

## ATTACHMENT B

### NETWORK UPGRADE REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

A. Network Requirements to include the implementation, upgrade or replacement of:

System	Required 5Yr Maintenance Contract
1. Network Edge devices	Type 1: 24x7x365 (4hr response)
2. WAN Optimization	Type 1: 24x7x365 (4hr response)
3. Firewall and Security	Type 1: 24x7x365 (4hr response)
4. Intrusion Prevention System	Type 1: 24x7x365 (4hr response)
5. Traffic Shaping	Type 1: 24x7x365 (4hr response)
6. Campus Core Switch	Type 1: 24x7x365 (4hr response)
7. Campus Switches	Type 1: 24x7x365 (4hr response)
8. Access Switches	Type 3: Spares to be provided (5% min. for all manufacturers and models)
9. NOC Core Switches	Type 1: 24x7x365 (4hr response)
10. NOC Server Access Switches	Type 1: 24x7x365 (4hr response)
11. DMZ Switch	Type 1: 24x7x365 (4hr response)
12. Load balancing architecture	Type 1: 24x7x365 (4hr response)
13. VPN	Type 1: 24x7x365 (4hr response)
14. Centralized device management including performance, fault, configuration and security management	Type 2: 8x5xNBD
15. Centralized Network Access Control	Type 1: 24x7x365 (4hr response)
16. Wireless Access Points	Type 3: Spare to be provided (5% min.)
17. Wireless Access Point Antennas	Standard Manufacturer Warranty
18. Centralized Wireless Network Management	Type 1: 24x7x365 (4hr response)
19. Misc. Network devices and hardware	
20. Network metrics and monitoring software	Type 2: 8x5xNBD

B. Existing systems that are suitable for integration into the proposed solution should be considered and identified within your RFP response.

## **1.02 RELATED SECTIONS**

- A. Request for Proposals, RFP #1011-04
- B. Attachment A – Existing Systems

## **1.03 SUBMITTALS**

- A. Provide network architecture and topology diagrams.
- B. Provide technical product specifications for each system or component.
- C. Provide manufacturer's installation instructions.
- D. Include instructions for routine operation and maintenance.

## **1.04 QUALITY ASSURANCE**

- A. Supplier Qualifications: Company authorized by manufacturer and specializing in supplying the proposed products to meet the requirements identified within this Section.
- B. Installer Qualifications: Company specializing in installing, configuring and testing the proposed products to meet the requirements identified in this Section.

## **PART 2 - PRODUCTS**

### **2.01 APPROVED MANUFACTURERS**

- A. Vendor selection is open.

### **2.02 PERFORMANCE SPECIFICATIONS**

- A. The following requirements are the minimum that must be provided with the recommended solution in your RFP response.
  - 1. The equipment supplied shall be new (unused), current model year production. The equipment shall be supplied with all accessories as required to install within the existing racks or cabinets according to industry standards, and provide all interfaces, modules and components necessary to meet the functional requirements identified within this RFP. All operating systems and configurations shall utilize current versions or releases at the time of configuration.
  - 2. Palm Beach State College network supports TCP/IP only. Proposed solutions should support the current IPv4 address scheme and migrate cleanly to IPv6.
  - 3. The existing Checkpoint firewall solution may be incorporated into your network architecture. Palm Beach State College will consider alternate firewall solutions based on vendor recommendations, immediate and long term benefits. The addition to the existing Checkpoint firewall solution or any alternate firewall solution shall incorporate stateful firewall pairs.

4. Intrusion Protection System:
  - a. Describe the layers within the OSI stack that the IPS solution protects.
  - b. The IPS solution must not introduce a choke point within the network.
  - c. Traffic rate shaping shall be provided to ensure normal known traffic is given priority over unknown traffic.
  - d. High availability must be provided through hot failover or load balancing architecture.
  - e. The IPS solution shall detect, record and implement appropriate remedial action for malicious or unknown traffic.
5. The WAN Optimization functionality can be incorporated as a card within the WAN edge device or as a dedicated appliance. The WAN Optimization shall support improved WAN performance by providing compression, caching, and/or application acceleration. The WAN Optimization functionality is required to support streaming video and other media rich applications.
6. A scalable system to accommodate additional servers and storage at the Lake Worth and Palm Beach Garden locations as Palm Beach State College continues to grow and develop additional services.
7. Proposals should scale to a network architecture that can support 10Gbps Ethernet in the PBC and FLR backbone network.
8. Access network equipment shall support 10/100/1000 Mbps end devices.
9. The ability to support server and thin-client desktop boot and swap files on NAS devices as 10Gbps Ethernet is implemented.
10. The ability to integrate VoIP telephony in the future.
11. Palm Beach State College desires to segregate the general campus data traffic and the data center (NOC) traffic to enable managing separate network security policies and traffic shaping.
12. Ability to manage network and applications QoS and CoS across LAN and WAN networks. The vendor will provide guidance to recognize “normal” network loads and suggest metrics to indicate when a problem occurs. The vendor will provide management software that will produce utilization reports for the Palm Beach State College wireless networks as well as other network assets. These metrics and tools will form the basis for network capacity planning moving forward.
13. Ability to provide policy based routing.
14. Ability to manage traffic shaping for all edge connections at Lake Worth and Palm Beach Garden campuses.
15. PoE switch technology is not required within the new core network or data center access layer. However, PoE will be required at the Campus typical building access layer to support the future Campus Security roll-out of its new IP based camera, alarm, and notification systems. The minimum quantity of PoE ports required within each network closet is identified in Table 1 of each campus LAN drawing.

16. Wireless LAN system:
  - a. Replace existing wireless LAN access points and controllers. WLAN system to support 802.11b, 802.11g, 802.11n standards.
  - b. WLAN controller to be a robust centralized solution with manageable authentication services for both student and faculty users. Authentication to Active Directory across multiple domains is required. MAC address overrides for individual devices is required.
  - c. WLAN access points shall be provided with imbedded intelligence, providing the benefit of both a single point of management for the Network Administrator, and ensures that the WLAN clients do not lose their connection with the access point if communications between the access point and the centralized management is temporarily lost.
  - d. Rogue access point detection and active notification is required.
  - e. WLAN access points shall be PoE, powered from the network access switches.
  - f. The security and RF management must be provided at multiple levels throughout the WLAN architecture. The WLAN architecture shall provide primary security for the wireless network and also provide bandwidth management. The WLAN management and monitoring capabilities shall allow remote monitoring, troubleshooting and configuration.
  - g. WLAN VoIP mobile technology is not required to be supported.
  - h. The WLAN system administration of the WLAN clients shall support 802.1Q packet tags providing the ability to implement bandwidth management based on individual user policies.
  - i. Vendor to provide suitable antenna for each access point to ensure adequate RF coverage for the given space.
17. Component redundancy for Edge devices, Campus Core, NOC Core, NOC Server Access, and DMZ switches:
  - a. All existing network room power circuits are 20 amp 120V/1 $\phi$ . Systems must be powered with dual power supplies (auto sensing 120V/1 $\phi$  or 208V/1 $\phi$ ) to provide true "2N" redundancy. All systems must remain 100% functional at 100% capacity with half of the power supply cords active, powered from either electrical source "A" or from electrical source "B". Clearly indicate within your proposal if any equipment requires more than a 120V/1 $\phi$  circuit greater than 20 amps, or 208V/1 $\phi$ , or 208V/3 $\phi$  circuits so that Palm Beach State College can plan for the necessary power circuit modifications.
  - b. All systems must be provided with redundant fan systems.
  - c. All systems must be provided with redundant routing or switching processors.
  - d. Redundant components shall be hot swappable.

18. Component redundancy for typical building access equipment:
  - a. All existing network room power circuits are 120V/1 $\phi$ . Fiber distribution switches in buildings must be powered with dual power supplies (auto sensing 120V/1 $\phi$  or 208V/1 $\phi$ ) to provide true “2N” redundancy. Other systems may be powered with single power supplies. Power supplies must be auto sensing 120V/1 $\phi$  or 208V/1 $\phi$ . Clearly indicate within your proposal if any equipment must be 208V/1 $\phi$  or 208V/3 $\phi$  so that Palm Beach State College can plan for the necessary power circuit modifications.
19. Identify the availability and reliability metrics of the proposed Campus Core, NOC Core and Access solutions including:
  - a. MTBF/MTTR data for each system or component included in your proposal.
  - b.
20. Describe the following typical network characteristics for the systems and architecture proposed:
  - a. Capacity
  - b. Optimum Utilization
  - c. Throughput
  - d. Delay/Latency
  - e. Delay variation
  - f. Response time
21. Describe the following management capabilities for the systems proposed:
  - a. Performance management
  - b. Fault management
  - c. Configuration management
  - d. Security management
  - e. Accounting management
22. Identify the protocols supported by the systems and architecture included in your proposal.

B. The following requirements are desired by Palm Beach State College and may be included in your basic proposal, or may be presented as additional functionality, service or cost.

1. Describe your solutions ability or roadmap to support multi-site Ethernet OSI Layer 2 connectivity over the Palm Beach County (PBC) Ethernet MAN backbone. The College's Ethernet MAN is managed by PBC and provided as a service provider to the College.
2. Describe your solutions ability or roadmap to support 40Gb or 100Gb Ethernet in the backbone.
3. Describe your solution's ability or roadmap to support 10Gb Ethernet server links for the NOC access switches.
4. Describe your solutions ability or roadmap to support Data Center Bridging (DCB)
  - a. Priority based flow control (IEE 802.1Qbb).
  - b. Enhanced transmission selection, allocation of bandwidth across class of service (IEE 802.1Qaz).
  - c. Congestion Notification (802.1Qau)
  - d. Data Center Bridging Capabilities (DCBX)
5. Describe your solutions ability or roadmap to support I/O consolidation with the implementation of Converged Network Adaptors (CNA) within the NOC network topology.
6. Describe your solutions ability or roadmap to support IPV6.
7. Describe the manufacturer's roadmap to support programmable flow for cloud computing services including the manufacturer's participation in developing OpenFlow or other programmable flow services.
8. Describe the manufacturer's roadmap to support "flat" non-blocking, any-to-any low-latency data center network links including the manufacturer's participation in developing IETF TRILL, IEEE SPB or other proprietary solution for advanced features and functionality.

C. Growth

1. Palm Beach State College is presently evaluating VoIP platforms and Network RFP responses should support a broad range of implementations.

## **2.03 EXISTING NON END-OF-LIFE NETWORK HARDWARE**

- A. In order to comply with the existing College I.T. plan, the network core, edge, and data closets must be managed from a single management platform. The current management platform is Cisco-based. Any respondent proposing a non-Cisco solution will be responsible for, in the case of non-end-of-life (service contract is still available), equipment, providing a comparable product substitution at no charge, or financial compensation for the non-end-of-life equipment that is replaced. That equipment will include, but is not limited to:
  - 1. Ethernet switches and accessories
  - 2. Routers and accessories
  - 3. Wireless Access Points, antennae and accessories
  - 4. Wireless Controllers and accessories
- B. A summary inventory of non-end-of-life and end-of-life equipment is included in Attachment A
- C. All equipment replaced or compensated becomes the property of the respondent and is subject to the same data wiping and disposal procedures and documentation requirements stated elsewhere in this bid package. Respondent is responsible for physical removal of the equipment from the College premises. Respondent will provide an electronic inventory in Microsoft Excel format of all equipment removed that will include the equipment model number, serial number and Palm Beach State asset tag number.
- D. The College will accept financial compensation for end-of-life equipment, and that equipment is subject to the same data wiping and disposal procedures and documentation requirements stated elsewhere in this bid package. Respondent will provide an electronic inventory in Microsoft Excel format of all equipment removed that will include the equipment model number, serial number and Palm Beach State asset tag number.
- E. List in Appendix E the equipment for which financial compensation will be provided.

## **2.04 ACCESSORIES**

- A. Mounting Hardware
  - 1. Include all necessary hardware to mount in standard 19" four or two post racks.
- B. In-Rack cabling
  - 1. Include all necessary cabling to inter-connect added hardware within the rack and between adjacent racks.
  - 2. Include 2RU horizontal cable managers for each device to provide suitable patch cable management at each network device. Horizontal cable managers to be provided with front snap-on cover panel that hinges top and bottom, contoured cable guides offset to ensure proper bending radii of patch cables.
  - 3. Include new Cat.6 patch cords to connect the active ports for each network device to the existing workstation patch panels. Patch cord lengths to have no more than 24 inches of slack to minimize cable congestion in the racks. Verify patch cord color scheme with Palm Beach State College prior to placing order.

4. Include all necessary cabling to inter-connect added hardware within the rack and between adjacent racks.

C. Uninterruptible Power Supplies

1. Acceptable Manufacturer: APC
2. Each network rack or network room, except as noted below, shall be provided with a new Uninterruptible Power Supply (UPS) for the network equipment.
  - a. The network equipment within the NOC will be connected to the existing UPS system supporting the NOC. The vendor is not required to provide a UPS system for the NOC.
  - b. Each of the following network rooms are provisioned with one existing APC #SUA2200XL UPS module and one APC #SUA48XLBP battery pack tower. These modules and battery pack towers have not reached their end of life. The vendor is only required to replace these systems if the existing UPS module capacity and battery run time does not meet the specifications noted within this RFP.

(1) Lake Worth

- (a) AH101.2
- (b) AH207
- (c) AH308
- (d) BA101.1
- (e) BA135
- (f) BA201.1
- (g) BA301.1
- (h) CE120.1
- (i) CE204
- (j) ETA113
- (k) ETA155
- (l) ETA217
- (m) ETA221
- (n) ETA252
- (o) ETB109
- (p) ETC113
- (q) ETC109
- (r) ETD110
- (s) ETD211
- (t) NS125
- (u) NS224

(2) Palm Beach Gardens

- (a) AA103.1
- (b) AA203
- (c) BB121
- (d) BB219
- (e) BB327
- (f) LC113.3
- (g) LC219.1
- (h) SC116
- (i) SC139
- (j) SC218
- (k) SC230

(3) Boca Raton

- (a) AD313
- (b) BK102
- (c) BT121
- (d) BT215
- (e) CA107.1
- (f) CA207.1
- (g) CB105.4
- (h) CB211
- (i) HT115
- (j) HT217
- (k) HT318
- (l) HT422

(4) Belle Glade

- (a) CRA114
- (b) CRA212.1
- (c) CRB226.1
- (d) TEC107
- (e) TEC211

3. UPS shall be sized so that the network equipment load does not exceed 60% of the UPS capacity.
4. UPS batteries shall have adequate capacity to support 90% of the UPS capacity for a period not less than 1 hour.
5. All existing network room power circuits are 120V/1 $\phi$ . Clearly indicate within your proposal if any UPS system must be powered by a 208V/1 $\phi$  or 208V/3 $\phi$  circuit so that Palm Beach State College can plan for the necessary power circuit modifications.
6. UPS systems with hot swappable power modules and batteries are preferred.

7. UPS systems to be manageable over an Ethernet network and shall be provided with an Ethernet network Web/SNMP management card. All UPS systems shall be centrally monitored, managed and controlled with a Web based portal/interface.
8. UPS output shall be provided with adequate quantity and type of receptacles to support the connected network equipment plus an additional 4 spare receptacles.
9. Racks that are provisioned with more than 4 network devices shall be provided with horizontal or vertical (zero-U) power outlet strips.
10. Include manufacturers 3 year NBD maintenance for UPS systems.
11. Include all necessary mounting hardware for each UPS system to install within a standard rack with 19 inch rails.

## **PART 3 - EXECUTION**

### **3.01 PROOF IN CONCEPT**

- A. Vendor may be required to provide a Proof In Concept partial deployment of the proposed solution. Identify a range of any additional costs that may be incurred to provide, install, configure, test and verify the Proof In Concept.
- B. Proof In Concept testing may include verification of:
  - 1. Application response time
  - 2. Throughput
  - 3. Availability

### **3.02 EXAMINATION**

- A. Verify that existing environmental conditions and power sources are ready to implement network systems.
- B. Beginning of installation means installer accepts conditions.

### **3.03 INSTALLATION**

- A. Vendor shall coordinate installation of network devices within existing active network so as to minimize network disruption and ensure seamless migration from existing legacy systems to new network systems.
- B. Vendor shall install all systems and components specified within this RFP (network equipment, patch cords, cable management, UPS systems, etc.)
- C. Vendor shall configure all network devices. Vendor to coordinate device configuration requirements with Palm Beach State College network engineers. Palm Beach State College network engineers to review and approve device configurations prior to Vendor placing equipment order.
- D. Vendor to backup all device configurations and turn over to Palm Beach State College upon completion of device configuration.
- E. Install in accordance with manufacturer's instructions.

### **3.04 FIELD QUALITY CONTROL**

- A. Perform manufacture's recommended operational tests on completed installation to verify proper configuration and operation.
- B. All fiber connections to existing fiber patch panels shall be tested to validate the ability to support 10G connectivity at the wavelength used. Test results shall be delivered to Palm Beach State College for review and approval.
- C. Provide the following tools to validate the performance of the network:
  - 1. Traffic generation tools
  - 2. Modeling and simulation tools
  - 3. QoS and CoS tools
- D. Network Baselines and Normal Operation Ranges
  - 1. Vendor shall provide Palm Beach State College network metric baselines and normal operating ranges for all hardware devices.
  - 2. Vendor shall demonstrate to owner, prior to substantial completion, that all systems are operating within the defined ranges.

### **3.05 MANUFACTURER'S FIELD SERVICES**

- A. Provide the services of a manufacturer's technical representative to assist in the configuration and testing of the network.
- B. Demonstrate network performance and functionality.
- C. Provide recommended training for Palm Beach State College network engineers in the configuration, management and monitoring of the proposed solutions. Include training for up to four Palm Beach State College network engineers. Clearly indicate if training will be on or off site.

**END OF SECTION**