

SPECIFICATIONS

I. GENERAL

- A. These specifications are for data communications systems for the Pennsylvania Convention Center in Philadelphia, PA.
- B. The wireless network access points, fiber backbone, and horizontal cabling are not included in the scope of this RFP.
- C. The intent is for vendors to meet all specific features listed in this request for proposal (RFP). If there are alternates that would be of benefit to the owner either through reduced cost or improved functionality or flexibility, specifically indicate which features and specifications are not being included, and what features are being added that are not herein listed, and how these modifications benefit the user on a price and/or performance basis.
- D. All work on site must be performed in compliance with rules and guidelines established by the PCCA. All physical cabling including patching between network switches and patch panels must be performed by Union labor.
- E. Compliance with all relevant codes including:
 - 1. Local and state building, plumbing, mechanical, electrical, fire and health department and public safety codes agencies.
 - 2. National Fire Protection Association (NFPA).
 - 3. Occupational Safety and Health Act (OSHA).
 - 4. National Electrical Code (NEC).
 - 5. National Electrical Safety Code (NESC).
 - 6. The ICC National Building Code.
- F. Equipment types included in this RFP
 - 1. Ethernet switching and routing, including power supplies, optical modules, etc.
 - 2. Firewalls.
 - 3. Mounting accessories and miscellaneous hardware.
 - 4. Fiber optic jumpers.
 - 5. Any power supplies or ancillary equipment that is required to allow the specified systems to function.
 - 6. Network configuration and startup.
 - 7. Ongoing support and warranties.
- G. Project Conditions

1. The Pennsylvania Convention Center is a very large facility comprising multiple floors of meeting spaces and large halls over approximately 2.1 million square feet.
2. It is expected that many of the systems described herein will be installed while the facility is active with operations and events. Careful coordination with the Owner will be required to insure that operations and events are not disturbed by the changeover of this critical equipment.
3. A significant number of IDF's are located in cabinets on columns 10-15' above the floor (see plans).
4. Cleanup will be done daily and removed from site. Areas worked in shall be left in a vacuumed condition. In all cases leave the area in better condition than you found it.
5. Training will be required before final acceptance of the systems. Schedule for training to be coordinated with the Owner.
6. Related systems provided and installed by others:
 - a. Structured cabling system for Voice and Data including equipment racks, cabling, patch panels, and workstation jacks.
 - b. Fiber optic backbone utilizing all singlemode fiber with the exception of the new "Client IDF" which will have singlemode to the cores and singlemode and multimode to the (2) client racks in this space.
 - c. Phone System.
 - d. Wireless network equipment.
 - e. Conduits, Back Boxes, and Cable Tray.

H. PERFORMANCE REQUIREMENTS

1. Submit proposal with recommendations that maximizes the features described herein. Include documentation on major system components with the proposal (e.g. brochure or technical data sheet).
2. Based on the written response to this RFP selected bidders may be given an opportunity to meet with the Owner to present the design, features, and benefits of their proposal. The intent is to allow the vendors to present those features specific to their system which they believe will provide the Owner with the maximum benefit within the budget.
3. Include all necessary labor, software, programming and the selection of the proper type and quantities of the system components and accessories to assure a complete and operational system. Installation of patch cords and connectivity must be by a Union contractor.
4. Indicate how the systems will be integrated (hardware, software & user interface) in order to operate as simply as possible. Note that ease of configuration is a critical feature of the systems being purchased through this RFP as the PCCA needs to routinely modify the network to accommodate users of the space for more than 200 events a year.
5. Each proposal must include a description of Owner training which is

included with the purchase of equipment and the incremental cost to acquire additional training as needed.

6. Include proof of highest level of partnership with proposed OEM (i.e. Cisco Gold, Fortinet Expert, or equivalent).
7. Provide resumes of local delivery engineers (Greater Philadelphia Area) with highest level of proposed OEM certification (NSE8, CCIE, or equivalent).
8. Each vendor must include a list of at least 5 similar projects completed in the last 3 years. Provide contact information including contact name, organization, phone, and email.

I. ALTERNATES

1. Where manufacturer's names are listed this is to establish a standard for quality and design. Where one manufacturer's name is mentioned, products of other manufacturers will be acceptable if, in the opinion of the Owner, the substitute product is of quality equal to or better than that of the material specified.
2. Detailed specifications and, if the Owner determines it is necessary, samples of proposed alternate products shall be provided to the Owner for review prior to purchase or installation of proposed alternates.
3. Cost for removal and replacement of any unapproved alternates pertaining to the items specified in this section is the sole responsibility of the contractor.

J. SUBMITTALS

1. Provide submittals in pdf format following award of contract but prior to commencing work.
2. Submittal documentation shall include the following:
 - a. Table of contents.
 - b. Systems installer Name, Contact Name, Address, Telephone Number, Fax Number, and email address.
 - c. Manufacturers' certificate of warranty for the complete (or each and every of the various subsystems) Communications System. Clear documentation of effective warranty periods. All warranties shall be filled out in the Owner's name.
 - d. Maintenance Documentation including the following:
 - i. List of all equipment by manufacturer.
 - ii. Information necessary for the Owner's technical staff to perform routine and/or corrective maintenance.
 - iii. List of all spare parts.
 - iv. Original copies of manufacturer's installation and operation instructions arranged alphabetically by manufacturer.

3. Technical Diagrams and Drawings:
 - a. Provide a simplified single line drawing showing functional relationships and interconnection of all equipment. These drawings should be sufficient to provide information that a technician who is unfamiliar with the installation be able to efficiently troubleshoot and service the system.
 - b. A complete set of all technical diagrams and drawings shall be mounted on the wall either behind a plastic cover or in a durable file holder (as determined by the owner) in the main telecommunications rooms.

II. PRODUCTS

A. Network Switches

1. Basis of design – Meraki MS390-48UX2-HW.
2. All ports shall support mGbE up to 10 Gbps over Cat6 cabling.
3. Switches shall support management protocols SNMP 1, RMON 1, RMON 2, RMON 3, RMON 9, TELNET, SNMP 3, SNMP 2C, HTTP. And be manageable through either a GUI or command line interface.
4. VLAN support including complete IEEE 802.1Q, and Multicast.
5. Switches shall be stackable with a single IP address for a stack. The stack port must support a minimum of 100G throughput.
6. Each switch must have (2) hot swappable power supplies.
7. Uplink optics must be included in a quantity of (2) per every IDF with 40GbE throughput on each.
8. Link between each of the (2) MDF's and each switch must be 40Gbps on OS2, singlemode fiber (the fiber backbone is in place and not included in the scope of this RFP).
9. Switches must support UPoE/802.3bt with an aggregate power of no less than 645W per switch.
10. Verify full functionality of backbone link and interconnection between each switch in each stack.
11. See Appendix A for switch quantities. Note the number of PoE ports required for each IDF and overall power requirements.

B. Core Switches

1. Each of the (2) MDF's will be configured with a chassis type Core switch to support backbone links to all IDF's from each MDF. The basis of design is the Cisco 9600 series.
2. The links to each IDF will be over existing single-mode fiber at a minimum

of 40Gbps with the option to breakout links at 10Gbps. The basis of design for line cards is the Cisco C9600-LC-24C.

3. All optical modules to support transmission at the required speeds must be included. See Appendix A for a spreadsheet of IDF's.
4. Support of Virtual Routing and Forwarding VRF's must be included.
5. Switches must support software defined access BGP, EVPN, EIGRP, VXLAN advanced routing,
6. Support of Layer 2 and Layer 3 VPN's, Multicast VPN's, and NAT.
7. Each chassis must be configured with (4) 2KW AC power supplies.
8. Support for up to 25.6Tbps switching capacity with up to 128 nonblocking 40 Gigabit QSFP56 ports.
9. Switch must be configured with line cards to support 40 Gigabit links to all IDF's, plus 15% spare capacity with additional chassis included as necessary.
10. Full front accessibility for all removable components, including supervisors, line cards, power supplies, and fan tray.
11. Availability of Smart Licensing with:
 - a. Pooled licenses that can be used across the organization.
 - b. Unified management of licenses to allow easy visibility of license availability and usage.
 - c. License flexibility to easily transfer licenses as needed.
 - d. Add-on licenses shall be quoted for a 7-year term.

C. Edge Router (2)

1. Both the MDF and xMDF will require an edge router.
2. The basis of design for the edge router is the Cisco Catalyst 8500-12X4QC.
3. The router must be able to support 50G internet connections on day 1 via 100GE ports supported on a minimum of (2) ports.
4. All optical modules required for internet links and links to the network core must be included.
5. Options for 1GE, 10GE, 40GE and 100GE ports.
6. Include high-efficiency dual power supplies for redundancy. Basis of design is the PWR-CH1-750WACR.
7. Software redundancy with dual operating systems running concurrently.
8. 16GB default DRAM that is upgradeable to 64GB.
9. Configure for 1x100GE and 3x40GE.
10. Software-Defined WAN (SD-WAN)

- a. Ability to dynamically route traffic across the “best” link based on current application and network conditions.
 - b. Multi-layer security with both on-premises and cloud based security options.
 - c. IP Routing, IPSec, Quality of Service (QoS), Hierarchical QoS, Network Address Translation (NAT), Network-Based Application Recognition (NBAR), Policy-Based Routing, and Network-Based Application Recognition (NBAR).
11. Availability of Smart Licensing with:
- a. Pooled licenses that can be used across the organization.
 - b. Unified management of licenses to allow easy visibility of license availability and usage.
 - c. License flexibility to easily transfer licenses as needed.
 - d. Add-on licenses shall be quoted for a 7-year term.

D. Firewall

1. Both the MDF and xMDF will require a firewall appliance.
2. The basis of design for the firewall appliance is the Cisco Firepower 4145.
3. The firewall must be able to support 50G throughput with (8) SFP+ interfaces on the chassis plus (2) Network Modules capable of supporting 1/10/40/100G connectivity.
4. Centralized configuration, logging, monitoring, and reporting with options for local or cloud based management.
5. Automated threat feed and IPS signature updates.
6. Dual 1100W AC power supplies and hot-swappable cooling fans.
7. Licenses must be quoted for a 7-year term.

E. PATCH CORDS

- a. Fiber Optic jumpers of duplex 8/125 μ Os2 fiber with appropriate connector types to mate between the fiber optic patch panel and fiber port on the associated switch (e.g. LC, CS, SM, etc.). Length determined by distance from switch to fiber patch panel with 1.5 meter added length allowance for future moves within the rack. Confirm connector compatibility with backbone infrastructure and switch ports prior to ordering.
- b. Category 6 copper patch cords are already owned for all ports on this project and it is not expected that additional patch cords will be needed.

F. WARRANTY

- a. Switches and wireless equipment shall have a 3-year, advance replacement, manufacturers warranty.
- b. System support must be quoted based on a 7-year term with annual fees clearly stated.

III. EXECUTION

A. FIELD QUALITY CONTROL

1. Provide single contact on site job supervisor to coordinate with all trades.
2. There will be Pre-Start Meeting to review existing conditions and project schedule with the Owner.
3. Owner will require a schedule to be submitted prior to commencing along with a Purchase & Delivery Schedule to be updated regularly.
 - a. Equipment should be staged locally before delivering to PCCA.
 - b. Network equipment may not be staged at the site as secure storage may not be available.
4. Do not drop ship equipment to the job site without expressed written permission of the Owner.
5. Perform operational test on completed installation to verify proper operation of all systems.

B. FIELD SERVICES

1. Make final connections to equipment.
2. Perform field inspection and testing.
3. Demonstrate system operation and provide on site training.
4. Configure the network equipment to support multicast streaming for security cameras and devices to redundant security servers and storage.
5. Provide the services of a manufacturer trained, authorized, technician to supervise the installation and final connections, plus adjusting, programming and all testing of the system required to assure a complete and fully operative facility and to instruct designated personnel in the operation, adjustment, testing and maintenance of the system.
6. Include testing at substantial completion. Invite the Owner, and Network Consultant to witness each test, provide two weeks advance notice to schedule the witnessing of the tests.

C. TRAINING

1. Provide up to (5) training sessions of 6-hours each for the Owners IT staff

on configuration, maintenance, and troubleshooting of network equipment.

2. Training shall include:
 - a. Use of management features.
 - b. Use of VRF's and VLANs and how to configure.
 - c. How to configure 802.1P and 802.1Q features.
 - d. Configuration of a replacement switch.
3. Provide unlimited phone support for duration of support agreement.

D. COMMISSIONING

1. Commissioning services shall be provided and coordinated with the owner's representative who will be issuing a report to the owner.
2. After installation of the complete systems, but prior to final acceptance, the contractor will be required to provide a detailed demonstration of the features and capabilities of the systems in coordination with the owners consultant in order for the consultant to write a detailed commissioning report confirming the functionality of the installed systems. Any costs associated with this process shall be included in the base bid. Any travel expenses shall be included in the base price.
3. Demonstration of installed and functioning systems shall be provided to the owners' representative.
4. The demonstrations shall be thorough and include all relevant features that are applicable to use in the convention center environment.
5. Systems included in the commissioning process are as follows:
 - a. Core Ethernet switches.
 - b. Edge Ethernet switches