and aqua-culture systems. 4. Sustainability and Resource Efficiency. Emphasis will be placed on sustainable practices that minimize negative impact on the environment. Research will	1	

focus on water management, minimizing chemical inputs, and exploring alternative energy sources to power the campus. The goal is to develop models that can be scaled and replicated on a larger scale to promote sustainable agriculture, and aqua-culture worldwide.

2. General Scope of Works

2.1. **Requirement Analysis**

2.1.1. Network Backbone that will link multiple buildings within the campuses.

2.1.2. Modular Data Center to be located at the San Andres Extramural Campus (Agpudlos).

2.1.3. Networking task for all E-Classrooms, E-Laboratory, and Administration offices.

2.1.4. Core Network System which will serve as the primary network with higher throughput to serve the networking requirements of the campuses.

2.1.5. Campus Network that will provide connectivity for Access Points, IDFs, PoE switches and other essentials.

2.1.6. Conversion of traditional classrooms to be converted into modern and interactive smart classrooms.

2.1.7. Command Center to house various network and applications monitoring tools and entire security system and management.

2.1.8. Server & Storage IT Infrastructure that will host the applications, systems, and platforms.

2.1.9. Smart Security system equipped with analytics tools.

2.2. **Implementation Plan**

2.2.1. A comprehensive implementation plan will be developed that will detail the project's timeline, milestones, and resources required for successful execution.

2.3. **Infrastructure Setup**

2.3.1. The project team will install and set up the necessary digital infrastructure required for the project, including servers, routers, switches, and other hardware devices.

		2.4. **Software Implementation** 2.4.1. Based on the planned design requirements, installation, customization and testing of all software and applications shall be performed to ensure full integration of all systems that form part of this project. 2.5. **Testing and Quality Assurance** 2.5.1. The project team will perform essential testing of various digital systems to ensure that these meet the specified requirements and are free from defects and errors. 2.6. **Training** 2.6.1. Facilitate the delivery of knowledge transfer through technical briefings, orientations and/or training. **3. Platform and Application** 3.1. **Smart Agriculture System** The Smart Greenhouse System integrates contemporary technology with traditional farming practices, ensuring that plants are provided with the optimal growth environment under varying conditions, through IoT devices and sensors, and software, in a reliable and secure manner. Using sensors and cameras, real-time information about the greenhouse environment is collected. This data/information are sent to a cloud-based or on-prem platform for processing. Actuators and relays are also used to control components such as shading devices, heaters, water pumps, switches, and other applicable devices or gadgets to enable automatic adjustments based on monitoring data. The system issues alerts and notifications when certain conditions happen. The system also provides the users the ability to remotely monitor and control the system via mobile or web, allowing access from anywhere through internet connectivity. Components: 3.1.1. Devices/Sensors/Systems 3.1.1.1. Data collection and environment control through IoT sensors/devices/systems: 3.1.1.2. Temperature and Humidity Control - air temperature and humidity sensors, substrate temperature and humidity sensors, and liquid temperature sensors 3.1.1.3. Light Control - light intensity sensors, greenhouse film roll-up motors, shading		

		film controllers, and a variety of plant grow lights 3.1.1.4. Water Control - water pumps, piping, water flow sensors, flow meters, electromagnetic valve controllers, water temperature sensors, and liquid level sensors 3.1.1.5. CO2 Control - carbon dioxide sensors, TVOC sensors, ammonia sensors, oxygen sensors, and carbon dioxide generators 3.1.1.6. Nutrient Control - EC sensors, pH sensors, and integrated fertigation systems 3.1.1.7. Capability to log and store the data locally on the devices/sensors or data logger 3.1.1.8. Reliable and secure data transmission from devices/sensors to the backend system with connectivity redundancy using LoRa, cellular, satellite 3.1.1.9. Capability to customize frequency of sending data - every 15 minutes or 1 hour or once a day, etc. 3.1.1.10. In case when there is no connectivity, capability to transmit unsent data when connectivity resumes 3.1.1.11. Capability to remotely control the operation of equipment/devices/gadgets such as heaters, pumps, etc. to maintain water quality conditions 3.1.2. Area of Agriculture and Orchard Farms 3.1.2.1. Area#1: approx. 30m x 10m 3.1.2.2. Area#2: approx. 30m x 10m 3.1.2.3. Area #3 is L-shape, with approx. 30m x 10m in length, 15m x 5m in width respectively 3.1.3. Camera System 3.1.3.1. High resolution 3.1.3.2. Wide angle of view 3.1.3.3. High dynamic range (HDR) 3.1.3.4. Powered by solar panel, controller, and		

		rechargeable battery 3.1.3.5. With data storage for video files 3.1.3.6. With a powerful processor - at least Intel Core i9 13900H Processor, GeForce RTX 4070 Graphics card, 16GB RAM 3.1.4. IoT LoRa Gateway 3.1.4.1. Receives and transmits sensor data from devices/sensors in a secure manner, with a range of more than 50 kilometers (omni-directional), with or without satellite or cellular network connectivity 3.1.4.2. Uses Low Power Long-Range (LoRa) radio frequency running in sub-GHz band spectrum 3.1.4.3. Powered by rechargeable battery – recharged by solar panel and/or electrical outlet 3.1.4.4. Internet backhaul can use WiFi, Wired connection, SIM Card, or satellite connectivity module 3.1.4.5. One gateway can handle at least a hundred devices/sensors – expandable to handle additional devices/sensors 3.1.4.6. Can be remotely monitored and maintained 3.1.5. IoT Platform 3.1.5.1. Capability to add/delete/edit devices, sensors, equipment, gadgets - assign identification/serial numbers, record type/kind, other data 3.1.5.2. Capability for video capture and intelligence 3.1.5.3. Capability to represent devices, sensors, equipment, gadgets on the user interface with icons and colors 3.1.5.4. Capability to allow only authenticated/authorized devices/sensors to collect and transmit data in the system 3.1.5.5. Capability to customize frequency of sending data - every 15 minutes or 1 hour or once a day, etc. 3.1.5.6. Must secure data through end-to-end		

		encryption 3.1.5.7. Capability to trigger alerts and notifications when user-defined conditions occur 3.1.5.8. Capability to send alerts and notifications on the system's user interface and through SMS and email 3.1.5.9. Capability to store data in a structured format for processing 3.1.5.10. Data could be saved, retrieved and exported to multiple formats such as csv, tsv, JSON, xml, etc. 3.1.5.11. Built-in support for data storage redundancy with archival support 3.1.5.12. Capability to store data in the cloud and physical hard drives 3.1.5.13. Capability to add/delete/edit users 3.1.5.14. Capability to add/delete/edit/define roles and permissions in using the system 3.1.5.15. Capability to assign users specific roles and permissions for managing devices and processing data 3.1.5.16. System's user interface, customized according to the requirements of the users, should be easy to navigate and use 3.1.5.17. Capability to create standard and customized dashboards using visual graphs, charts and reports, according to users' preferences 3.1.5.18. Capability for analytics and data summarization for identifying trends 3.1.5.19. Capability for machine learning and artificial intelligence - precision farming, irrigation, application of fertilizer and pesticides, anomaly detection, etc. 3.1.5.20. Capability to integrate with other systems through APIs 3.1.5.21. Capability for complete audit log management and reporting Data could be saved, retrieved and exported to multiple formats such as csv, tsv, JSON, xml, etc. 3.1.5.22. Built-in support for data storage		

		redundancy with archival support 3.1.5.23. Capability to store data in the cloud and physical hard drives 3.1.5.24. Capability to add/delete/edit users 3.1.5.25. Capability to add/delete/edit/define roles and permissions in using the system 3.1.5.26. Capability to assign users specific roles and permissions for managing devices and processing data 3.1.5.27. System's user interface, customized according to the requirements of the users, should be easy to navigate and use 3.1.5.28. Capability to create standard and customized dashboards using visual graphs, charts and reports, according to users' preferences 3.1.5.29. Capability for analytics and data summarization for identifying trends 3.1.5.30. Capability for machine learning and artificial intelligence - precision farming, irrigation, application of fertilizer and pesticides, anomaly detection, etc. 3.1.5.31. Capability to integrate with other systems through APIs 3.1.5.32. Capability for complete audit log management and reporting 3.1.6. Supply of Drone for Smart Agriculture application, with two (2) extra sets of batteries, compliant with the following minimum requirements: 3.1.6.1. 90 kg maximum takeoff weight for spraying (at sea level) 3.1.6.2. 101 kg maximum takeoff weight for spreading (at sea level) 3.1.6.3. Hovering Accuracy Range: 3.1.6.3.1. Real-time Kinetic Positioning (RTK) enabled: ±10 cm horizontal, ±10 cm vertical 3.1.6.3.2. Real-time Kinetic Positioning (RTK) disabled: ±60 cm horizontal and ±30 cm vertical (radar enabled: ±10 cm)		

		3.1.6.4. Hovering Time: 3.1.6.4.1. Hovering without payload: 18 min (@30000 mAh & takeoff weight 50 kg) 3.1.6.4.2. Hovering and spraying with full payload: 7 min (@30000 mAh & takeoff weight 90 kg) 3.1.6.4.3. Hovering and spreading with full payload: 6 min (@30000 mAh & takeoff weight 101 kg) 3.1.6.5. Motor KV value of at least 48/RPM/ V 3.1.6.6. Motor power of at least 4000W/ rotor 3.1.6.7. Rotor quantity of at least eight (8) 3.1.6.8. Must be equipped with Dual Atomized Spraying System 3.1.6.8.1. with Operation Box: Capacity of 40 L (Full load) 3.1.6.8.2. Sprinkler Quantity: 2 3.1.6.8.3. with Magnetic Drive Impeller Pump 3.1.6.9. Must include an Intelligent Remote Controller compliant with the following, at a minimum: 3.1.6.9.1. Operating frequency of 2.4000 to 2.4835 GHz and 5.725 to 5.850 GHz 3.1.6.9.2. Signal Effective Distance of at least 4 kms. 3.1.6.9.3. WIFI 6 WiFi Protocol 3.1.6.9.4. WiFi Operating frequencies: 2.4000 to 2.4835 GHz; 5.150 to 5.250 GHz; 5.725 to 5.850 GHz 3.1.6.9.5. Equipped with Bluetooth 5.1. Bluetooth protocol 3.1.6.9.6. Bluetooth Operating Frequency of 2.4000-2.4835 GHz 3.1.6.9.7. Display screen of at least 7-inches touch LCD 3.1.6.9.8. Internal battery life of at least 3 hours		

		3.1.6.9.9. External battery life of at least 2.5 hours 3.1.7. Supply of drone for Immersive Site Survey applications, with two (2) extra sets of batteries, compliant with the following minimum requirements: 3.1.7.1. Equipped with Normalized Difference Vegetation Index (NDVI) imaging that indicates plant health. 3.1.7.2. Able to monitor field conditions and soil health. 3.1.7.3. Flight time duration of approximately 41 minutes on a single battery charge 3.1.7.4. Dual max ascent speed mode with 6ms and 8 ms respectively 3.1.7.5. Dual max descent speed mode with 6ms and 6 ms respectively 3.1.7.6. Triple max speed with 75 kph, 72 kph and 68kph respectively 3.1.7.7. Omnidirectional vision system 3.1.7.8. Vision altitude range of at least 0-30m 3.1.7.9. Equipped with Infrared Sensing System 3.1.7.10. Effective camera pixel of at least 20MP 3.1.7.11. Maximum video bit rate of 4K: 130Mbps, FHD: 70Mbps 3.1.7.12. Supported File System: exFAT 3.1.7.13. Support photos in JPEG, DNG (raw) and JPEG+DNG format. 3.1.7.14. Supports videos in MP4 (MPEG-4 AVC/H.264) format. 3.1.7.15. Must support microSD Cards. 3.1.7.16. Must have Mini HDMI port. 3.1.7.17. Smart Farming Experiment System (Experimental Group) 3.1.7.17.1. Soil Cultivation Experimental Device 3.1.7.17.2. Hydroponic Planting		

		Experimental Device 3.1.7.18. Smart Farming Experiment System (Control Group) 3.1.7.18.1. Experimental Planting Scaffold 3.1.7.18.2. Control Platform 3.1.7.18.3. Sensor Unit 3.2. **Smart Aqua Culture System** The Smart Aquaculture System is used to continuously monitor important environmental and aquatic parameters through IoT devices and sensors, and software, in a reliable and secure manner. Using sensors and cameras, real-time information about the aquaculture environment are collected. This data/information are sent to a cloud-based platform for processing. Actuators and relays are also used to control components such as heaters, water pumps, feeders, and other applicable devices or gadgets to enable automatic adjustments based on monitoring data. The system issues alerts and notifications when certain conditions happen. The system also provides the users the ability to remotely monitor and control the system via mobile or web, allowing access from anywhere through internet connectivity. Capability to log the data locally before being transmitted across the network for backend processing. This is to bring data transmission resiliency and redundancy. 3.2.1. Water Quality Monitoring and Control 3.2.1.1. Data collection through wireless IoT sensors/devices for measuring water quality - temperature, dissolved oxygen, turbidity, PH, etc. 3.2.1.2. Capability to log and store the data locally on the devices/sensors or data logger. 3.2.1.3. Reliable and secure data transmission from devices/sensors to the backend system with connectivity redundancy using LoRa, cellular, and satellite. 3.2.1.4. Capability to customize frequency of sending data - every 15 minutes or 1 hour or once a day, etc. 3.2.1.5. In case when there is no connectivity, capability to transmit unsent data		

		when connectivity resumes. 3.2.1.6. Equipment, devices, gadgets such as heaters, pumps, shading devices, etc. for maintaining water level and quality. 3.2.1.7. Capability to remotely control the operation of equipment/devices/gadgets such as heaters, pumps, etc. to maintain water level and quality conditions. 3.2.2. Feeding System 3.2.2.1. Capability to control the feeding amount. 3.2.2.2. Capability to automatically feed the fish based upon its requirements. 3.2.3. Underwater Camera System 3.2.3.1. High resolution 3.2.3.2. Wide angle of view 3.2.3.3. Highly sensitive to low light 3.2.3.4. Powered by solar panel, controller, and rechargeable battery. 3.2.3.5. With data storage for video files 3.2.3.6. With a powerful processor - at least Intel Core i9 13900H Processor, GeForce RTX 4070 Graphics card, 16GB RAM 3.2.4. IoT LoRa Gateway 3.2.4.1. Receives and transmits sensor data from devices/sensors in a secure manner, with a range of more than 50 kilometers (omni-directional), with or without satellite or cellular network connectivity. 3.2.4.2. Uses Low Power Long-Range (LoRa) radio frequency running in sub-GHz band spectrum. 3.2.4.3. Powered by rechargeable battery – recharged by solar panel and/or electrical outlet. 3.2.4.4. Internet backhaul can use WiFi, Wired connection, SIM Card, or satellite connectivity module. 3.2.4.5. One gateway can handle at least a hundred devices/sensors – expandable		

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		have the minimum specifications: 3.2.6.4.1. Front camera 3.2.6.4.2. Wi-Fi antenna that communicates with its base station 3.2.6.4.3. Underwater camera 3.2.6.4.4. 2x electric brushed on-board motors 3.2.6.4.5. Side-scan sonar sensor 3.2.6.4.6. Base station 3.2.6.4.7. Battery capacity of 40Ah, 12V 3.2.6.4.8. Operating speed of 4km/h 3.2.6.4.9. Switch to autonomous and manual drive modes. 3.2.6.4.10. Data link range of 200m to base station 3.2.6.4.11. Directional antenna with automatic tracking system 3.2.6.5. The drone software should have at least the following features: 3.2.6.5.1. Define target area on the map for autonomous driving mode. 3.2.6.5.2. Playback captured camera video, sonar display, and side-scan down-scan sonar data. 3.2.6.5.3. Click anywhere on the drone route to see the data captured at that position. 3.2.6.5.4. Measure location, water depth and distances on the map. 3.2.6.5.5. Inspect point of interest with the drop camera 3.2.6.5.6. Export 3D-model of the scanned area. 3.3. **Internet Subscription** 3.3.1. Shall provide internet connection to all campuses (should there be no available fiber connection alternative option such as but not specific to Starlink Internet Service) for 2 years 3.3.1.1. San Andres Campus – 1 unit (200mbps) 3.3.1.2. Agpudlos Campus – 2 units (200mbps) 3.3.1.3. Calatrava Campus – 1 unit (200mbps) 3.3.1.4. Santa Maria Campus – 1 unit (200mbps) 3.3.1.5. Santa Fe Campus – 1 unit (200mbps) 3.3.1.6. Romblon Campus – 1 unit (200mbps) 3.3.1.7. Cajidiocan Campus – 1 unit (200mbps) 3.3.1.8. San Fernando Campus – 1 unit		

		(200mbps) 3.4. **Learning Management System (LMS)** 3.4.1. **LMS Platform** 3.4.2. A software application that is designed to facilitate online learning and training by managing course content, tracking learner progress, and providing tools for communication and collaboration: Must supply the following modules and services: 3.4.3. **LMS Administration Module** 3.4.3.1. The solution must have a Database that is connected to a server that can be accessed at all times needed. 3.4.3.2. The solution must allow the migration of structured data such as Programs, Subjects, Teachers, Students, Subject code, and the likes. 3.4.3.3. All passwords created by the system must be Key sensitive. 3.4.3.4. The solution must allow Users to change their password and username upon the first login. 3.4.3.5. Allow Incoming Events and School Mission, Vision to be viewable on Newsfeed. 3.4.3.6. Capable of uploading a photo to serve as a profile picture per User. 3.4.3.7. Equipped with Live – Chat, and Messaging between Users. 3.4.4. **Professor Module** 3.4.4.1. Able to provide view access to Teachers for student attendance monitoring. 3.4.4.2. Capable of creating lesson plans and attaching or linking related files such as learning modules, PowerPoint files, excel, PDF, text, and word files with a maximum file size of 20Mb. 3.4.4.3. The solution must allow the addition of		

		student/user activities such as Homework, Quizzes, and Examinations. 3.4.5. **Student Module** 3.4.5.1. Able to allow Teachers to set up time limits on testing and other output-based student activities. 3.4.5.2. The solution must allow the setting of date ranges for users to take the assigned activities. 3.4.5.3. Able to display activity Scores immediately viewable immediately upon activity completion. 3.4.5.4. Allow the list of created questions to be viewable and editable by the activity creator. 3.4.5.5. The solution must allow the creation of lessons and quizzes one at a time with the same subject description. 3.4.6. **Parents Module** 3.4.6.1. Provide Parents or Guardians with access to allow monitoring of activities and progress of the students under their direct care (e.g., children, personal scholars, etc.) 3.4.6.2. Able to support limitless addition of students within the parents or guardians' care 3.4.7. **400 units of iPad and 100 units of Smart Phones** 3.4.7.1. Must provide 400 units of iPads and 100 units of Smart Phones with the following specifications: 3.4.7.1.1. iPad 3.4.7.1.2. Screen: 10.9" 3.4.7.1.3. Display Resolution: 2.360 x 1.640pixels 3.4.7.1.4. Screen Technology: IPS 3.4.7.1.5. Pixel Density: 264ppi 3.4.7.1.6. Main Camera: 12MP; Video Resolution: 4K; Face Detection: Yes; HDR: HDR; Camera Lenses: Single Camera; Selfie Camera: 12MP 3.4.7.1.7. Weight: 481g, 477g; Dimensions		

		(W x H x D): 248.6 x 179.5 x 7mm; Colour: Silver, Blue, Pink, Yellow 3.4.7.1.8. Battery Capacity: 7606mAh; Charging: Fast Charging; Battery Type: Li-Polymer 3.4.7.1.9. Processor: 6-core CPU; Chipset: Apple A14 Bionic; Processor Core: Hexa Core 3.4.7.1.10. Storage: 256GB, 64GB; RAM: 4GB 3.4.7.1.11. Keyboard Support: Yes; Pen Support: Yes; Mouse Support: Yes Fingerprint: Yes 3.4.7.1.12. Wi-Fi Standard: 802.11 a/b/g/n/ac/6 3.4.7.1.13. Cellular Network: 5G, None; SIM: Nano-SIM, None 3.4.7.1.14. Bluetooth: Yes; Navigation: Yes; Connector Port: USB-C 3.4.7.1.15. OS: iOS; OS Version: OS 16 3.4.7.2. Smart Phone 3.4.7.2.1. *Network:* Technology: GSM / CDMA / HSPA / CDMA2000 / LTE / 5G 3.4.7.2.2. *Body:* Dimensions: 152.8 x 71.5 x 8.2 mm or 8.3 mm 3.4.7.2.3. *Weight:* 188 g or 193 g (6.63 oz); Build: Glass front (Gorilla Glass Victus), glass back or silicone polymer back, aluminum frame 3.4.7.2.4. SIM: Nano-SIM and eSIM or Dual SIM (Nano-SIM, dual stand-by) 3.4.7.2.5. IP68 dust/water resistant (up to 1.5m for 30 min) 3.4.7.2.6. Display: Type: LTPO OLED, 68B colors, 120Hz, Dolby Vision, HDR10+, 1000 nits (typ), 3000 nits (peak); Size: 6.36 inches, 97.6 cm2 (~89.3% screen-to-body ratio) 3.4.7.2.7. Resolution: 1200 x 2670 pixels, 20:9 ratio (~460 ppi density) 3.4.7.2.8. Protection: Corning Gorilla Glass Victus 3.4.7.2.9. Platform: OS: Android 14, HyperOS 3.4.7.2.10. Chipset: Qualcomm SM8650-AB Snapdragon 8 Gen 3 (4 nm) 3.4.7.2.11. CPU: Octa-core (1x3.3 GHz Cortex-X4 & 3x3.2 GHz Cortex-A720 & 2x3.0 GHz Cortex-A720 & 2x2.3 GHz Cortex-A520) 3.4.7.2.12. GPU: Adreno 750		

		3.4.7.2.13. Memory: Card slot: No 3.4.7.2.14. Internal: 256GB 8GB RAM, 256GB 12GB RAM, 512GB 12GB RAM, 512GB 16GB RAM, 1TB 16GB RAM; UFS 4.0 3.4.7.2.15. *Main Camera:* Triple: 50 MP, f/1.6, 23mm (wide), 1/1.31", 1.2µm, dual pixel PDAF, Laser AF, OIS; 50 MP, f/2.0, 75mm (telephoto), PDAF (10cm - ∞), OIS, 3.2x optical zoom; 50 MP, f/2.2, 14mm, 115˚ (ultrawide) 3.4.7.2.16. Features: Leica lens, Dual-LED dual-tone flash, HDR, panorama 3.4.7.2.17. Video: 8K@24fps (HDR), 4K@24/30/60fps (HDR10+, 10-bit Dolby Vision HDR, 10-bit LOG), 1080p@30/60/120/240/960fps, 720p@1920fps, gyro-EIS 3.4.7.2.18. Selfie Camera: Single: 32 MP, f/2.0, 22mm (wide), 0.7µm 3.4.7.2.19. Features: HDR, panorama 3.4.7.2.20. Video: 4K@30/60fps, 1080p@30/60fps, gyro-EIS 3.4.7.2.21. Sound: Loudspeaker: Yes, with stereo speakers 3.4.7.2.22. 3.5mm jack: No 3.4.7.2.23. 24-bit/192kHz Hi-Res & Hi-Res wireless audio; Snapdragon Sound 3.4.7.2.24. Comms: WLAN: Wi-Fi 802.11 a/b/g/n/ac/6e/7, dual-band, Wi-Fi Direct 3.4.7.2.25. Bluetooth: 5.4, A2DP, LE, aptX HD, aptX Adaptive, LHDC 3.4.7.2.26. Positioning: GPS (L1+L5), GLONASS (G1), BDS (B1I+B1c+B2a), GALILEO (E1+E5a), QZSS (L1+L5), NavIC (L5) 3.4.7.2.27. NFC: Yes 3.4.7.2.28. Infrared port: Yes; Radio: No 3.4.7.2.29. USB: USB Type-C 3.2, OTG 3.4.7.2.30. Sensors: Fingerprint (under display, optical), accelerometer, proximity, gyro, compass, barometer, color spectrum 3.4.7.2.31. Type: Li-Po 4610 mAh, non-removable 3.4.7.2.32. Charging: 90W wired, PD3.0, QC4, 100% in 31 min (advertised); 50W wireless, 100% in 46 min (advertised); 10W reverse wireless		

		3.4.7.3. Provide means for faculty and staff in accessing (both downloading and uploading) of online learning materials in the Learning Management system (LMS) and Library Information Management System **4. E-Classroom and E-Laboratories** 4.1. **E-Classroom** Conversion of traditional classrooms to a digitally enhanced facility that will allow learners to access course contents online, deliver lectures remotely and host productivity tools among others. List of e-Classrooms to be converted are as follows: a.) Main Campus (8 Rooms) b.) Agpudlos Campus (2 Rooms) c.) Calatrava Campus (2 Rooms) d.) San Agustin Campus (2 Rooms) e.) Santa Maria Campus (2 Rooms) f.) Santa Fe Campus (2 Rooms) g.) Romblon Campus (3 Rooms) h.) Cajidiocan Campus (2 Rooms) i.) San Fernando Campus (1 Rooms) j.) San Andres Campus (2 Rooms) The list below are the components to be spread across the e-Classrooms: 4.1.1. Each e-Classroom should have the following scope of auxiliary works and services: 4.1.1.1. Lighting works 4.1.1.2. Wall finishing 4.1.1.3. Ceiling works 4.1.1.4. 2 Units 2.5 HP Air Conditioner Split Type 4.1.1.5. Electrical works 4.1.1.6. 2 units of Dome Camera, 4MP or higher MP 4.1.1.7. Supply of Access Point for Wi-Fi access 4.1.1.8. Provision of furnishing 4.1.2. Each e-Classroom must have 41 desktop tables and chairs for students and 1 set of table and chair for the faculty.		

		4.1.3. Interactive Boards for e-Classrooms. The interactive board should be able to deliver the minimum following features and specifications listed. 4.1.3.1. Must propose a total of 26 units 75" Interactive Board Display for all e-Classrooms: 4.1.3.1.1. Must have screen type resolution of 3,840 x 2,160 with 60Hz. 4.1.3.1.2. Must have brightness of 350cd/m2 (without glass) 4.1.3.1.3. Must have contrast ratio of 4000:1 (without glass) 4.1.3.1.4. Must have 8ms response time. 4.1.3.1.5. Must have the following speaker type: Built in Speaker (10W x 4CH); 4.1.3.1.6. Must have the following external Control: touch Input RS232C thru stereo jack, RJ45(For MDC) 4.1.3.1.7. Must have a number of drawing of 20 touch (internal/external) 4.1.3.1.8. Must have touch ten type - passive pen with magnet. 4.1.3.1.9. Must have an object recognition range 2mm/ 4mm / 8mm / 50mm. 4.1.3.1.10. Must have a touch response time of 6.7ms 4.1.3.1.11. Must have a drawing speed (touch latency) of 26ms. 4.1.3.1.12. Must have VESA Mount of 400 * 400. 4.1.3.1.13. Must be Wall Mounted 4.1.3.1.14. Must have the following hardware features Touch Overlay(IR), Front		

		Connectivity, OPS I/F Support (w/OPS Box); Built in Speaker(40W 4CH), WiFi/BT Module Embedded 4.1.4. **Must provide 41 units of Desktop Computers per e-Classroom (Total of 26 e-Classrooms):** 4.1.4.1. Intel i7 CPU 4.1.4.2. Memory 16GB 4.1.4.3. Storage 1TB SSD 4.1.4.4. 1x RJ45 Gigabit Ethernet 4.1.4.5. 1x HDMI 1.4 4.1.4.6. Power Supply 4.1.4.7. Wired Keyboard & Mouse (USB Port) 4.1.4.8. End Point Security License 4.1.4.9. Windows Operating System License 4.1.4.10. Office Productivity Perpetual License 4.1.4.11. Monitor 23 Inches **5. E-Laboratories** 5.1. **Animation Laboratory** The Animation laboratory shall be a dedicated facility equipped with tools, software, and resources for animators to develop and produce animated contents. In this facility, animators are able to explore various aspects of animation including character design, storyboarding, 2D or 3D animation techniques, special effects, and post-production editing. 5.1.1. Participating bidder must provide the following: 5.1.1.1. Perform essential works for the existing facility designated by RSU as its animation laboratory. It must include the following at a minimum: 5.1.1.1.1. Lighting works 5.1.1.1.2. Wall finishing 5.1.1.1.3. Ceiling works 5.1.1.1.4. 2 Units 2.5 HP Air Conditioner Split Type 5.1.1.1.5. Electrical works 5.1.1.1.6. 2 units of Dome Camera, 4MP or higher MP 5.1.1.1.7. Supply of Access Point for Wi-Fi access 5.1.1.1.8. Provision of furnishing 5.1.1.2. Supply and installation of the following hardware: 5.1.1.2.1. 60 Desktop computers with the following specifications: 5.1.1.2.1.1. Intel i7 CPU 5.1.1.2.1.2. Memory 16GB		

		5.1.1.2.1.3. Storage 1TB SSD 5.1.1.2.1.4. 1x RJ45 Gigabit Ethernet 5.1.1.2.1.5. 1x HDMI 1.4 5.1.1.2.1.6. Power Supply 5.1.1.2.1.7. Wired Keyboard & Mouse (USB Port) 5.1.1.2.1.8. End Point Security License 5.1.1.2.1.9. Windows Operating System License 5.1.1.2.1.10. Office Productivity Perpetual License 5.1.1.2.1.11. Monitor 23 Inches 5.1.1.3. Must provide 60 pcs Tables for Desktop Computers 5.1.1.4. Must provide 1 pc Table and 1 pc chair for Faculty 5.1.1.5. Must Provide 60 pcs Chairs. 5.1.1.6. Must provide 1 unit Interactive Board 5.1.1.7. Must provide 60 units Graphic Tablet 5.1.1.8. Product Size (W x H x D) 5.1.1.8.1. 10.0 x 16.7 x 0.8 in or 253 x 424 x 21 mm 5.1.1.9. Product Weight 5.1.1.9.1. 2.7 kg or 6.0 lbs 5.1.1.10. Display Size 5.1.1.10.1. 17.3 in or 43.9 cm 5.1.1.11. Active Area 5.1.1.11.1. 15.0 x 8.5 in or 382 x 215 mm 5.1.1.12. Display Resolution 5.1.1.12.1. 3840 x 2160 Pixels (Ultra HD) 5.1.1.13. Color Performance 5.1.1.13.1. Display colors: 1.07 billion (30 bit colors); Color gamut coverage ratio Adobe® RGB 88% (CIE1931)(typ), DCI-P3 99%(CIE1931)(typ), HDR gamma support, Pantone™ Validated and Pantone SkinTone™ Validated certifications 5.1.1.14. Viewing Angle 5.1.1.14.1. V 170° (85/85) H, (85/85) V (typ) 5.1.1.15. Contrast ratio/ Response rate 5.1.1.15.1. 1000:1 (typ) / 8ms (typ) 5.1.1.16. Aspect ratio/Brightness 5.1.1.16.1. 16:9 / 400 cd/m2 (typ) 5.1.1.17. Connectivity 5.1.1.17.1. USB-C (DP alt mode) x 1, USB-C x 1, HDMI x 1, Mini DisplayPort x 1		

		5.1.1.18. Graphics Input 5.1.1.18.1. USB-C port with DisplayPort Alternate Mode, or HDMI 2.1 or DisplayPort 1.4 port and USB-A port 5.1.1.19. Multi Touch 5.1.1.19.1. Physical switch to turn multi-touch on and off; pan, zoom and rotate gestures available in most applications including Adobe® Photoshop® and Illustrator® 5.1.1.20. Pen 5.1.1.20.1. Battery-free Wacom Pro Pen 3 with 3 customizable side switches, 8192 pressure levels and customizable grip size, weight & weight balance. 5.1.1.21. Supported Pen Tilt Angle 5.1.1.21.1. -60/60 degrees 5.1.1.22. Express Key 5.1.1.22.1. 8 easy to access and customizable, application-specific ExpressKeys placed on the ExpressKey grip at the rear of the display 5.1.1.23. Stand 5.1.1.23.1. Includes the Easy Stand for Wacom Cintiq Pro 17 that attaches by a standard 75 x 75 mm VESA mount. Optional Wacom Cintiq Pro 17 Stand that supports tilt, lift, and rotation; the stand attaches by a standard 75 x 75 mm VESA mount 5.1.1.24. Security 5.1.1.24.1. Kensington® MicroSaver 2.0 (lock to be purchased separately) 5.1.1.25. Productivity Boosters 5.1.1.25.1. Physical on/off switch for multi-touch; ExpressKeys, 3 pen side switches, and time-saving on screen shortcuts including Radial menus, Grid panels, and pen gestures 5.1.1.26. Ergonomics 5.1.1.26.1. Right or left-handed use; optional adjustable stand that supports tilt, lift, and rotation, VESA mount (75 x 75 mm) to attach third party arms or stands; Wacom Pro Pen 3 with comfortable, ergonomic grips in different sizes; detachable pen		

		holder to be placed at either side of the display. 5.1.1.27. Compatibility or System requirements 5.1.1.27.1. Windows® 10 or later, macOS 11 or later; USB-C port with DisplayPort Alternate Mode or DisplayPort or HDMI and USB-A; internet access to download driver 5.1.1.28. Power Consumption 5.1.1.28.1. Maximum power consumption: 50 W or less, 1.5 W or less when asleep, 0.3 W or less when off. 5.1.1.29. Box Inclusions 5.1.1.29.1. Pen Display, Pro Pen 3 with 2 extra grips, 3 extra button plates, and a balance piece, a detachable pen holder with 10 replacement nibs (5 standard, 5 felt) and nib removal tool, PVC-free USB-C to USB-C cable (1.8 m), PVC-free AC adaptor, power cord (1.0 m), quick start guide, regulation sheet. Pen resolution 2540 lpi 5.1.1.30. Must provide 60 units Android Tablets 5.1.1.30.1. 10.9” Screen 5.1.1.30.2. 1440 x 2304 pixels 5.1.1.30.3. 128GB Storage 5.1.1.31. Three (3) units of streaming servers with the following minimum specifications or equivalent: 5.1.1.31.1. Single Socket P (LGA 3647) 5.1.1.31.2. Intel Xeon 12 Core CPU (Cascade Lake-W) 5.1.1.31.3. Graphics Card with the following specifications: 5.1.1.31.3.1. Single Precision Performance at 65.3 TFLOPS 5.1.1.31.3.2. RT Performance at 151.0 TFLOPS 5.1.1.31.3.3. Tensor Performance at 1,044 TFLOPS 5.1.1.31.3.4. 16GB RAM 5.1.1.31.4. 1U Rackmount 5.1.1.31.5. PCI-E Gen 3x16 Switch CPU-GPU Interconnect 5.1.1.31.6. 128 GB RAM 5.1.1.31.7. 1TB SSD 5.1.1.31.8. 2 – RJ45 10GBase – T ports 5.1.1.31.9. 1 – RJ45 Dedicated IPMI LAN port		

		5.1.1.32. Four (4) units of application servers with the following minimum specifications or equivalent: 5.1.1.32.1. Single Socket P (LGA-4677) 5.1.1.32.2. Intel Xeon 12 Core CPU (Cascade Lake-W) 5.1.1.32.3. 1U Rackmount 5.1.1.32.4. PCI-E Gen 3x16 Switch CPU-GPU Interconnect 5.1.1.32.5. 32 GB RAM 5.1.1.32.6. 1TB SSD 5.1.1.32.7. 2-RJ45 10GBase-T ports 5.1.1.32.8. 1-RJ45 Dedicated IPMI LAN port 5.1.1.33. Supply and installation of Animation Software: 5.1.1.33.1. 2D Animation Software to create two-dimensional animations. 5.1.1.33.2. 3D Animation Software to create three-dimensional animations. 5.1.1.33.3. Motion Graphics Software to create animated graphics and visual effects for videos, presentations, and other multimedia projects. 5.1.1.33.4. Web Animation Software for creating animations that can be displayed on websites and web applications. 5.1.1.34. Supply and installation of Streaming Platform Software: 5.1.1.34.1. Streaming platform to deliver immersive 2D and 3D content on the internet using thin clients such as PC, tablet, and mobile phones. (3-years license). 5.1.1.34.2. Training of Unity 3D Software for 2D and 3D content creation. 5.1.1.34.3. Ten (10)-days on-site and online training on the use Unity3D for thirty (30) select students participating in the program. 5.2. Mobile Gaming and Application Development Laboratory for 8 laboratories: 5.2.1. Participating bidder must provide the following: 5.2.1.1. Perform essential works for the existing facility designated by RSU as its Mobile Gaming and Application Development laboratory. There are 8 laboratories		

		which must include the following: 5.2.1.1.1. Lighting works 5.2.1.1.2. Wall finishing 5.2.1.1.3. Ceiling works 5.2.1.1.4. 2 Units 2.5 HP Air Conditioner Split Type 5.2.1.1.5. Electrical works 5.2.1.1.6. 2 units of Dome Camera, 4MP or higher MP 5.2.1.1.7. Supply of Access Point for Wi-Fi access 5.2.1.1.8. Provision of furnishing 5.2.1.2. Supply and installation of 24 Desktop computers per laboratory with the following specifications: 5.2.1.2.1. Intel i7 CPU 5.2.1.2.2. Memory 16GB 5.2.1.2.3. Storage 1TB SSD 5.2.1.2.4. 1x RJ45 Gigabit Ethernet 5.2.1.2.5. 1x HDMI 1.4 5.2.1.2.6. Graphics card with the following specifications: 5.2.1.2.6.1. 2.51 Boost clock (ghz) 5.2.1.2.6.2. 2.21 Base clock (ghz) 5.2.1.2.6.3. 16GB Memory 5.2.1.2.6.4. 256 bit memory interface width 5.2.1.2.7. Power Supply 5.2.1.2.8. Wired Keyboard & Mouse (USB Port) 5.2.1.2.9. End Point Security License 5.2.1.2.10. Windows Operating System License 5.2.1.2.11. Office Productivity Perpetual License 5.2.1.2.12. Monitor 23 Inches 5.2.1.3. Must provide 1 table for faculty for each of the 8 laboratories. 5.2.1.4. Must provide 1 chair for faculty for each of the 8 laboratories. 5.2.1.5. Must provide 24 pcs chairs for each of the 8 laboratories. 5.2.1.6. Must provide 24 pcs computer table for each of the 8 laboratories. 5.2.1.7. Must provide 75” Interactive Board for each of the 8 laboratories. 5.2.1.8. Must provide 24 units Android Tablets per classroom (total of 8 classrooms) 5.2.1.8.1. 10.9” Screen 5.2.1.8.2. 1440 x 2304 pixels 5.2.1.8.3. 128GB Storage 5.3. **Robotics**		

		5.3.1. Supply and delivery of three (3) robots which can be configured to carry light-weight materials like books, magazines, light-tools, and the like. 5.3.2. The robot should be LIDAR-equipped (or equivalent technology) and programmable. 5.3.3. Supply of custom application that runs on Android at least, or any other smartphone. 5.3.4. Supply of three (3) Android tablets for the custom application. 5.3.5. Provide a development kit (SDK) for students and professors to be used in developing new applications for the robot. 5.3.5.1. General Parameters 5.3.5.2. Overall Size: 526 mm x 493 mm x 1,320 mm 5.3.5.3. Net Weight: 37 Kg 5.3.5.4. Color: Pearl White + Elegant Black 5.3.5.5. Body Material: Aviation aluminum; High Strength PC+ABS (Food Grade Plastic Material) 5.3.5.6. Screen Size: 10.1-inch; 1080P 5.3.5.7. Loading Capability 5.3.5.7.1. Loading Space: 3 tiers/4 tiers adjustable, the area of each tier is 0.18 m^2 5.3.5.7.2. Single Tray Load: 10 Kg 5.3.5.7.3. Total Load: 40 Kg 5.3.5.7.4. Gradeability: 5 Degrees 5.3.5.8. Interactive Ability: Voice Interaction + Touch Screen Control 5.3.5.9. System Performance 5.3.5.9.1. Hardware Platform: Qualcomm 8-core chip + 32-bit Microchip 5.3.5.9.2. MCU+, RealSense depth sensor 5.3.5.9.3. Operating System: Deep customized Robot OS operating system Based on Android 9.0 5.3.5.10. Navigation System: Lidar + Visual 5.4. **LMS Content Creation Laboratory** 5.4.1. Supply and installation of software tools that will enable the creation of Inter-active video content and eBooks, at least with the following specifications: 5.4.2. With pre-built layout slides, which include text, images, scenarios, and questions. 5.4.3. Able to easily copy and paste selected attributes of different objects or components. 5.4.4. Able to select an object and choose to copy		

		and paste either the interaction, or animation or appearance to a different object in an instant. 5.4.5. Equipped with intuitive interactions panel, with set of triggers, add conditions, and select from a comprehensive list of actions to assign to the trigger. 5.4.6. Able to create courses that meet accessibility standards by instantaneously adding closed captions for slide videos or audio content. 5.4.7. Able to create 'Demo', 'Training', and 'Assessment' modules by easily capturing on-screen keyboard activities, system audio, and mouse movements. 5.4.8. Able to record new videos or import existing online videos or Vimeo videos. Able to add informational slides or knowledge check questions as overlays at specific points in the video. Able to add bookmarks in the timeline to aid learner remediation. Feedback options for answers and interactions must be customizable. 5.4.9. Able to strategically place bookmarks on the slide or video timeline. 5.4.10. For the e-Books creation software, it must meet the following minimum requirements: 5.4.11. Able to precisely layout and style text, pictures, borders, calendars, and more 5.4.12. With wide range of pre-designed templates. 5.4.13. Able to consolidate text and pictures. 5.4.14. Able to render the final material in a non-editable format. 5.4.15. Must provide 5 units Desktop Computer with the following specifications: 5.4.15.1. Intel i7 CPU 5.4.15.2. Memory 16GB 5.4.15.3. Storage 1TB SSD 5.4.15.4. Power Supply 5.4.15.5. Wired Keyboard & Mouse (USB Port) 5.4.15.6. End Point Security License 5.4.15.7. Windows Operating System License 5.4.15.8. Office Productivity Perpetual License 5.4.15.9. Monitor 23 Inches 5.4.16. Must provide 5 Computer tables and 5 chairs 5.5. **E-Library** This will serve as the main online research facility for the students for them to access their digital textbooks and other online references. 5.5.1. **Auxiliary Works** 5.5.1.1.1. Lighting works		

		5.5.1.1.2. Wall finishing 5.5.1.1.3. Ceiling works 5.5.1.1.4. 2 Units 2.5 HP Air Conditioner Split Type 5.5.1.1.5. Electrical works 5.5.1.1.6. 2 units of Dome Camera, 4MP or higher MP 5.5.1.1.7. Supply of Access Point for Wi-Fi access 5.5.1.1.8. Provision of furnishing 5.5.2. **Must provide 60 Units Desktop Computers** 5.5.2.1. Intel i7 CPU 5.5.2.2. Memory 16GB 5.5.2.3. Storage 1TB SSD 5.5.2.4. Power Supply 5.5.2.5. Wired Keyboard & Mouse (USB Port) 5.5.2.6. End Point Security License 5.5.2.7. Windows Operating System License 5.5.2.8. Office Productivity Perpetual License 5.5.2.9. Monitor 23 Inches 5.5.3. **Must provide 60 Computers Tables and chairs** 5.6. **Library Information Management System (LIMS)** 5.6.1. Must have the capability to manage and store the database of the members. 5.6.2. Books must be issued with bar codes that contain the book's title, author, subject, and publication date. 5.6.3. Catalogue of books, journals and library databases must be accessible online. 5.6.4. Must have self-check-in and self-check-out books, and the members of digital libraries can log in, search for, choose, issue, and return books on their own. 5.6.5. Must have Dashboard for the librarians to maintain each member's account and collect membership payments. 5.6.6. The system must be capable of assessing and calculating penalties for late returns. 5.6.7. The system must enable the library staff to manage the inventory of library resources, including tracking the location and availability of resources. 5.6.8. The system must provide statistical reports and analysis of library usage and resources. The reports will include information such as the number of resources borrowed, the most popular		

		resources, and the patron demographics. 5.6.9. The system must provide the librarian the information what books are out, due for return, and returned. 5.6.10. Must provide a seamless process of any book's whereabouts at any given time. 5.6.11. Must have analytics to show, but not limited to, frequently borrowed or delayed return books, users with good standing/bad standing, frequently not available, popular authors and topics. 5.6.12. Can be accessible through mobile apps for reservation, borrowing, scanning or searching for books. Mobile apps must also provide the capability to complain or make reports. 5.6.13. Must be open source, web-based applications with API to connect to a compatible Campus Management System. 5.6.14. Must support open-source databases such as Postgres. 5.6.15. Must include the provision of Four (4) units of barcode printers, Four (4) handheld scanners and consumables. **6. Command and Control Center Equipment Requirements** 6.1. **Auxiliary Works and Services** 6.1.1. The winning bidder must provide all essential works to prepare the area nominated by RSU to be its Command and Control Center. At a minimum, it must include the following: 6.1.1.1. Wall, ceiling and floor finishes 6.1.1.2. Lighting works 6.1.1.3. Electrical works 6.1.1.4. 2 Units 2.5 HP Air Conditioner Split Type 6.1.1.5. Provision of network nodes 6.1.1.6. CCTV Camera 6.1.1.7. Door Access System 6.2. **Must provide 6 Units Desktop Computers** 6.2.1. CPU Intel i7 6.2.2. Memory 16GB 6.2.3. Storage 512GB SSD or higher 6.2.4. 1x RJ45 Gigabit Ethernet 6.2.5. 1x HDMI 1.4		

		6.2.6. Keyboard & Mouse 6.2.7. Wired Keyboard (USB) 6.2.8. Wired Optical mouse (USB) 6.2.9. Monitor 23 inches 6.3. **Security Surveillance System** 6.3.1. TCP/IP Based CCTV Cameras 6.3.2. Should support 12-24 VDC or 24 VAC 6.3.3. Should support 1920 x 1080 Resolution 6.3.4. Should support 25/30/50/60 fps 6.3.5. Should support Night Vision/IR for at least 50m 6.3.6. Should be at IP67 Ingress protection 6.3.7. CCTV System must consist of the following: 6.3.7.1. 106 Units Dome Camera, 4MP or higher MP 6.3.7.2. 71 Units Bullet Camera, 4MP or higher MP 6.3.7.3. Network Video Recorder (NVR) with the right-sized storage 6.3.7.4. CCTV software and analytics 6.3.8. Provision of furnishings and other fixtures necessary for a Command Center 6.3.9. Provision of 55” Display Monitor (Video Wall 3 x 2 Setup) 6.3.10. Shall perform powerhouse works to ensure power is generated safely and relayed from power stations and substations. 6.3.11. Electrical Works for connecting electricity supply wiring to electrical equipment. 6.3.12. Supply and installation of Generator Set, Transformer, Transmission Line, Electrical panel board, and Electrical wirings. 6.3.13. Six (6) Tables for Command Center 6.3.14. Six (6) Chairs 6.4. **Must provide 1 unit out of band switch for data center access:** 6.4.1. Must have 48 Ports x RJ45 RS-232 Serial Ports. 6.4.2. Must be LTE enabled. 6.4.3. Must have antenna extender. 6.5. **Micro Data Center Facility** Must be a modular and portable datacenter solution. Enclosure must be equivalent to a compact data center enclosure to house the data center racking system. 6.5.1. Master Rack (600mm x 1100mm x 200) 6.5.2. Metered PDU half rack (1250mm), 200/240v, 32A, (24)C13, (4)C19			

		6.5.3. EMS 2000 Gateway 6.5.4. EMS 1000 Sensor Temp & Hum 6.5.5. User interface IP65 10" touch screen IPC with Windows 10 pro 6.5.6. 8 PORT POE switch 6.5.7. Row Air Conditioner DXA 21.2KW 380V 60/50HZ with Humidity Control 6.5.8. 20KW(2u) 3 Phase On-Line UPS with 4 EBC 11.8min 6.5.9. Metered PDU 0U Half rack (1250mm,200/240V, 32A, (24)C13, (4)C19 6.5.10. Microdata center Added rack, 600mm x 1100mm x 2000 6.5.11. Microdata center added rack, 800mm x 1100mm x 2000 6.5.12. RT Series Rail Kit 6.5.13. MINI SNMP IPv6 CARD (SWAPPABLE) 6.5.14. RT 5-20 KVA External Battery Pack(3U), 1 string of 12V9Ah x 20pcs 6.5.15. CUBE Novec1230 Detection and Extinguishing up to 1.5m3 3U 6.5.16. SNMP Port for PACU 6.5.17. Water Leaking detection Kit for PACU 6.5.18. Water Pump Kit for PACU 6.5.19. Start-up Services for PACU 6.5.20. Start-up Services for UPS 6.5.21. Rack mounted Distribution Board 6.5.22. Start-up Services for DCIM/EMS 6.5.23. High availability 6.5.23.1. Support the highest Class-A availability level. Three national standard GB50174 A, B and C availability levels and provides N, N+1 or 2N configurations. 6.5.23.2. Highly reliable emergency Air Conditioner. The Air Conditioner system whenever messages such as over-temperature are detected. It should provide a highly reliable power supply system. 6.5.23.3. Distributed control to increase reliability for air-conditioning, UPS, environment and smart rack (temperature and humidity, lighting, PDU, door sensor, and more). The normal display and uploading of other equipment messages should not be affected even if one of the controllers' malfunctions. 7. **Infrastructure (Data Center Compute System)** 7.1. Compute Nodes consisting of Four (4) Rack mounted Servers (Linux Cluster), with minimum specifications as follows: 7.1.1. Servers 7.1.1.1. 2 x Intel Xeon 28 Core		

		7.1.1.2. 512GB Memory 7.1.1.3. 1 x Quad Port 10GbE 7.1.1.4. 2 x 480GB SSD 7.1.1.5. 4G RAID Controller 7.1.1.6. 256GB NVMe 0.3DWPD M.2 SSD 7.1.1.7. 1 x 2 Port 32Gbe FC HBA Card 7.1.1.8. Redundant Power Supply 7.1.2. Data Center and Virtualization Software Licenses for 4 Units Server Nodes with 2 CPU's each 7.1.3. Open source server operating system license enterprise class with unlimited virtual machine per licensed device. 7.2. **Data Center Block Storage** 7.2.1. **Enterprise Block Storage System Specifications:** 7.2.1.1. 12 x 7.8TB NVMe Drives RAID 5 (60TB Useable Capacity NVMe SSD Drives (Physical Capacity) 7.2.1.2. 8 x 32GB FC Ports with Transceivers 7.2.1.3. Must be future-proof and provide data-in-place upgrades within the same generation or next-generation of appliances or scale out of their existing environment with a second system equal to their current model. 7.2.1.4. Must have proactive monitoring tools for the storage solution. 7.2.1.5. Must include built-in management features to eliminate dozens of time-consuming tasks and decision points. 7.2.2. **SAN Switch Specifications:** 7.2.2.1. 2 units switch 24 ports 32GB FC. 7.2.2.2. 48 pcs 5m LC to LC Cables 7.2.2.3. 48 pcs 32GB FC SFP Transceivers 7.3. **Data Center Back-Up System** Requirements for Enterprise on-premise based back-up system: 7.3.1. **1 Unit Server:** 7.3.1.1. 2 x Intel Xeon Silver 4310 (12C, 2.1G, 120W) 7.3.1.2. 128GB Memory 7.3.1.3. 1 x Quad Port 10GbE 7.3.1.4. 2 x 480GB SSD 7.3.1.5. 1 x 2 Port 32Gbe FC HBA Card 7.3.1.6. Redundant Power Supply 7.3.2. **Software:**		

		7.3.2.1. Back-up for 40 Virtual Machines 7.3.2.2. Operating System for back-up software 7.3.3. **1 Unit Back-up External Storage:** 7.3.3.1. 32 x 14 TB NL SAS Drives RAID 6 12+2 (280TB Useable Capacity) 7.3.3.2. 8 x 32GB FC Port with Transceivers 7.3.3.3. 8 x FC LC-LC Cable 7.4. **Must Provide 4 units NGFW with the following specifications:** 7.4.1. Must perform stream-based, bi-directional traffic analysis, without proxying or buffering, to uncover intrusion attempts and malware and to identify application traffic regardless of port. 7.4.2. Must scan for threats in both inbound and outbound traffic simultaneously to ensure that the network is not used to distribute malware and does not become a launch platform for attacks in case an infected machine is brought inside. 7.4.3. Must have proxy-less and non-buffering inspection technology provides ultra-low latency performance for DPI of millions of simultaneous network streams without introducing file and stream size limitations, and can be applied on common protocols as well as raw TCP streams. 7.4.4. Must have a single-pass DPI architecture simultaneously scans for malware, intrusions and application identification, drastically reducing DPI latency and ensuring that all threat information is correlated in a single architecture. 7.4.5. Must have an engine with the multi-core architecture to provide high DPI throughput and extremely high new session establishment rates to deal with traffic spikes in demanding networks. 7.4.6. Must identify and mitigate even the most insidious modern threats, including future Meltdown exploits. Detects and blocks malware that does not exhibit any malicious behavior and hides its weaponry via encryption. 7.4.7. Must prevent potentially malicious files from entering the network, files sent to the cloud for analysis can be held at the gateway until a verdict is determined.		

		7.4.8. Must have multi-engine sandbox platform, which includes virtualized sandboxing, full system emulation and hypervisor level analysis technology, executes suspicious code and analyzes behavior, providing comprehensive visibility to malicious activity. 7.4.9. Must have a Secure SD-WAN that enables distributed enterprise organizations to build, operate and manage secure, high-performance networks across remote sites for the purpose of sharing data, applications and services using readily-available, low-cost public Internet services without additional license cost. 7.4.10. Must supports Active/Passive (A/P) with state synchronization. The proposed solution should support Hardware redundancy using only single security license in both primary & secondary appliance 7.4.11. Must have block until verdict To prevent potentially malicious files from entering the network, files sent to the cloud for analysis can be held at the gateway until a verdict is determined. 7.4.12. Must have zero day protection to protect the network against zero-day attacks with constant updates against the latest exploit methods and techniques that cover thousands of individual exploits. 7.4.13. Must have Bi-directional raw TCP inspection that scans raw TCP streams on any port and bi-directionally to detect and prevent both inbound and outbound threats. 7.4.14. The Anti-Malware System must be capable of Stream-based malware scanning, Gateway anti-virus, Gateway anti-spyware, Bi-directional inspection, No file size limitation 7.4.15. Must be certified with ICSA labs Advance Threat Defense certified with 100% unknown threat detection for 7 consecutive quarters from Q1-Q4, 2021 & Q1-Q3, 2022. 7.4.16. "The system must have the minimum throughput requirements (or higher): 7.4.17. Firewall Inspection Throughput – 36 Gbps; 7.4.18. Threat Prevention throughput – 19 Gbps; 7.4.19. Application inspection throughput – 20 Gbps; 7.4.20. IPS throughput – 20 Gbps; 7.4.21. Anti-malware inspection throughput- 18.5 Gbps 7.4.22. TLS/SSL decryption and inspection		

		throughput (DPI SSL) – 9 Gbps; 7.4.23. VPN throughput – 19 Gbps;" 7.4.24. "The system must be capable of handling: 7.4.25. Connections per second - 228,000/sec; 7.4.26. Maximum connections (SPI) – 8,000,000; 7.4.27. Max DPI-SSL Connections – 750,000; 7.4.28. Maximum connections (DPI) – 6,000,000 " 7.4.29. The system's interface must include: 7.4.29.1. 16 x 1-GbE Cu, 7.4.29.2. 2 x 40G QSFP+, 7.4.29.3. 8 x 25G, 7.4.29.4. 4 x 10G/5G/2.5G/1G SFP+, 7.4.29.5. 4 x 10G/5G/2.5G/1G Cu, 7.4.29.6. 2 x USB 3.0, 7.4.29.7. Management interfaces - 1 GbE, 1 Console 7.4.30. Storage: 256GB M.2 (expandable up to 1TB) **8. Must provide 1 unit out of band switch for data center access:** 8.1. Must have 48 Ports x RJ45 RS-232 Serial Ports. 8.2. Must be LTE enabled. 8.3. Must have antenna extender. **9. Network** 9.1. **Supply and Installation of 16 units campus DC Core Switch with the following specifications:** 9.1.1. Layer 3 switch with BGP, EVPN, VXLAN, VRF, and OSPF with robust security and QoS 9.1.2. High performance front plane stacking for up to 10 switches 9.1.3. High performance up to 1760 Gbps switching capacity, up to 1310 MPPS of throughput and up to 400 Gbps stacking bandwidth 9.1.4. Power-to-port switch bundle with back-to-front airflow ideal for data center 1GbE ToR and OOBM deployments 9.1.5. Intelligent monitoring, visibility, and remediation with Network Analytics Engine 9.1.6. Supports management via a single pane of glass across wired, wireless, and WAN 9.1.7. 24 x 1G/10G SFP+ ports 9.1.8. 4x 1G/10G/25G1/50G SFP ports		

		9.1.9. 1x USB-C Console Port, 1x OOBM port , 1x USB Type A Host port, 1x Bluetooth dongle to be used with Mobile App 9.1.10. 2 field-replaceable, hot-swappable power supply slots 9.1.11. Provides N+1 and N+N redundancy for high reliability in the event of power line or supply failures 9.1.12. Virtual Router Redundancy Protocol (VRRP)—Allows groups of two routers to dynamically back each other up to create highly available routed environments. 9.1.13. Unidirectional Link Detection (UDLD)—Monitors link connectivity and shuts down ports at both ends if unidirectional traffic is detected, preventing loops in STP-based networks. 9.1.14. IEEE 802.3ad LACP—Supports up to 54 link aggregation groups (LAGs), each with eight links per group with a user-selectable hashing algorithm. 9.1.15. Support for Microsoft Network Load Balancer (NLB) for server applications 9.1.16. Ethernet Ring Protection Switching (ERPS) supports rapid protection and recovery in a ring topology 9.1.17. IEEE 802.1s Multiple Spanning Tree provides high link availability in VLAN environments where multiple spanning trees are required; and legacy support for IEEE 802.1d and IEEE 802.1w 9.1.18. Jumbo frames allow for high-performance backups and disaster-recovery systems; provides a maximum frame size of 9198 bytes 9.1.19. Packet storm protection against broadcast and multicast storms with user-defined thresholds 9.1.20. Smart link enables simple, fast converging link redundancy and load balancing with dual uplinks avoiding Spanning Tree complexities 9.1.21. Address Resolution Protocol (ARP) determines the MAC address of another IP host in the same subnet; supports static ARPs		

		9.1.22. Domain Name System (DNS) provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server 9.1.23. Supports internal loopback testing for maintenance purposes and increased availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per VLAN basis for added flexibility 9.1.24. Route maps provide more control during route redistribution; allow filtering and altering of route metrics 9.1.25. IGMP Snooping allows multiple VLANs to receive the same IPv4 multicast traffic, lessening network bandwidth demand by reducing multiple streams to each VLAN 9.1.26. Multicast Listener Discovery (MLD) enables discovery of IPv6 multicast listeners; support MLD v1 and v2 9.1.27. Protocol Independent Multicast (PIM) defines modes of IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; supports PIM Sparse Mode (SM) and Dense Mode (DM) for both IPv4 and IPv6 9.1.28. Internet Group Management Protocol (IGMP) utilizes Any-Source Multicast (ASM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3 9.2. **Supply and Installation of 16 units campus DC Distribution Switch with the following specifications:** 9.2.1. 48 x ports 10/100/1000BASE-T Ports, 4x 100M/1G/10G SFP ports. 9.2.2. 1x USB-C Console Port, 1x OOBM port, 1x USB Type A Host port, 1x Bluetooth dongle to be used with Mobile App 9.2.3. Jumbo frames allow for high-performance backups and disaster-recovery systems; provides a maximum frame size of 9198 bytes. 9.2.4. Support for ACLs, robust QoS and common protocols such as static and Access OSPF routing.		

		9.2.5. Support for up to 8 switches (or members) in a stack via chain or ring topology. 9.2.6. Capable of Intelligent monitoring, visibility, and troubleshooting with built-in tool 9.2.7. Single pane of glass management via cloud across wired, wireless, and WAN 9.2.8. Capable of one touch deployment using a mobile app 9.2.9. Support for automated configuration and verification via dedicated software. 9.2.10. Secure and simple access for users and IoT with Dynamic Segmentation. 9.2.11. Packet storm protection against broadcast and multicast storms with user-defined thresholds. 9.2.12. Smart link enables simple, fast converging link redundancy and load balancing with dual uplinks avoiding Spanning Tree complexities. 9.2.13. Loopback interface address defines an address in Open Shortest Path First (OSPF), improving diagnostic capability. 9.2.14. Address Resolution Protocol (ARP) determines the MAC address of another IP host in the same subnet; supports static ARPs; gratuitous ARP allows detection of duplicate IP addresses; proxy ARP allows normal ARP operation between subnets or when subnets are separated by a Layer 2 network. 9.2.15. Domain Name System (DNS) provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server 9.2.16. Supports internal loopback testing for maintenance purposes and increased availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per-VLAN basis for added flexibility. 9.2.17. IGMP Snooping allows multiple VLANs to receive the same IPv4 multicast traffic, lessening network bandwidth demand by reducing multiple streams to each VLAN.		

		9.2.18. Multicast Listener Discovery (MLD) enables discovery of IPv6 multicast listeners; support MLD v1 and v2. 9.2.19. Protocol Independent Multicast (PIM) defines modes of IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; supports PIM Sparse Mode (SM) and Dense Mode (DM) for both IPv4 and IPv6 9.2.20. Internet Group Management Protocol (IGMP) utilizes Any-Source Multicast (ASM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3 9.2.21. Strict priority (SP) queuing and Deficit Weighted Round Robin (DWRR) 9.2.22. Traffic prioritization (IEEE 802.1p) for real-time classification into 8 priority levels that are mapped to 8 queues 9.2.23. Transmission rates of egressing frames can be limited on a per-queue basis using Egress Queue Shaping (EQS) 9.2.24. Class of Service (CoS) sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), Layer 3 protocol, TCP/UDP port number, source port, and DiffServ 9.2.25. Rate limiting sets per-port ingress enforced maximums and per-port, per-queue minimums 9.2.26. Up to 176 Gbps in non-blocking bandwidth and up to 130.9 Mpps for forwarding 9.2.27. Selectable queue configurations that allow for increased performance by defining a number of queues and associated memory buffering to best meet the requirements of network applications 9.3. **Campus Network Access Switches:** 9.3.1. **Supply and Installation of 15 Units 48 Port Access Switch PoE+:** 9.3.1.1. Enterprise-class Layer 2 connectivity with support for ACLs, robust QoS and static routing		

		9.3.1.2. Convenient built-in 1/10GbE uplinks 9.3.1.3. Management flexibility with support for Cloud-management, easy-to-use Web GUI, and CLI 9.3.1.4. Software defined ready with REST APIs 9.3.1.5. Simple deployment with Zero Touch Provisioning 9.3.1.6. Up to 176 Gbps in non-blocking bandwidth and up to 98.6 Mpps for forwarding 9.3.1.7. Selectable queue configurations that allow for increased performance by defining a number of queues and associated memory buffering to best meet the requirements of network applications 9.3.1.8. 48x ports 10/100/1000BASE-T Ports 4x 1G/10G SFP ports 9.3.1.9. 1x USB-C Console Port , 1x USB Type A Host port 9.3.1.10. Jumbo frames allow for high-performance backups and disaster-recovery systems; provides a maximum frame size of 9198 bytes 9.3.1.11. Packet storm protection against broadcast and multicast storms with user-defined thresholds 9.3.1.12. Strict priority (SP) queuing and Deficit Weighted Round Robin (DWRR) 9.3.1.13. Traffic prioritization (IEEE 802.1p) for real-time classification 9.3.1.14. Class of Service (CoS) sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), Layer 3 protocol, TCP/UDP port number, source port, and DiffServ 9.3.1.15. Rate limiting sets per-port ingress enforced maximums and per-port, per-queue minimums 9.3.1.16. Large buffers for graceful congestion management		

		9.3.1.17. IGMP Snooping allows multiple VLANs to receive the same IPv4 multicast traffic, lessening network bandwidth demand by reducing multiple streams to each VLAN 9.3.1.18. Multicast Listener Discovery (MLD) enables discovery of IPv6 multicast listeners; support MLD v1 and v2 9.3.1.19. Protocol Independent Multicast (PIM) defines modes of IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; supports PIM Sparse Mode (SM) and Dense Mode (DM) for both IPv4 and IPv6 9.3.1.20. Internet Group Management Protocol (IGMP) utilizes Any-Source Multicast (ASM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3 9.3.1.21. Multicast Service Discovery Protocol (MSDP) efficiently routes multicast traffic through core networks 9.3.1.22. MSDP for Anycast RP is an intra-domain feature that provides redundancy and load-sharing capabilities 9.3.1.23. Address Resolution Protocol (ARP) determines the MAC address of another IP host in the same subnet; supports static ARPs 9.3.1.24. Domain Name System (DNS) provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server 9.3.1.25. Supports internal loopback testing for maintenance purposes and increased availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per VLAN basis for added flexibility 9.3.2. **Supply and Installation of 16 units 12 port Access Switches PoE+**: 9.3.2.1. Enterprise-class Layer 2 connectivity with support for ACLs, robust QoS and static routing		

		9.3.2.2. Convenient built-in 1/10GbE uplinks 9.3.2.3. Management flexibility with support for Cloud-management, easy-to-use Web GUI, and CLI 9.3.2.4. Software defined ready with REST APIs 9.3.2.5. Simple deployment with Zero Touch Provisioning 9.3.2.6. Strict priority (SP) queuing and Deficit Weighted Round Robin (DWRR) 9.3.2.7. Traffic prioritization (IEEE 802.1p) for real-time classification 9.3.2.8. Class of Service (CoS) sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), Layer 3 protocol, TCP/UDP port number, source port, and DiffServ 9.3.2.9. Rate limiting sets per-port ingress enforced maximums and per-port, per-queue minimums 9.3.2.10. Large buffers for graceful congestion management 9.3.2.11. IEEE 802.3ad LACP supports up to 8 LAGs, each with up to 8 links per LAG; and provides support for static or dynamic groups and a user-selectable hashing algorithm 9.3.2.12. IEEE 802.1s Multiple Spanning Tree provides high link availability in VLAN environments where multiple spanning trees are required; and legacy support for IEEE 802.1d and IEEE 802.1w 9.3.2.13. Up to 68 Gbps in non-blocking bandwidth and up to 45.1 Mpps for forwarding 9.3.2.14. Selectable queue configurations that allow for increased performance by defining a number of queues and associated memory buffering to best meet the requirements of network applications 9.3.2.15. Connectivity 9.3.2.16. 12x ports 10/100/1000BASE-T Ports		

		9.3.2.17. 2x 1G/10G SFP ports 9.3.2.18. 2x 10/100/1000BASE-T ports 9.3.2.19. Supports PoE Standards IEEE 802.3af, 802.3at 9.3.2.20. Jumbo frames allow for high-performance backups and disaster-recovery systems; provides a maximum frame size of 9198 bytes 9.3.2.21. Packet storm protection against broadcast and multicast storms with user-defined thresholds 9.3.2.22. VLAN support and tagging for IEEE 802.1Q (4094 VLAN IDs) 9.3.2.23. Jumbo packet support improves the performance of large data transfers; supports frame size of up to 9,220 bytes 9.3.2.24. Bridge Protocol Data Unit (BPDU) tunneling transmits STP BPDUs transparently, allowing correct tree 9.3.2.25. Rapid Per-VLAN Spanning Tree (RPVST+) allows each VLAN to build a separate spanning tree to improve link bandwidth usage; is compatible with PVST+ 9.3.2.26. MVRP allows automatic learning and dynamic assignment of VLANs 9.3.2.27. STP supports standard IEEE 802.1D STP, IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for faster convergence, and IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) 9.3.2.28. Internet Group Management Protocol (IGMP) Controls and manages the flooding of multicast packets in a Layer 2 network 9.3.2.29. Port mirroring duplicates port traffic (ingress and egress) to a monitoring port; supports 4 mirroring groups 9.3.2.30. Address Resolution Protocol (ARP) determines the MAC address of another IP host in the same subnet; supports static ARPs		

		9.3.2.31. Domain Name System (DNS) provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server 9.3.2.32. Supports internal loopback testing for maintenance purposes and increased availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per VLAN basis for added flexibility 9.3.2.33. IGMP Snooping allows multiple VLANs to receive the same IPv4 multicast traffic, lessening network bandwidth demand by reducing multiple streams to each VLAN 9.3.2.34. Multicast Listener Discovery (MLD) enables discovery of IPv6 multicast listeners; support MLD v1 and v2 9.3.2.35. Protocol Independent Multicast (PIM) defines modes of IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; supports PIM Sparse Mode (SM) and Dense Mode (DM) for both IPv4 and IPv6 9.3.2.36. Internet Group Management Protocol (IGMP) utilizes Any-Source Multicast (ASM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3 9.3.2.37. Multicast Service Discovery Protocol (MSDP) efficiently routes multicast traffic through core networks 9.3.2.38. MSDP for Anycast RP is an intra-domain feature that provides redundancy and load-sharing capabilities 9.3.3. **Must provide 41 units 24 port Access Switches PoE+ with the following configuration:** 9.3.3.1. Enterprise-class Layer 2 connectivity with support for ACLs, robust QoS and static routing 9.3.3.2. Convenient built-in 1/10GbE uplinks		

		9.3.3.3. Management flexibility with support for Cloud-management, easy-to-use Web GUI, and CLI 9.3.3.4. Software defined ready with REST APIs 9.3.3.5. Simple deployment with Zero Touch Provisioning 9.3.3.6. Up to 128 Gbps in non-blocking bandwidth and up to 95.2 Mpps for forwarding 9.3.3.7. Selectable queue configurations that allow for increased performance by defining a number of queues and associated memory buffering to best meet the requirements of network applications 9.3.3.8. 24x ports 10/100/1000BASE-T Ports 4x 1G/10G SFP ports 9.3.3.9. 1x USB-C Console Port , 1x USB Type A Host port 9.3.3.10. Jumbo frames allow for high-performance backups and disaster-recovery systems; provides a maximum frame size of 9198 bytes 9.3.3.11. Packet storm protection against broadcast and multicast storms with user-defined thresholds 9.3.3.12. Strict priority (SP) queuing and Deficit Weighted Round Robin (DWRR) 9.3.3.13. Traffic prioritization (IEEE 802.1p) for real-time classification 9.3.3.14. Class of Service (CoS) sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), Layer 3 protocol, TCP/UDP port number, source port, and DiffServ 9.3.3.15. Rate limiting sets per-port ingress enforced maximums and per-port, per-queue minimums 9.3.3.16. Large buffers for graceful congestion management 9.3.3.17. IGMP Snooping allows multiple VLANs to		

		receive the same IPv4 multicast traffic, lessening network bandwidth demand by reducing multiple streams to each VLAN 9.3.3.18. Multicast Listener Discovery (MLD) enables discovery of IPv6 multicast listeners; support MLD v1 and v2 9.3.3.19. Protocol Independent Multicast (PIM) defines modes of IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; supports PIM Sparse Mode (SM) and Dense Mode (DM) for both IPv4 and IPv6 9.3.3.20. Internet Group Management Protocol (IGMP) utilizes Any-Source Multicast (ASM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3 9.3.3.21. Multicast Service Discovery Protocol (MSDP) efficiently routes multicast traffic through core networks 9.3.3.22. MSDP for Anycast RP is an intra-domain feature that provides redundancy and load-sharing capabilities 9.3.3.23. Address Resolution Protocol (ARP) determines the MAC address of another IP host in the same subnet; supports static ARPs 9.3.3.24. Domain Name System (DNS) provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server 9.3.3.25. Supports internal loopback testing for maintenance purposes and increased availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per VLAN basis for added flexibility 9.3.4. **Must provide 16 units Wireless LAN Controller (2 units per campus)** 9.3.4.1. Cloud-managed and purpose-built for branch SDWAN requirements 9.3.4.2. Unified policy enforcement for wired and wireless traffic through Dynamic Segmentation		

		9.3.4.3. Visibility into over 3,000 applications with no added hardware 9.3.4.4. Integrated LTE option available 9.3.4.5. Policy Enforcement Firewall - includes a Layer 4-7 stateful firewall with PEF to deliver a consistent user, device, and application awareness across WLAN, LAN, and WAN. 9.3.4.6. Threat Defense with IDS/IPS - To improve security against a growing attack surface, gateways deployed in SD-WAN mode add role and identity-based intrusion detection and prevention capabilities (IDS/IPS) on top of existing security features. 9.3.4.7. Application visibility and control - Deep Packet Inspection (DPI) technology, which is a component of PEF, consistently evaluates and optimizes performance and usage policies for over 3,000 applications. This ensures the highest possible Quality of Service (QoS) – even for encrypted traffic 9.3.4.8. Unified Communications and Collaboration (UCC) - Visualize and troubleshoot networks based on call quality metrics such as MOS, latency jitter and packet loss. Supported applications include: Teams, Skype for Business, Wi-Fi Calling, FaceTime, SIP, Jabber, Spark and more. 9.3.4.9. Maximum campus or remote AP licenses: 32 9.3.4.10. Maximum concurrent users/devices: 2,048 9.3.4.11. Maximum clients: Up to 2,048 9.3.4.12. Maximum VLANs: 4,096 9.3.4.13. Active firewall sessions: 64K 9.3.4.14. Concurrent GRE tunnels: 544 9.3.4.15. Concurrent IPsec sessions: 2,048 9.3.4.16. Concurrent SSL sessions: 2,048 9.3.4.17. Firewall throughput (Gbps): 4 9.3.4.18. Wired Bridged Throughput (Gbps): 4 9.3.4.19. Encrypted throughput 3DES (Gbps): 4 9.3.4.20. Encrypted throughput AES-CBC-256 (Gbps): 4 9.3.4.21. Encrypted throughput AES-CCM (Gbps): 2.0 9.3.4.22. Encrypted throughput AES-GCM-256 (Gbps): 4 9.3.4.23. Form factor/footprint: Desktop/fanless 9.3.4.24. 10/100/1000BASE-T: 4 9.3.4.25. USB 2.0 interface: 1 9.3.4.26. Supports management/status LEDs 9.3.4.27. Supports Central connectivity status LED 9.3.4.28. Supports Cellular (LTE) status LED 9.3.4.29. Console port: micro USB, RJ45 9.3.4.30. Operates at 0° C to 40° C (32° C to 104° F)		

		9.3.4.31. Maximum power consumption of 25W (with USB) 9.3.4.32. Power Source: 12v DC, 2.5A AC-to-DC power adapter Indoor APs 9.3.4.33. Access Point shall support Wi-Fi6 9.3.4.34. Access Point shall support 4x4 MIMO with four spatial streams 9.3.4.35. Access Point shall support dual 5-GHz radio mode. 9.3.4.36. Access Point shall have integrated or external antenna SKUs. 9.3.4.37. Access Point shall contain 2GB or higher-sized DRAM for capacity and scalability. 9.3.4.38. Access Point shall support USB 2.0 @ 4.5W. 9.3.4.39. Access Point shall have a dedicated hardware chipset to offload performance of advanced RF spectrum analysis and security. 9.3.4.40. Access Point shall support Uplink/downlink OFDMA 9.3.4.41. Access Point shall support management console port (RJ-45) 9.3.4.42. Access Point shall support integrated BLE5 radio 9.3.4.43. Access Point shall be able to offer IoT container hosting 9.3.4.44. Access Point shall be able to leverage partnerships for Apple Analytics 9.3.4.45. OEM should be listed in Gartner Leader Quadrant for Wired and Wireless LAN Infrastructure from the last 5 years before releasing this RFP. 9.3.5. **Must propose 210 Indoor Access Points** 9.3.5.1. 1.49 Gbps maximum real-world speed (HE80/HE20) 9.3.5.2. WPA3 and Enhanced Open security 9.3.5.3. Built-in technology that resolves sticky client issue or Wi-Fi 6 and Wi-Fi 5 devices 9.3.5.4. OFDMA for enhanced multi-user efficiency. 9.3.5.5. IoT-ready Bluetooth 5 and Zigbee support. 9.3.5.6. Designed to optimize user experience by maximizing Wi-Fi efficiency and dramatically reducing airtime contention between clients. 9.3.5.7. Support Orthogonal frequency-division multiple access (OFDMA) 9.3.5.8. Supports cellular optimization. 9.3.5.9. Supports up to 2 spatial streams (2SS) and 80MHz channel bandwidth (HE80). 9.3.5.10. Supports handling multiple Wi-Fi 6capable clients on each channel simultaneously, regardless of device or traffic type.		

		9.3.5.11. Supports Channel utilization optimization by handling each transaction via smaller sub-carriers or resource units (RUs). 9.3.5.12. Supports controller-less mode and can provide SLA-grade performance by allocating radio resources, such as time, frequency, and spatial streams, to specific traffic types. 9.3.5.13. Supports Layer 7 deep packet inspection (DPI) to identify user roles and applications, the APs will dynamically allocate the bandwidth needed. 9.3.5.14. Supports elimination of sticky client issues by placing Wi-Fi 6 capable devices on the best available AP. 9.3.5.15. Supports Wi-Fi 6 aware client optimization by steering mobile devices to the best AP based on available bandwidth, types of applications being used and traffic type –even as users roam. 9.3.5.16. Supports Advanced Cellular Coexistence (ACC) uses built-in filtering to automatically minimize the impact of interference from cellular networks, distributed antenna systems (DAS), and commercial small cell or femtocell equipment. 9.3.5.17. Supports continuously monitor and report hardware energy consumption. can also be configured to enableor disable capabilities based on available PoE power 9.3.5.18. Supports integrated Bluetooth 5 and 802.15.4 radio (for Zigbee support) to simplify deploying and managing IoT-based location services 9.3.5.19. Supports Target Wake Time (TWT) by establishing a schedule for when clients need to communicate with an AP 9.3.5.20. Supports for stronger encryption and authentication is provided via the latest version of WPA for enterprise protected networks. 9.3.5.21. Supports WPA2-MPSK MPSK enables simpler passkey management for WPA2 devices 9.3.5.22. Supports VPN Tunnels can be used to establish a secure SSL/IPSec VPN tunnel to a VPN concentrator 9.3.5.23. Supports Trusted Platform Module (TPM) for secure storage of credentials and keys, and boot code 9.3.5.24. Supports flexible management platform either standalone, controller-less,controller-based, cloud-based and On-premise NMS using unifed OS 9.3.5.25. Supports zero touch provisioning 9.3.5.26. Supports Transmit beamforming (TxBF) Increased signal reliability and range		

		9.3.5.27. Supports Passpoint Wi-Fi (Release 2) (Hotspot 2.0) 9.3.5.28. Supports Seamless cellular-to-Wi-Fi carryover for guests 9.3.5.29. Supports Dynamic Frequency Selection (DFS) Optimized use of available RF spectrum 9.3.5.30. Supports Maximum Ratio Combining (MRC) Improved receiver performance 9.3.5.31. Support Cyclic Delay/Shift Diversity (CDD/CSD) Greater downlink RF performance 9.3.5.32. Support Space-Time Block Coding Increased range and improved reception 9.3.5.33. Support Low-Density Parity Check (LDPC) High-efficiency error correction Indoor, dual radio, 5GHz and 2.4GHz 802.11ax 2x2 MIMO 9.3.6. **Supply and Installation of 10 Outdoor Access Points:** 9.3.6.1. AP type: Outdoor Hardened, Wi-Fi 6 dual radio, 5 GHz 4x4 MIMO and 2.4 GHz 2x2 MIMO 9.3.6.2. Software-configurable dual radio supports 5 GHz (Radio 0) and 2.4 GHz (Radio 1) 9.3.6.3. Support for up to 512 associated client devices per radio, and up to 16 BSSIDs per radio 9.3.6.4. Available channels: Dependent on configured regulatory domain. 9.3.6.5. Dynamic frequency selection (DFS) optimizes the use of available RF spectrum. 9.3.6.6. 4x4:4SS MU-MIMO capability 9.3.6.7. With maximum aggregate on air data rates of 3 Gbps (HE80/HE40) 9.3.6.8. Uplink and Downlink Orthogonal Frequency Division Multiple Access (OFDMA), Downlink Multi-User MIMO (MU-MIMO) and cellular co-location. With up to 4 spatial stream and 160 MHz channel capability 9.3.6.9. AI powered technology ensures that all clients are attached to their best serving Access Point. Session metrics, network metrics, applications and client type are used to identify and maintain the best connection. 9.3.6.10. IoT-ready Bluetooth 5 and Zigbee support 9.3.6.11. High performance Dual Radio 802.11ax AP with OFDMA and Multi-User MIMO (MU-MIMO). 9.3.6.12. Includes Bluetooth Low Energy (BLE) and Zigbee radios for location and IOT use cases.		

		9.3.6.13. Multi user capability with uplink and downlink multi-user MIMO 9.3.6.14. Unified AP support—Flexibility to deploy in either controller-based, cloud-managed, or controller-less networks. 9.3.6.15. Up to 4.8 GBPS wireless data rate to individual 4SS HE160 Wi-Fi 6 client device 9.3.6.16. Up to 575 Mbps wireless data rate to individual 2SS HE40 Wi-Fi 6 client device 9.3.6.17. Advanced Cellular Coexistence (ACC) minimizes interference from cellular networks. 9.3.6.18. Maximum ratio combining (MRC) for improved receiver performance. 9.3.6.19. Cyclic delay/shift diversity (CDD/CSD) to enable the use of multiple transmit antennas 9.3.6.20. Short guard interval for 20-MHz, 40-MHz, 80-MHz and 160-MHz channels. 9.3.6.21. Space-time block coding (STBC) for increased range and improved reception. 9.3.6.22. Low-density parity check (LDPC) for high-efficiency error correction and increased throughput. 9.3.6.23. Transmit beam-forming (TxBF) for increased signal reliability and range. 9.3.6.24. Maximum (worst-case) power consumption: POE powered (dual ports): 32.0W, POE powered (single port, full function): 26.1W 9.3.7. **Custom Captive Portal Management System** 9.3.7.1. Centralized Wi-Fi management system that controls the access of users. 9.3.7.2. Built-in AAA components to handle authentication, authorization, and accounting. 9.3.7.3. Custom user journey for each SSID which can deliver video, banners, and surveys. 9.3.7.4. Dashboards and reports 9.3.8. **The winning bidder must provide 226 pcs SFP+ transceivers to be used for the switches of various campuses of this project.** **10. Structured Cabling Works:** 10.1. The winning bidder shall supply, install and test UTP and Fiber Optic Cables and all necessary materials essential for various network nodes as defined in this Terms of Reference 10.1.1. The winning bidder must provide a network node schedule that basically tabulates the various network nodes		

		required. 10.1.2. The winning bidder shall include all necessary equipment and materials. 10.1.3. The winning bidder shall also include the IDFs with UPS power supply. 10.1.4. 3ft IDF 10.1.5. 4ft IDF 10.2. **Inter-Building Fiber Optic Connection** 10.2.1.1. The winning bidder shall supply, install and terminate the fiber optic cabling that will link the existing Network Switch Room to the new Data Center. 10.2.1.2. FOC installation shall be underground through either micro trenching or Horizontal Direct Drilling (HDD). 10.2.1.3. Supply and Installation of Fiber Termination Equipment and/or network switches. 10.3. **In-Building Structured Cabling works** 10.3.1.1. The winning bidder shall furnish all labor, materials, tools, and equipment, and perform all operations necessary to complete the supply, delivery, installation, termination, testing, and commissioning of Structured Cabling Works. 10.3.1.2. Supply, delivery, and pulling of Category 6 UTP cables and Fiber Optic Cables. The winning bidder shall perform proximity measurements and bandwidth requirements assessment to validate the FOC to be supplied whether Single-Mode, Multi-Mode, or a mix of both. 10.3.1.3. Supply and installation of Inter-Rack cabling at the Data Center Facility 10.3.1.4. Supply, Installation, and termination of data cables necessary for the interfacing of devices. 10.3.1.5. Supply and Installation of Cable Ladders, Cable trays, and fiber guides and perform harnessing with appropriate labeling. **11. LED Displays** 11.1. Supply and installation of five (5) sets of 9' x 12' and one (1) set of 12' x 32' Outdoor LED Displays for purposes of campus related advertisements, announcements, notifications and other communication purposes, complete with all peripherals to complete a working system. Ip Displays will be installed in:		

		11.1.1. Four (4) Units in Main Campus 11.1.2. One (1) Unit in San Andres Extramural Campus (Agpudlos) 11.1.3. One (1) Unit in San Agustin Campus **12. Unified Database Platform** The Unified Database Platform must meet the following specifications, at a minimum: 12.1. Must be cloud agnostic and cloud-native and can support deployments in bare metal, VMs, or Kubernetes both in on-premises infrastructure as well as cloud for at least the following options: 12.1.1. Baremetal 12.1.2. VMware vSphere 12.1.3. AWS 12.1.4. Google Cloud Platform 12.1.5. Microsoft Azure 12.2. It must support both the SQL and NoSQL APIs under a common storage substrate to address current and future use cases. 12.3. Capable of enabling client applications to auto-discover cluster nodes and cluster topology using an application-friendly library. 12.4. Able to support a single synchronous cluster stretched across multiple AZ's/regions/clouds and support multiple advanced replication architectures for the resiliency of the system. 12.5. Able to horizontally scale out/in/up/down with minimal to no business disruptions 12.6. Must offer a single user interface across various clouds with simplified database management and monitoring like DB upgrades, backups, security & on-demand scaling of nodes to simplify operation and management 12.7. The proposed solution shall support distributed ACID and transactions with strong data consistency. 12.8. The proposed solution must include at least 96 cores of database license subscription for production and 96 cores of database license for non-production 12.9. Must include 1 year Enterprise Support for production and non-production 12.10. Able to provide the ability to increase computing capacity linearly by adding new nodes to the existing database system with no downtime.		

		12.11. The proposed solution must support data replication between two isolated instances to support application-level active-active deployments. 12.12. Able to enhance the primary cluster capability with additional read-replica nodes to facilitate reads closer to the customer base. 12.13. Able to support data affinity to comply with country/region-specific regulatory/compliance requirements. 12.14. Must support encryption in transit and rest to have a strong security posture. 12.15. The proposed solution shall be able to provision and manage in a fully air-gapped environment. 12.16. Shall support region/zone/cloud affinity to define different data serving topologies to keep the data serving nodes closer to the user base 12.17. Capable of horizontally scaling with no downtime to support adhoc peak workloads or increase in sizing without interruption 12.18. The proposed solution must offer a single user interface across various clouds with simplified database management and monitoring like DB upgrades, backups, security & on-demand scaling of nodes to simplify operation and management 12.19. The proposed solution must have CDC capability to generate events on data change. 12.20. Must have API for management automation 12.21. The proposed solution must support advanced SQL features like stored procedure, foreign keys, triggers, json support (filtering, constraints and projections) to support current and future use cases. **13. Miscellaneous Requirements:** 13.1. **CCTV Cameras** 13.1.1. 106 Units Dome Type 13.1.2. 71 units bullet Type 13.2. **Must propose 1,500 Units laptops with the following specifications for faculty and student use:** 13.2.1. Intel i7 Processor CPU 13.2.2. 16GB Memory 13.2.3. 512GB SSD Storage		

		13.2.4. Windows operating System 13.2.5. Must have endpoint security. 13.2.6. Must include licensed (perpetual) office productivity software. 13.2.7. Must include power supply. 13.2.8. Must include carrying case (laptop bag) 13.3. **System and Hardware Installation** 13.3.1. Provision of essential services for installation of devices, software and systems supplied for this project. 13.4. **Operating System (OS) Hardening** The OS hardening service shall include the patching and application of advanced system security procedures to secure the server's OS. The OS hardening procedures must include the following, at a minimum: 13.4.1. If available, install service packs, firmware and/or patches to keep the OS up to date 13.4.2. Perform secure configuration by deleting unnecessary programs and/or drivers, apply restrictions to the network, files and applications, assign groups and set the policies and use templates to manage and enforce security configurations 13.4.3. Install End-Point Protection 13.5. **Support Services** 13.5.1. The winning bidder must ensure that appropriate support services are in place within the active warranty period of all supplied devices and software. 13.6. **Knowledge Transfers** 13.6.1. Provide training for all users and IT Support of RSU. 13.6.2. Document handover: 13.6.2.1. Network Diagram 13.6.2.2. System Diagram 13.6.2.3. System Credentials 13.6.2.4. Network Topology and IP VLan 13.6.2.5. Application and system documentation 13.6.3. Prior to the project handover, the winning bidder must conduct a walk-through with university nominated personnel but limited to engineering and IT technical personnel. The intent primarily is to orient on the supplied equipment/devices, completed installations, equipment type, functionalities,		

		basic operations & maintenance, and how these are integrated holistically. **14. Implementation Timeline** 14.1. Project implementation shall be within Three Hundred Thirty (330) calendar days from receipt of the Notice to Proceed (NTP). The winning bidder must complete and hand over the project within the prescribed implementation timeline. 14.2. Participating bidders are required to include in its bid submission a high-level Gantt Chart that will illustrate the project implementation schedule per WBS **15. Bidder Competency Requirements and Submittals** 15.1. The bid submission shall be in sufficient detail to show compliance with the Specification and shall include the following: 15.1.1. Statement of compliance, or otherwise, against the Specification for the System offered. 15.1.2. A detailed technical description of the proposed System, including all the equipment and software offered as appearing under Section VI – Schedule of Requirements.		
TOTAL			**1 Lot**	

_____
Name and Signature of the Bidder/
Authorized Representative

_____
Name of the Company