



Request for Proposal 3100

CCAC Internet Routers Upgrade Turnkey Project: Procurement of Internet Router Hardware, Software, and implementation/Integration to multi-home ISPs

RESPONSES TO THIS REQUEST FOR PROPOSAL

**MUST BE DELIVERED TO THE PROCUREMENT DEPARTMENT OF
THE COMMUNITY COLLEGE OF ALLEGHENY COUNTY**

800 ALLEGHENY AVENUE, PITTSBURGH, PA 15233 NO LATER THAN:

Tuesday, January 23, 2018 AT 2:00 PM

No fax or e-mail proposals will be accepted.

An optional walkthrough of the site will be available on Wednesday, January 10, 2018 at 10:00 a.m. The assembly point will be the Office of College Services Lobby, 800 Allegheny Ave., Pittsburgh, PA 15233. Park in the OCS lot directly across from Wendy's. There is a gate on the lot but you may push the button and speak to the receptionist to enter.

The CCAC Procurement Department publishes all Invitations to Proposal and Requests for Proposals (Proposals and RFP's) via the CCAC Procurement website at https://www.ccac.edu/Bid-RFP_Opportunities.aspx (see "Proposal and RFP Opportunities"). It will be each vendor's responsibility to monitor the Proposal/RFP activity within the given website and/or verify they are on the CCAC vendor list for this particular Proposal/RFP in order to ensure receipt of and compliance with all applicable documents inclusive of any issued addenda. Failure to incorporate any applicable addenda in the final submittal may result in the rejection of your proposal.

Interested parties may obtain further information from: mcvetic@ccac.edu.

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1.0 PURPOSE

The purpose of this Request for Proposal (RFP) “CCAC Internet Routers Upgrade Turnkey Project: Procurement of Internet Router Hardware, Software, and implementation/Integration to multi-home ISPs” is to solicit proposals from qualified vendors to upgrade current HP internet routers. The new Internet Routers should support the colleges' bandwidth-intensive applications and evolving services driven by cloud, wireless, IoTs, Video Surveillance camera, digital signage, 21st Century workforce technology, building automation, and so on for consistently high network performance, quality, reliability, and security.

2.0 PROJECT BACKGROUND

The Community College of Allegheny County is the largest institution of postsecondary higher education in Pennsylvania. The college serves 30,000 credit students through 170 degree and certificate programs and offers thousands of lifelong learning non-credit and workforce development courses to 35,000 students annually and future growth.

Incorporating a learning-centered environment committed to the future of the region, CCAC continues to expand its reach through innovative programming and accessible instruction offered via convenient day, evening, weekend and online courses. With four campuses and five centers serving Allegheny County and surrounding communities, CCAC endeavors to fulfill its mission to provide affordable access to quality education and offer a dynamic, diverse and supportive learning environment that prepares the region's residents for academic, professional and personal success in our changing global society. More information about CCAC can be found on it's website at https://www.ccac.edu/Welcome_Message.aspx.

2.1 Current Environment

CCAC's Internet service is provided by two ISPs(In future, college may decide to add third ISP). Each ISP connect to two Internet Routers via 1Gbps Ethernet copper port. CCAC own AS number and Internet Routers receive full BGP routing from each ISP. The college's combine Internet Access bandwidth is 1.7Mbps. College goal is to share 1.7Gbps Internet Access bandwidth efficiently. Please refer 19.0 APPENDIX C: Internet Router Network topology

2.2 Business Objectives

The college's primary purpose is serving current and prospective students—from those selecting a college while in high school to those finding themselves in a midlife career transition—as well as important secondary markets of parents, funders, legislators, community leaders, partner institutions and the like. In support of this, technology hardware is a critical component of IT strategy. All proposed solutions must be business class solutions to ensure the technology is utilized as a tool to facilitate and enhance teaching and learning and to help reach a larger, more diverse student population. The technology to be implemented must enable or assist the college in achieving the following business objectives (the order of the list doesn't reflect the importance or the priority of the objectives):

- a. Support the College's mission. Please see the [College's Vision, Mission, and Goals](#) for more information.
- b. Provide technology as a tool to facilitate and enhance teaching and learning.

- c. Capability to accommodate and support current and future online learning experiences and support of location agnostic technology services to different constituents on various mobile devices with different form factors.
- d. Improve the college's responsiveness to changing business conditions.
- e. Improve Internet service availability, resiliency, QoS, and capacity without being cost prohibitive.

CCAC invites interested parties that meet the qualifications listed in this document to submit proposals regarding their product and related service offerings. All information shall be submitted in the format stipulated in this RFP.

2.3 Solution Vision

Internet routers and Internet service should enhance teaching and learning experience within the classrooms, online and upcoming Cyber campus initiative. Proposed solution should support college identified future strategic technologies like

- Open Micro-credentials,
- Digital assessment, digital twins
- Predictive Learning,
- virtual reality (VR) / augmented reality (AR),
- Integration Technologies,
- Institution management,
- Smart machines,
- Listening and sensing technologies,
- Robotic Telepresence,
- Affective Computing, Maker Spaces etc
- Artificial Intelligence
- Intelligent Apps and Analytics
- Cloud computing technologies
- Conversational Platforms
- Event-Driven Model
- Continuous Adaptive Risk and Trust
- Audio/video/telepresence, VOIP 4 and 6

The selected vendor is expected to provide the following: Project plan, risk plan, testing plan, technical/user manuals, and deployment plan, hardware, software, installation, configuration, testing, integration services, support and training:

- a. The selected vendor will work with the college's staff to implement the proposed solution and integrates with existing network infrastructure.
- b. The selected vendor will remove current routers, and rack install new routers, patch cables, setup and configure and integrate the proposed solution into the college's networks. The selected vendor is required to review and understand current Internet Router hardware and software configurations for successful implementation
- c. The selected vendor will configure the proposed solution for high availability and migrate current configuration of the HP Internet Routers.

- d. For all equipment and software in the proposal, if they are not manufactured by the vendor, the vendor must include signed copy of the agreement from third party licenses and pertinent warranties.

In summary, the selected vendor will provide turnkey solution i.e. – from installation, configuration, testing, migration, and eventual final configuration, software updates (if any), training, support and integration services for the proposed solution.

Once a contract has been reached, a purchase order will be cut and development and implementation of the new solution will begin. The system will be rolled out in a phased approach as estimated in the project timeline prepared by the vendor.

The proposed solution will be purchased through the proper channels of CCAC procurement

3.0 SOLUTION REQUIREMENTS

Proposed solution should meet or exceed solution requirements. All work must be done under the supervision of a dedicated vendor's most qualified certified expert (utilizing the resources of other less qualified technical personnel when it's necessary and/or appropriate). The overall technical responsibility of the project is to be carried out by the vendor's dedicated/certified engineer. At project completion, this dedicated engineer must provide and sign-off on the final document(s) to acknowledge the conformity of the work completed by the vendor.

The vendor must inventory all deliverables at the Office of College services with designated CCAC ITS staff person.

Vendors are required to submit their responses as a comprehensive turnkey solution. Therefore, all submittals must bundle the proposed designed products, vendor approved training, and technical labor, in addition to delineating material and labor in a clearly itemized list, as part of the vendor's proposal. CCAC recognizes that this project involves significant technical capability for successful completion. Any information provided by CCAC with regard to this project is strictly confidential and shall not be disclosed to third parties.

The proposed solution(s) must address the technical requirements and design objectives delineated herein. The vendor is solely responsible to deliver a fully functional solution meeting the specifications described herein. After the award of the contract, the awarded vendor (contractor) is responsible for any necessary item not brought to the attention of CCAC before the award in order to complete the project by the specifications & design objectives.

3.1 Design Objectives and hardware and software Requirements

The proposed Internet Routers solution should integrate to HP DMZ switch 7510 and respective ISP's switch interface. The new Internet Routers should support bandwidth-intensive applications(e.g., collaboration, streaming desktop, etc.) for consistently high network performance, quality, reliability, and security. The vendor response should include the detailed explanation for each requirement stated below in the context of the proposed solution:

Mandatory features of Internet Routers:

- Vendor to propose, two, chassis based, minimum 6-slot, Internet router hardware and software as a trunked solution.
- Each Internet Router should support at least ten 10GbE Ethernet ports and twelve 1GbE copper Ethernet ports.
- Each Internet Router hardware should scale to support at least ten 100GbE ports in future.
- Proposed Internet Router should support BGP, BGP4, for Ipv4 and IPv6. for static routing, OSPF, OSPF v3, BGP, BGP4, MPLS.
- Each Internet Router should support up to 4 million Ipv4 or 4 million IPv6 routes and option to upgrade RAM to accommodate routing-table growth. If applicable, vendor is required to state forwarding information base (FIB) ternary content addressable memory (TCAM) limitations.
- Proposed Internet Router solution should support Virtual Router Redundancy Protocol (VRRP) for dynamic high available routed environments in IPv4/IPv6.
- Proposed Internet Router solution should support 'Hitless software upgrades'. Proposed solution should allow patches to be installed without restarting the device thereby increasing network uptime and simplifying maintenance.
- Each Internet Router should support hot-swappable AC dual power supply.
- Each Internet Router should support online insertion and removal (OIR) of modules and transceivers.
- Proposed Internet Router should support management by CLI, SSH, secure copy and Web GUI.
- Proposed Internet Router should support logging to a remote Syslog server, Security Event Information Management system(SEIM), support TFTP, and FTP for copying OS images onto the system.
- Proposed Internet Router switch should support SNMPv3 and SNMP traps for monitoring and fault management.
- Proposed solution should have "performance and availability" at least up to 99.99% or higher. Vendor to provide MTBS.
- Vendor is required to provide product roadmap and policy details of End-of-Life, End-of-Sale, and End-of-Support.
- Vendor is required to provide product's Mean Time Between Failure (MTBF) and Mean Time To Failure (MTTF) details.
- Vendor to propose single dashboard centralized management, bandwidth monitoring and analytics tool. Management tool should help in automating software image management, including patch management, track device configuration changes, alarm notification including threshold overshoot.
- Proposed Internet Router solution should support standards listed at 20 APPENDIX D: STANDARDS SUPPORT FOR INTERNET ROUTER.

Desired features of Internet Routers:

- Proposed solution may support firmware/patch upgrade and configuration automation.

- Proposed Internet Routers may support telemetry. Telemetry data must be model based e.g. OpenConfig/YANG data modeling language. Support for JSON encoding open-source software API to manipulate and analyze data.
- Proposed Internet Routers may support support for multiple overlay encapsulation methods, including VXLAN, Network Virtualization using Generic Routing Encapsulation (NVGRE), MPLSoUDP, MPLSoGRE, 802.1BR, SR-MPLS, and SR-V6.
- Proposed Internet Routers may support chassis-level redundancy to enable managing two-router as a single element.
- Proposed Internet Routers may support latest OpenFlow specifications to enable SDN by allowing separation of the data and control paths.

3.2 Implementation Requirements

The college expects the selected vendor to provide industry best practices for management of production services and any specifics related to their proposed solution. It is desired that the solution architecture is designed to accommodate future growth without requiring the college to invest in expensive network architecture redesign. In case the college chooses to work with more than one vendor for the right solution, it is expected that all vendors work together for the successful completion of the project. It is very important for vendors to understand the current network design and configuration and come up with a plan showing proposed solution steps. The following requirements are mandatory:

3.2.1 Testing, Staging and Deployment Schedule

- a. Demonstrate prototype solution showing the configuration as it interoperates with the college's network.
- b. Describe how the solution works during link and device failure.
- c. Vendors are required to submit the complete plan and action steps clearly specifying execution items.
- d. The vendor is required to provide product road map and its end of life details.
- e. The vendor must provide a summary of known outstanding bugs associated with the current network equipment image/software version.
- f. The vendor must provide a physical and logical network diagram using Visio tool.
- g. Vendors must work in such a manner that college business is not affected in any way. If emergency network down time is inevitable to deliver the proposed solution, at least 15 days' prior written notice is required by the college's ServiceDesk.
- h. It is the vendor's responsibility to install, configure and integrate the complete solution as per college business schedule.

3.2.2 Availability and Business Continuity

The college's information systems operate as a 'virtual campus', where users access these systems from any place at any time. The proposed design is expected to prevent possible single points of failure within the system.

3.2.3 Management and Monitoring

- a. The vendor must specify the recommended and minimum memory, number of CPUs, and disk space for the proposed system hardware(or Virtual Machine over MS Hypervisor) and operating system for the network management tool. The system must be installed and updated by ITS personnel on CCAC owned hardware located in the college's network operations center.
- b. Configure the management tool to provide alerts for failures via phone, text messaging, email etc.
- c. Describe how the system logs errors, what error data constituents are documented and how to view useable information from log errors.
- d. Describe any monitoring tools or plug-ins (i.e. Nagios plug-ins) that exists to monitor the system.
- e. Describe how the system monitors status and data flow analysis.

3.3 Security and Audit

The vendor solution should not cause security vulnerabilities.

3.4 Training and Support

3.4.1 Training

- a. Provide manufacturer certified training for three CCAC employees to be trained to configure, operate and maintain the proposed solutions and any college requested technology. The assumptions about the proficiency of the CCAC personnel must be noted. CCAC may use these vouchers at any point in time.
- b. The training course should include
 - a. Indepth training in BGP protocol
 - b. vendor-specific network OS REST API, YANG, and NETCONF. Basic introduction to automation/DevOps tools using Ansible. Additional topics to include
 1. NETCONF and the XML API
 2. YANG
 3. Jason and YAML
 4. Python in vendor-specific network OS
 5. Automation Scripting Using Python
 6. Jinja2 Templating Language
 7. Using Ansible to Automate device operations
 8. Zero Touch Provisioning
- c. Provide a list of the printed documentation provided for installation, operation, use, and administration of the whole solution.

- d. In addition to formal classroom training, the college requires the vendor to provide on-site training of key concepts including skills transfer specific to the proposed solution. The vendor must specify the type of training provided.
- e. Specify and describe any help files provided by the system, and whether they can be customized for CCAC.

3.4.2 Support

- a. Describe if and how you will provide 24 x 7 support and the time frame of guaranteed initial response time.
- b. Describe other services for maintaining the solution in a supported state.
- c. Proposed quote should include pricing for hardware and software support for options 24x7x4, 24x7xNBD and 8x5xNBD.

3.5 Project Deliverables

1. Project Management Plan

Purpose

The purpose of the Project Management Plan (PMP) documents how the Project Team will plan, execute, monitor, control, and close the project. The PMP details the approach to manage the project and ensure optimal project performance. The PMP should the following plans:

- a. Scope - what is in scope and what is out of scope
 - b. Schedule – include tentative schedule for the entire project from initiation to closing
 - c. Cost – what costs are fixed, recurring or time and materials
 - d. Quality – include quality industry benchmarks or metrics
 - e. Change Management plan – how changes will be managed after go-live
 - f. Staff training – hours and number of staff to be trained
 - g. Communication plan
 - h. Risk Management
 - i. Technical plan
 - j. Training plan
 - k. Operations documentation
 - a. Requirement matrix Procurement – include licensing requirement for each equipment, owned or supplied by a third party
 - b. Assumptions – include any known assumptions of your proposed solution that you are making
 - c. Constraints - Include any known constraints of your proposed solution
2. A fully functional solution that meets with design objectives, technical requirements, standards and best industry practices for proposed turnkey solution
 3. The vendor is responsible for submitting cut-over plan a week before scheduled implementation proposed solution. The vendor is required to provide rollback plan if original plan did not work as anticipated. Business continuity is paramount, and successful restoration of college business is mandatory before scheduled maintenance is over.

4. The vendor will visit installation site for “Site readiness” and make recommendations on the environment(temperature etc.), shelves/Rack unit space, and electrical power requirements and electrical receptacle to interface with the proposed solution.
5. The vendor will visit equipment installation site, remove old Internet Routers and patch cords from racks, install new proposed solution into racks and patch cords; Test network for optimum Internet access speed and performance.
6. The vendor is solely responsible for Internet Routers configuration to the new proposed solution and integrating with ISP and CCAC network infrastructure. Internet Routers will receive will BGP routing table from each ISP. Internet Routers will receive full BGP routing table from each ISP.
7. The vendor is solely responsible for arranging necessary patch cords (copper or fiber), compatible transceiver, and power cord(s) to make the proposed solution work
8. The vendor is solely responsible for labeling at each end of individual patch cables (copper or fiber) and creating documentation for future cable tracing and troubleshooting.
9. The vendor is solely responsible for delivering a fully functional turnkey solution meeting the specifications described herein.
10. The vendor is solely responsible for successful testing and working of proposed solution.
11. The vendor will provide technical data on all equipment and component parts.
12. The vendor will provide detailed project plan for the preparation, implementation, training, testing and acceptance phases of this project and related technologies.
13. The on-site and vendor certified training of CCAC personnel and the verification and testing of all project related technologies.
14. A list of acceptance-testing procedures to be followed upon completion of installation to demonstrate the functionality of the system and compliance with these specifications & design objectives.
15. A detailed final documentation (upon completion of the project), containing installation, configuration, configuration backup procedures. Restore configuration procedures, contact information, best practices and recommended operating protocol, and procedural guidelines.
16. The vendor will guide CCAC personnel on the parameters of security policies to facilitate decision-making regarding operation and maintenance.
17. The vendor will provide as-configured documentation to include logical and physical layout diagrams in paper and electronic format (in a Visio drawing format).
18. Create equipment/management application access based on role to the system resources and prevent accidental changes to the system.
19. Install and test all equipment and software in the purchase contract between CCAC and the vendor. Ensure the interoperability between the new equipment and the existing network.
20. Provide all required training (on and off-site) and documentation on the new equipment. Note section 3.4 Training and Support for details

4.0 SCHEDULE OF EVENTS

RFP release **Dec 19, 2017**

Pre-Proposal onsite visit (optional with required “email: mcvetic@ccac.edu registration” with Mr. Michael Cvetic, Director of Purchasing)

1. OCS, OCS-NOC (10:00 a.m.) **January 10, 2018**

Close date for RFP questions	<u>January 17, 2018</u>
Proposal due 2:00 PM	<u>January 23, 2018</u>
Contract signed for for turnkey Project (estimated).....	<u>January 26, 2018</u>
Implementation to begin (estimated).....	TBD
The project is completed on (estimated)	TBD

5.0 INSTRUCTIONS TO VENDORS

5.1 RFP Questions and Clarifications

Vendors shall aggregate their requests for clarification and submit them via e-mail to mcvetic@ccac.edu. Contact should be no later than **January 17, 2018**. Such requests for clarification, and CCAC's response, will be supplied in writing to all parties that have received copies of the RFP, without identifying the source of the inquiry.

5.2 RFP Response Format

Vendors must address all information specified by this RFP. All questions must be answered completely. CCAC reserves the right to verify any information contained in the vendor's RFP response, and to request additional information after the RFP response has been received. Any supplemental information that you provide must be in writing and will become part of your proposal.

Marketing brochures included as part of the main body of the proposal response shall not be considered. Such material must be submitted only as attachments and must not be used as a substitute for written responses. In case of any conflict between the content in the attachments and a vendor's answers in the body of the proposal, the latter will prevail.

5.3 Cover Letter

The proposal must be accompanied by a cover letter, signed by an individual authorized to bind the proposed entity.

5.4 Vendor Profile and Demographics

Provide a statement giving a brief history of your company, how it is organized, and how its available products and of years under the present business name.

- a. The number of years that the vendor has been providing the specific solution that forms part of its current proposal.
- b. A description of the vendor's operations: facilities, business and objectives, and the number of employees.

5.5 Financial Information

Upon request (within 48 hours) the vendor shall provide a complete set of audited financial statements for the past three years. All financial statements should be prepared to generally accepted accounting principles. Each vendor should note that CCAC reserves the right to purchase credit reports and additional financial information as it deems necessary. The vendor shall also provide a copy of its corporate annual report.

5.6 Proposal Submission

Vendors' proposals should be mailed/delivered to the following address:

Mr. Michael Cvetic
Assistant Director of Purchasing
Community College of Allegheny County
800 Allegheny Avenue
Pittsburgh, PA 15233-1895

Please note that it is the vendor's responsibility to ensure that the proposal and all other required documents are received at the address named above by the closing date specified above. CCAC will be the sole judge of the qualifications of all prospective candidates, and reserves the right to reject any and all submittals without recourse.

CCAC is aware that information contained in the proposals indicates the vendor's current operations. Therefore, use of this information shall be confined to this request and will be treated as confidential.

Vendors shall bear all costs associated with preparing and submitting responses to this RFP and the subsequent evaluation phase. CCAC will, in no way, be responsible for these costs, regardless of the conduct or outcome of the prequalification process.

5.7 Proposal Evaluation

The evaluation process may include:

- a. Detailed description and presentation of DWDM solution at College Office, 800 Allegheny Avenue, PA 15233
- b. A detailed technical evaluation to determine conformity to the requirements.
- c. After completing the evaluation phase of the process, CCAC will enter into contract/financial negotiations with identified vendors. The final selection will be based on the satisfactory outcome of these negotiations.

5.8 Preliminary Examination

CCAC will examine the proposals to determine whether they are complete, that the documents have been properly signed and that they are compliant with the general proposal requirements.

5.9 Detailed Technical Evaluation

An evaluation of proposed products will generally include an assessment of the viability of those products in the proposed solution. These assessments will be based on an established installed base, market share and growth trends, for which vendors must provide supporting information.

Evaluation will also include the fit and integration with related CCAC infrastructure, system environments and business applications. Technical merits and features will be reviewed against the requirements identified in the vendor and technical requirements sections of this document.

5.10 References

The vendor should provide details of three to five customers for reference. References should be for customers with objectives and requirements similar to those of CCAC. References should include information about the contract (specific products in use, date of contract execution, "go live" and completion date and any services provided), as well as contact information for the client's project manager or other senior staff members familiar with the project. CCAC reserves the right to contact these references and discuss the client's level of satisfaction with the vendor and its products.

5.11 Sample of Proposed Systems

Vendor must submit samples of proposed systems prior to proposal due date. Samples will be returned to vendor after testing. Vendors might be asked to demonstrate certain features. Exact-configuration sample models are required.

5.12 Treatment of Information

All information about CCAC provided during the RFP process shall remain under nondisclosure and cannot be released without the express permission of CCAC. The vendor may not make any public announcements or news releases pertaining to the vendor's intent to enter into an agreement without CCAC's prior written permission.

6.0 VENDOR REQUIREMENTS:

6.1 Operational requirements:

- a. The vendor must be flexible in modifying their project plan timeframe to meet the college's project demands. The project must be completed within the published timeframe.
- b. The vendor shall furnish acceptable evidence of the proposed systems in use by other schools/institutions. Vendor to provide 3 references.
- c. CCAC recognizes that this project involves significant technical capability for successful completion. Any information provided by CCAC with regard to this project is strictly confidential and shall not be disclosed to third parties.

- d. Any information provided by CCAC or any vendor prior to the release of this RFP, verbally or in writing, is considered preliminary and is not binding for CCAC or the vendor.
- e. No interpretation of the meaning of the specifications or other proposal documents, or correction of any apparent ambiguity, inconsistency, or error therein will be made orally to any vendor. Every request for such interpretation or correction must be in writing, addressed to a CCAC agent. In case CCAC finds it expedient to supplement, modify, or interpret any portion of the proposal documents prior to the proposal due date, such procedure will be accomplished by the issuance of written addenda to the RFP which will be e-mailed, mailed, faxed, or delivered to all prospective vendors at the respective address furnished for such purpose.
- f. All addenda must be acknowledged in writing and included within the proposal documents submitted by the vendor.
- g. This RFP, any subsequent addenda, and any written responses to questions take precedence over any information previously provided.
- h. The solution integration and interoperation may necessitate some changes on the college's existing information technology systems. In such case, the proposed changes have to be reviewed and approved by the appropriate college staff.
- i. Clarification and Interpretation of RFP:

The words "must", "will", "should", or "shall", in this RFP indicate mandatory requirements. Taking exception to any mandatory requirement may be grounds for rejection of the proposal.
- j. A proposal, which is in any way incomplete, irregular, or conditional, will not be accepted unless approved in advance by CCAC.
- k. The college expects the new solution to be **delivered within twelve weeks of issuance of the PO(s).** Purchase order will reflect exact purchase requirements.
- l. THE VENDOR MUST ENSURE INTEGRATED OPERABILITY BETWEEN THE NEWLY INSTALLED SOLUTION AND THE COLLEGE'S EXISTING INFORMATION RESOURCES FOR A 60-DAY PERIOD FOLLOWING THE NEW SOLUTION INSTALLATION BEFORE THE COLLEGE SHALL PROVIDE THE PROJECT SIGN-OFF. ONCE THE SIGN-OFF IS MADE, THE REMAINING 25% OF THE AWARD WILL BE REMITTED TO THE VENDOR, MINUS PENALTIES.
- m. The vendor must address the technical requirements delineated herein and professional services objectives identified in section 2.3 Solution Vision. After the award of the contract, the awarded vendor (contractor) is responsible for any necessary item not brought to the attention of CCAC before the award in order to complete the project.
- n. It is not the intent of this specification to describe all technical requirements essential to operation, installation, and management of the solution, nor to set forth those requirements adequately covered by applicable codes, industry standards, and accepted trade practices. It's the vendor's responsibility to implement and deliver a fully functioning, complete, optimized system that meets the criteria of all objectives, technical and functional requirements.

7.0 VENDOR COMPLIANCE MATRIX

The accompanying Vendor Compliance Matrix must be completed by each respondent (**Attachment 1**).

8.0 REQUIRED SUBMITTALS

The College requires that responses to this solicitation contain the following information:

- ❑ **SUBMITTAL FORM –1:** Vendor must complete, sign, and submit this page with their proposal response.
- ❑ **PRICING SUMMARY PAGES:** Submit the designated Pricing Page (and attach detailed pricing breakdown).
- ❑ **VENDOR COMPLIANCE MATRIX – (see Attachment 1):** Vendor must complete, sign, and submit this form with their proposal response.
- ❑ **REQUIRED DOCUMENTATION:** Submit all documentation and support materials as described throughout this RFP.
- ❑ **REFERENCES** – submit at least three customer references for similar services.
 - ❑ **MBE/WBE PARTICIPATION:** CCAC encourages the participation of minority and women-owned businesses in all of its contracts and is committed to providing maximum opportunities for qualified minority and/or women-owned business enterprises ("MBE/WBEs") to participate in its work. Vendor agrees (1) if qualified, to take reasonable and timely steps to obtain appropriate certification as an MBE and/or WBE, (2) to ensure that MBE and/or WBEs are appropriately considered as subcontractors and/or suppliers under this Agreement; and (3) to report moneys spent for MBE and/or WBE subcontractors and/or suppliers for work as CCAC may from time to time reasonably request. CCAC's goal for MBE/WBE participation is 15%. Please provide documentation as to your firm's good faith effort to reach this goal by describing all applicable details of MBE/WBE participation that may be included in the resulting agreement.

9.0 GENERAL SUBMITTAL REQUIREMENTS

- ❑ All proposal responses, inclusive of the required submittals and all other documentation, must be submitted in hard copy and either mailed, delivered by private carrier, or hand-delivered (no fax or electronic responses).
- ❑ **PROPOSAL DEADLINE:** Proposals are due by 2:00 p.m. Tuesday, January 23, 2017. (Proposals received late will not be considered by the College.)

One original and one digital copy of such shall be appropriately identified and delivered to: Community College of Allegheny County, Purchasing Department - Attn: Michael Cvetic, 800 Allegheny Avenue, Pittsburgh, PA 15233
- ❑ Proposals shall clearly indicate company name, full address, contact person, phone number, fax number and e-mail address.

- ❑ Proposals must contain the original signature of a duly authorized officer or agent of the company submitting the proposal.
- ❑ Any/all information/language that is proposed to be incorporated into any final agreement shall be submitted with the vendor's response.
- ❑ All costs incurred in preparing a response shall be at the vendor's expense.

❑ **VENDOR REPRESENTATION / WARRANTY**

Any responding vendor, by submitting a proposal, specifically represents and warrants that it has and shall possess, and that its employees, agents and subcontractors have and shall possess, the required education, knowledge, experience and character necessary to qualify them individually for the particular duties they perform. CCAC shall reserve the right to inspect and/or evaluate any potential awardee's facility, physical equipment, staff, and all matters that may bear upon the ability to successfully perform the scope of work. CCAC shall conduct interviews of vendors as needed to evaluate qualifications. Should CCAC reasonably find that any vendor does not have the capacity to perform the work, CCAC may reject the vendor's proposal.

❑ **CONTRACTOR INTEGRITY PROVISIONS**

The awarded Contractor must agree and abide by the following integrity, confidentiality and non-disclosure provisions:

- ❑ **COLLEGE'S INTERESTS:** Contractor agrees that it will not during the term of the resulting agreement engage in any activity which is contrary to and in conflict with the best interests, goals and purposes of the College.
- ❑ **CONFIDENTIALITY:** The Contractor shall not disclose to others any confidential information gained by virtue of the proposal process and the resulting contract.
- ❑ **COMPLIANCE WITH APPLICABLE LAW:** The Contractor shall maintain the highest standards of integrity in the performance of the contract and shall take no action in violation of state or federal laws, regulations, or any other requirements that govern contracting with the College.
- ❑ **PREVIOUS PERFORMANCE CONSIDERATIONS:** Contracts will not be awarded by the College to any corporation, firm or individual that has failed in any former contract with the College to perform or complete work or, in the College's sole judgment, to satisfactorily deliver or provide the quality of materials, fulfill any guarantee(s) or complete work in accordance with the schedule for such prior contract.

10.0 GENERAL TERMS AND CONDITIONS OF THE AWARDED CONTRACT

Execution of a written contract, with terms and conditions in such form attached hereto under **Appendix A (Master Service Agreement)**, will be required by any company selected to perform the work that is the subject of this RFP. The final, executed contract will incorporate this RFP document, any addenda to the RFP issued by the College, and those portions of the selected vendor's proposal designated as accepted by College.

The Master Service Agreement (MSA) and any documents referred to or incorporated therein and/or attached thereto shall be complementary, and what is called for by any one shall be as binding as if called for by all. If, with respect to any subject, the terms and conditions set forth in such documents and attachments are consistent with the terms and conditions of the MSA, then their provisions and requirements shall be deemed cumulative and Seller shall comply with each provision and requirement. However, to the extent that any provision in such documents is, or may be, inconsistent with a provision therein, on the same subject or a part of a subject, then the Contractor shall comply with the provision which is most favorable to College, as determined by College.

Any terms and conditions of a responding vendor that are in conflict with the College's terms and conditions, inclusive of any specific contractual requirements, must be identified within the vendor's response. CCAC, at its sole discretion, may negotiate the inclusion, exclusion, or alteration of any language, terms, pricing or conditions prior to the issuance of a signed contract or, if applicable, throughout the term of the contract.

Systems proposed must be fully functional. The cost of any omissions will be the responsibility of the vendor.

11.0 INSURANCE AND INDEMNIFICATION REQUIREMENTS

The awarded Contractor agrees to comply with the College's insurance and indemnification requirements as stated in **Form B** attached and incorporated herein. An insurance certificate that meets all requirements must be submitted by the Contractor prior to any work being performed.

12.0 EVALUATION AND AWARD OF PROPOSALS

While each proposal shall be considered objectively, CCAC reserves the right to accept or reject any proposal and to waive any formalities, informalities or technicalities in the RFP process at its own discretion.

CCAC will not be bound by oral explanations or instructions given by any CCAC employee or agent at any time during the competitive proposal process or after award. Only modifications to specifications issued in writing by way of an addendum shall be valid.

13.0 FORM B

COMMUNITY COLLEGE OF ALLEGHENY COUNTY INSURANCE AND INDEMNIFICATION REQUIREMENTS

FORM B (awardee only)

Indemnification. To the fullest extent permitted by law, Contractor shall defend, indemnify and hold harmless the Community College of Allegheny County (CCAC), its agents, officers, employees, and volunteers from and against all claims, damages, losses, and expenses (including but not limited to attorney fees and court costs) to the extent directly arising from the acts, errors, mistakes, omissions, work or service of Contractor, its agents, employees, or any tier of its subcontractors in the performance of this Contract. The amount and type of insurance coverage requirements of this Contract will in no way be construed as limiting the scope of indemnification in this Paragraph.

Insurance. Contractor shall maintain during the term of this Contract insurance policies described below issued by companies licensed in Pennsylvania with a current A.M. Best rating of A- or better. At the signing of this Contract, and prior to the commencement of any work, Contractor shall furnish the CCAC Procurement Department with a Certificate of Insurance evidencing the required coverages, conditions, and limits required by this Contract at the following address: Community College of Allegheny County, Procurement Department, 800 Allegheny Avenue, Pittsburgh, PA 15233.

The insurance policies, except Workers' Compensation and Professional Liability (as applicable), shall be endorsed to name Community College of Allegheny County, its agents, officers, employees, and volunteers as Additional Insureds with the following language or its equivalent:

Community College of Allegheny County, its agents, officers, employees, and volunteers are hereby named as additional insureds as their interest may appear.

All such Certificates shall provide a 30-day notice of cancellation. Renewal Certificates must be provided for any policies that expire during the term of this Contract. Certificate must specify whether coverage is written on an Occurrence or a Claims Made Policy form.

Insurance coverage required under this Contract is:

- 1) Commercial General Liability** insurance with a limit of not less than \$1,000,000 per occurrence for bodily injury, property damage, personal injury, products and completed operations, and blanket contractual coverage, including but not limited to the liability assumed under the indemnification provisions of this Contract.
- 2) Automobile Liability** insurance with a combined single limit for bodily injury and property damage of not less than \$1,000,000 each occurrence with respect to Contractor's owned, hired, and non-owned vehicles.
- 3) Workers' Compensation insurance with limits statutorily required by any Federal or State law and Employer's Liability insurance of not less than \$100,000 for each accident, \$100,000 disease for each employee, and \$500,000 disease policy limit.**

14.0 SUBMITTAL FORM

SUBMITTAL FORM - page 1 of 3

All responses must be typewritten or printed. If an explanation is requested or additional space is required, please include additional pages as required and sign each additional page. The signatory represents and warrants the accuracy of all information and responses provided on this form. Failure to submit a fully completed Submittal Form may cause the proposal to be deemed non-responsive and disqualified from further review. If a change occurs which would necessitate a modification of any response, the proposer should submit an updated form to the CCAC Procurement Department within thirty (30) calendar days.

GENERAL INFORMATION

1. **Legal Name of Organization:** _____
2. **Principal Office/Business Address:**
Street Address: _____

City/State: _____
Zip Code: _____
3. **Business Phone Number:** _____
4. **Fax Number:** _____
5. **Website Address:** _____
6. **Location of Branch Offices:** _____
7. **Years in Business:** _____
8. **Number of Employees:** _____
9. **Federal Employer Tax ID No.:** _____

ORGANIZATION STRUCTURE

1. Type of Business Entity (check one):

☐ Corporation ☐ Partnership ☐ Other (*please attach document describing ownership structure*)

2. Corporation Information (if applicable):

Date of Incorporation: _____
State of Incorporation: _____
President: _____
Vice-President(s): _____
Secretary: _____
Treasurer: _____

3. Partnership Information (if applicable):

Date of Organization: _____
Type (limited; general): _____
Name/Addresses of Partners: _____

4. Are you a certified M/W/DBE? ☐ YES ☐ NO

If “YES”, list certification number and classification:

5. Indicate whether you anticipate subcontracting any portion of these services, and the names and addresses of any proposed subcontractors:

6. List any and all other legal and DBA names under which your firm has operated during the past ten (10) years, including dates when used and the reasons for the subsequent change in name(s):

7. State whether any firm owner, partner or officer has operated a similar business in the past ten (10) years. Include the names and addresses of each such business:

CONTACT INFORMATION FOR RFP RESPONSE

Please provide the requested information for the individual(s) responsible for preparing your organization's response to this RFP and/or to whom requests for additional information or clarification should be directed:

Name: _____
Title: _____
Address: _____

City/State/Zip: _____
Phone Number: _____
Fax Number: _____
Email: _____

ACKNOWLEDGMENT AND SIGNATURE

The undersigned, having carefully examined all sections and attachments to this Request for Proposal (RFP), does hereby offer to furnish all labor, materials, equipment, supplies, insurance and any bonds specified, and all services necessary to fulfill the requirements set forth in the RFP. The undersigned further represents and warrants by its signature below that it has fully reviewed and understands all elements of the RFP, that all information submitted by it or included with its proposal, including all responses on this Submittal Form, is truthful and accurate, and that it agrees to be bound by all terms and conditions set forth in the RFP, any resulting addenda, and its attachments.

STATEMENT OF NON-COLLUSION

The undersigned also certifies that this proposal is made without previous understanding, agreement or connection with any person, firm, or corporation making a proposal on this same service and is in all respects, fair and without collusion or fraud.

Company Name: _____
Signature **of** _____
Representative: _____
Printed Name **of** _____
Representative: _____
Title: _____
Date: _____

15.0 PERFORMANCE BOND REQUIREMENTS

Performance Bond Required of Awarded Vendor – \$25,000.00

Must use the college's form on the next page.

In lieu of a performance bond, the awarded vendor may submit either a certified or cashier's check or an Irrevocable Letter of Credit in the amount of \$25,000.00.

Irrevocable Letter of Credit shall be as follows:

A contractor or supplier to the Community College of Allegheny County may substitute an Irrevocable Letter of Credit in lieu of a Performance Bond. If this option is chosen by the contractor or supplier, the Irrevocable Letter of Credit must include the following terms.

- a. The terms of payment must be stated as follows:

“The drafts must be accompanied by your (CCAC) signed statement certifying that the contractor has not performed satisfactorily in accordance with the specifications and conditions of the contract.

Unsatisfactory performance will be determined solely by the Community College of Allegheny County”.

- b. The Irrevocable Letter of Credit must be payable and confirmed through a correspondent bank headquartered within the United States and which has total assets of at least \$5 billion.

Any performance bond, certified/cashier's check, or Irrevocable Letter of Credit submitted by the awarded vendor shall remain in effect (certified/cashier's check held by CCAC) for a period of ninety days beyond the final date of acceptance and signoff by CCAC.

16.0 PERFORMANCE BOND (awardee only)

COMMUNITY COLLEGE OF ALLEGHENY COUNTY

800 Allegheny Avenue, Pittsburgh, Pennsylvania 15233

BOND NUMBER _____

PERFORMANCE BOND

Know all men by these Presents that we _____
(hereinafter called "Principal") as Principal, and _____

authorized to do business in the Commonwealth of Pennsylvania (hereinafter called "Surety") as Surety, are held
and firmly bound unto the Community College of Allegheny County, through its Board of Trustees,
_____ in the sum of _____

to be paid to the said College aforesaid, its certain attorney, or assigns. To which payment will and truly be made,
said principal and said surety to bind themselves, their respective successors or assigns jointly and severally, firmly by
these presents.

WITNESS our hands and seals, the _____ day of _____ the year of our Lord 2009.

WHEREAS the above bounded _____
has filed with the Community College of Allegheny County proposals for the _____
_____. The Condition of the above Obligation is such that if the said
_____ shall perform _____ In accordance
with the agreement between _____ and the Community
College of Allegheny County of even date herewith and the specifications and proposals attached to and made part of
the agreement, shall indemnify and save harmless the said Community College of Allegheny County from all liens,
charges, demands, losses and damages of every kind and nature, whatsoever. Then this obligations to be void,
otherwise to be and remain in full force and virtue.

Attest:

CONTRACTOR

(SEAL)

SECRETARY

PRESIDENT

Signed, Sealed, and Delivered in presence of:

(SEAL)

SURETY COMPANY

WITNESS

ADDRESS

TITLE

17.0 APPENDIX A MASTER SERVICES AGREEMENT (awardee only)

THIS MASTER SERVICES AGREEMENT ("Agreement") is made and entered into as of this ____ day of _____, 2017, by and between Community College of Allegheny County, with a business office located at 800 Allegheny Avenue, Pittsburgh, PA 15233 (hereinafter referred to as the "College"), and the company or business listed on the signature page hereto (hereinafter referred to as "Contractor").

RECITALS

WHEREAS, the College has issued a Request for Quotation, Proposal Solicitation, Request for Proposal, and/or a Purchase Order (hereinafter individually and collectively referred to as the "Order"), pursuant to Proposal No.

which College seeks to procure certain work and services, as more fully described on the Order; and

WHEREAS, Contractor has submitted a proposal to the College to provide the services described in the Order, a copy of which is attached hereto as Exhibit A (hereinafter the "Proposal") and incorporated by reference;

WHEREAS, the College desires to engage Contractor to provide the services, pursuant to and in accordance with the terms and conditions that this Agreement set forth herein.

NOW, THEREFORE, in consideration of the premises and covenants that this Agreement contains, the receipt and adequacy of which are hereby acknowledged, the parties, intending to be legally bound, agree as follows:

1. Term. The term of this Agreement shall be as specified in the Order unless otherwise stated in the section below. If no date is specified, this Agreement shall begin with the date first stated above and terminate upon satisfactory completion of the services described herein.
2. Services. Contractor shall fully and faithfully perform the work and services described in the Order and the Proposal and any specifications, scope of work or other documentation attached thereto. Contractor warrants that all work and services performed by or on behalf of it under this Agreement will conform to all terms and specifications set forth in the Order and in the Proposal.
3. Price/Fees: The College shall pay Contractor for the services and work performed by Contractor in accordance with the fees and/or prices set forth in the Proposal.
4. Terms and Conditions: This Agreement, and the services to be performed by Contractor hereunder, will be

subject to and governed by College's Standard Terms and Conditions for the Purchase of Goods and Services ("Master Terms"), which are incorporated herein by reference. The Master Terms can be viewed and downloaded at https://www.ccac.edu/Terms_and_Conditions.aspx. By signing below, Contractor acknowledges its receipt and acceptance of the Master Terms.

5. Insurance Requirements: In addition to the Master Terms, Contractor shall comply with the insurance and indemnification requirements set forth on Exhibit B, which are incorporated herein by reference. Prior to commencing performance of the Services, Contractor shall furnish to the College a properly executed

certificate(s) of insurance which evidence all insurance required by Exhibit B. Said certificate(s) of insurance shall be attached herein as Exhibit C.

6. Assignment. Contractor may not assign or subcontract this Agreement or its performance thereof, in whole or in part, without the College's prior written consent.

7. Entire Agreement; Modification. This Agreement, together with the Exhibits and other documents referenced and incorporated herein, sets forth the entire agreement of the parties on the subject matter hereof and supersedes all previous or concurrent agreements between them, whether oral or written. Any proposal, quotation, acknowledgment, confirmation or other writing submitted by Contractor to the College shall not be deemed to amend or modify this Agreement, and will be of no legal effect except to the extent that it serves to identify the work and services to be performed by the Contractor. This Agreement, and the terms set forth in the Master Terms, will control over any conflicting terms or provisions contained in any proposal, invoice or other documentation submitted by Contractor to College. The terms of this Agreement may not be modified or changed except by a writing that both parties sign. This Agreement shall inure to the benefit of the College and Contractor and the College's successors and assigns.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the day and year first above written.

CONTRACTOR:

By: _____

Signature: _____

Title: _____

Date: _____

COMMUNITY COLLEGE

OF ALLEGHENY COUNTY:

By: _____

Signature: _____

Title: _____

Date: _____

EXHIBITS - The following Exhibits are attached hereto and made a part of this Agreement for all purposes:

- ☐ Exhibit A - Contractor's Proposal Response
- ☐ Exhibit B - Insurance Requirements
- ☐ Exhibit C - Contractor's Certificate(s) of Insurance.
- ☐ Exhibit D – Performance and Payment Bonds
- ☐ Exhibit E - No-Lien Agreement

18.0 APPENDIX B Pricing Page

PRICING PAGE – CCAC Internet Routers Upgrade Project: Procurement of Internet Router Hardware, Software, and turnkey implementation/Integration to multi-home ISPs

In addition to this Pricing Summary Page, vendors must submit **complete and itemized listings** of all proposed charges in MS Excel spreadsheet format, with columns: Part number, Part number description, Quantity, List price, Discount applied, Unit Selling Price, Ext. Selling Price - per line item. Proposed solution items include equipment, parts, and materials; software, shipping; labor, installation, integration, and implementation; maintenance options; etc.). Systems proposed must be fully functional. The cost of any omissions will be the responsibility of the vendor.

Lump Sum Hardware Cost	\$
Lump Sum Software Cost	\$
Lump Sum Labor, Installation, Integration, Implementation, Testing, Training, and Other Costs	\$
Grand Total	\$

Hardware and Software Maintenance Options:

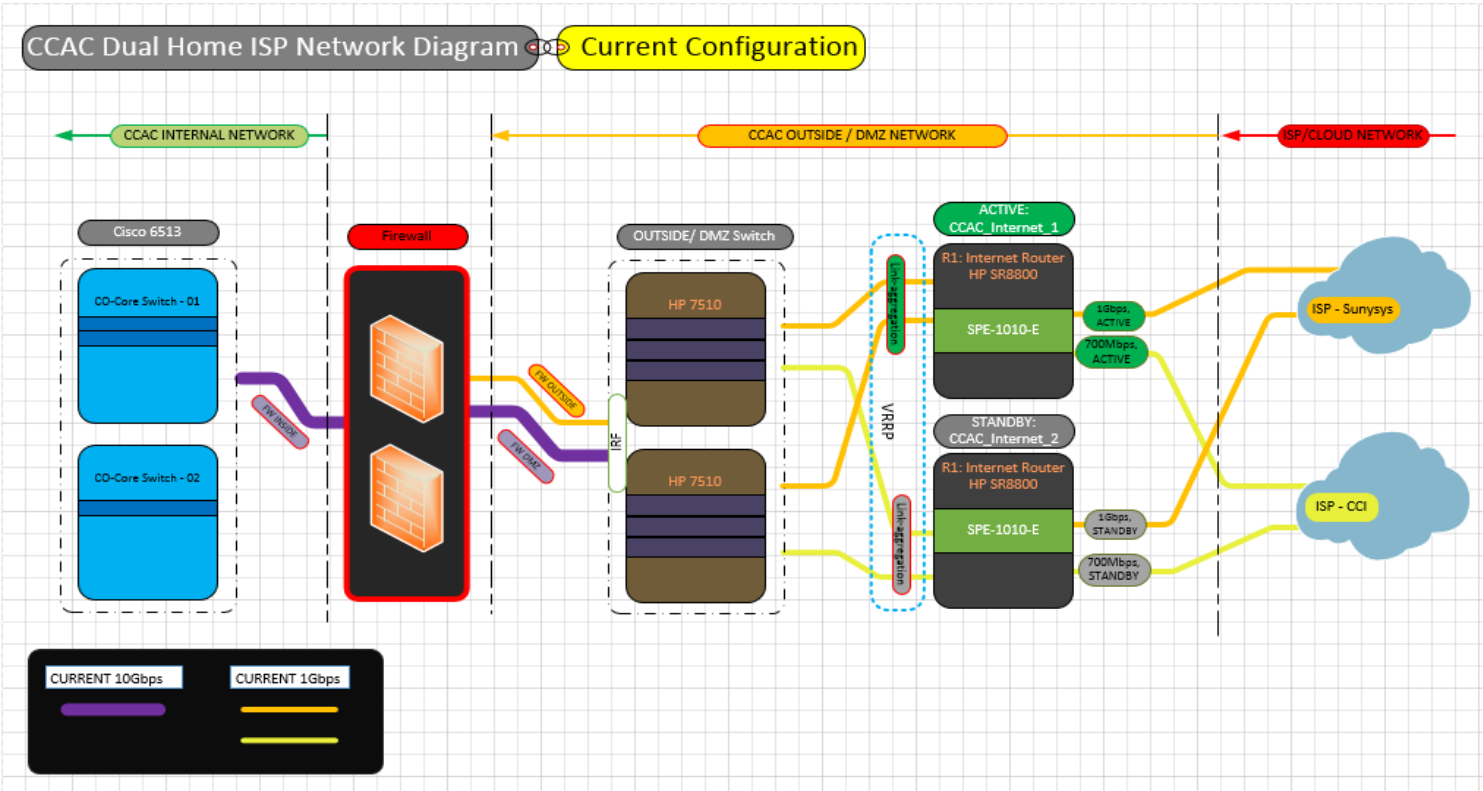
24 x 7 x 4	\$
24 x 7 x NBD	\$
8 x 5 x NBD	\$

Itemized price listing MS Excel Format:

16							
17							
18	Product Number	Description	Qty	List Price	Discount Applied	Unit Selling Price	Ext Selling Price
19							
20							
21							
22							
23							
24							

Vendor Name: _____

19.0 APPENDIX C: Internet Router Network topology



20.0 APPENDIX D: STANDARDS SUPPORT FOR INTERNET ROUTER

Layer 3 Features:

- IPv4
- IPv6
- BGP
- OSPF
- Static routing
- Dual IP stack
- Equal-Cost Multipath (ECMP)
- IPv6 tunnels over IPv4
- MPLS
- Multiprotocol Label Switching (MPLS) Layer 3 VPN
- Multiprotocol Label Switching (MPLS) Layer 2 VPN
- Multiprotocol Label Switching Traffic Engineering (MPLS TE)
- Virtual Private LAN Service (VPLS)

Quality of Service

- Layer 2 QoS
- Layer 3 QoS
- 802.1p,
- L2-L4 classification criteria
- Congestion avoidance capabilities
- Weighted random early detection (WRED)/random early detection (RED)

Multicast

- IGMP: v1, v2, v3
- IGMP snooping
- PIM-SM, PIM-SSM, PIM-DM

Security

- Security (TLS), Tunneled TLS (TTLS), Protected Extensible Authenticated Protocol (PEAP)
- RADIUS
- TACACS+
- SSHv2
- Secure copy
- HTTP/HTTPS
- System logging

Configuration backup via FTP/secure copy

ACL

NAT

Link Aggregation

IEEE 802.3ad: Link Aggregation Control Protocol

802.3ad (LACP) support:

LLDP

Supported RFCs

RFC 1772 Application of the BGP

RFC 1965 BGP-4 confederations

RFC 1997 BGP Communities Attribute

RFC 2385 BGP Session Protection via TCP MD5

RFC 2439 BGP Route Flap Damping

RFC 2918 Route Refresh Capability

RFC 3107 Support BGP carry Label for MPLS

RFC 3392 Capabilities Advertisement with BGP-4

RFC 4271 A Border Gateway Protocol 4 (BGP-4)

RFC 4360 BGP Extended Communities Attribute

RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)

RFC 4486 Subcodes for BGP Cease Notification Message

RFC 4724 Graceful Restart Mechanism for BGP

RFC 4760 Multiprotocol Extensions for BGP-4

RFC 4893 BGP Support for Four-octet AS Number Space

RFC 5065 Autonomous System Confederations for BGP

RFC 5291 Outbound Route Filtering Capability for BGP-4

RFC 5492 Capabilities Advertisement with BGP-4

RFC 1157 SNMPv1/v2c

RFC 2452 MIB for TCP6

RFC 2573 (SNMPv3 Applications)

RFC 768 UDP

RFC 791 IP

RFC 792 ICMP

RFC 793 TCP

RFC 826 ARP

RFC 854 TELNET

RFC 951 BOOTP

RFC 1058 RIPv1

RFC 1332 The PPP Internet Protocol Control Protocol (IPCP)

RFC 1350 TFTP Protocol (revision 2)

RFC 1377 The PPP OSI Network Layer Control Protocol (OSINLCP)
RFC 1519 CIDR
RFC 1534 DHCP/BOOTP Interoperation
RFC 1542 BOOTP
RFC 1638 PPP Bridging Control Protocol (BCP)
RFC 1661 The Point-to-Point Protocol (PPP)
RFC 1662 PPP in HDLC-like Framing
RFC 1812 IPv4 Routing
RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses
RFC 1989 PPP Link Quality Monitoring
RFC 1990 The PPP Multilink Protocol (MP)
RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP)
RFC 2082 RIP-2 MD5 Authentication
RFC 2131 DHCP
RFC 2453 RIPv2
RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)
RFC 2615 PPP over SONET/SDH (Synchronous Optical Network/Synchronous Digital Hierarchy)
RFC 2787 Definitions of Managed Objects for VRRP
RFC 2878 PPP Bridging Control Protocol (BCP)
RFC 3046 DHCP Relay Agent Information Option
RFC 3596 DNS Extensions to Support IP Version 6
RFC 3768 VRRP
RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates
RFC 5382 The IP Network Address Translator (NAT)
RFC 5508 NAT Behavioral Requirements for ICMP
RFC 5880 Bidirectional Forwarding Detection
RFC 5881 BFD for IPv4 and IPv6 (Single Hop)
RFC 5883 BFD for Multihop Paths
RFC 1112 IGMP
RFC 2236 IGMPv2
RFC 2362 PIM Sparse Mode
RFC 3376 IGMPv3
RFC 3446 Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 3618 Multicast Source Discovery Protocol (MSDP)
RFC 4601 PIM Sparse Mode
RFC 4604 Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast
RFC 4607 Source-Specific Multicast for IP
RFC 4608 Source-Specific Protocol Independent Multicast in 232/8 (PIM SSM)
RFC 4610 Anycast-RP Using Protocol Independent Multicast (PIM)
RFC 1981 IPv6 Path MTU Discovery

RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 IPv6 Specification
RFC 2461 IPv6 Neighbor Discovery
RFC 2462 IPv6 Stateless Address Auto-configuration
RFC 2464 Transmission of IPv6 over Ethernet Networks
RFC 2529 Transmission of IPv6 Packets over IPv4
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2740 OSPFv3 for IPv6
RFC 3587 IPv6 Global Unicast Address Format
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 4007 IPv6 Scoped Address Architecture
RFC 4193, Unique Local IPv6 Unicast Addresses
RFC 4291 IP Version 6 Addressing Architecture
RFC 4443 ICMPv6
RFC 4552 Authentication/Confidentiality for OSPFv3
RFC 5072 IP Version 6 over PPP
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
RFC 1157 A Simple Network Management Protocol (SNMP)
RFC 1215 A Convention for Defining Traps for use with the SNMP
RFC 1657 BGP-4 MIB
RFC 1724 RIPv2 MIB
RFC 1850 OSPFv2 MIB
RFC 1907 SNMPv2 MIB
RFC 2011 SNMPv2 MIB for IP
RFC 2452 IPV6-TCP-MIB
RFC 2465 IPv6 MIB
RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Notification MIB
RFC 2573 SNMP-Target MIB
RFC 2574 SNMP USM MIB
RFC 2578 Structure of Management Information Version 2 (SMIv2)
RFC 2665 Ethernet-Like-MIB
RFC 2819 RMON MIB
RFC 2863 The Interfaces Group MIB
RFC 3273 HC-RMON MIB
RFC 3414 SNMP-User based-SM MIB
RFC 3418 MIB for SNMP
RFC 3826 AES for SNMP's USM MIB
RFC 4133 Entity MIB (Version 3)
RFC 4292 IP Forwarding Table MIB

RFC 3031 Multiprotocol Label Switching Architecture
RFC 3032 MPLS Label Stack Encoding
RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks
RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL
RFC 1157 SNMPv1
RFC 1215 Convention for defining traps for use with the SNMP
RFC 2571 SNMP Management Frameworks
RFC 2572 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 2573 SNMP Applications
RFC 2574 SNMPv3 User-based Security Model (USM)
RFC 2575 SNMPv3 View-based Access Control Model (VACM)
RFC 2576 Coexistence between SNMP versions
RFC 2578 SMIv2
RFC 2819 Remote Network Monitoring Management Information Base
RFC 3164 BSD syslog Protocol
RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks
RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 3413 Simple Network Management Protocol (SNMP) Applications
RFC 3414 SNMPv3 User-based Security Model (USM)
RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)
RFC 4292 IP Forwarding Table MIB
RFC 1765 OSPF Database Overflow
RFC 2328 OSPFv2
RFC 2370 OSPF Opaque LSA Option
RFC 3101 OSPF NSSA
RFC 3137 OSPF Stub Router Advertisement
RFC 3623 Graceful OSPF Restart
RFC 2138 RADIUS Authentication
RFC 2865 RADIUS Authentication
RFC 2866 RADIUS Accounting
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers