

# REQUEST FOR INFORMATION

For

## LAYER 2 SWITCHING PLATFORM

In support of the

## MID-ATLANTIC CROSSROADS NETWORKS

Issued by the  
**Mid-Atlantic Crossroads**

June 6, 2011

### **Information for Responders**

Electronic delivery of the Response to this Request for Information (“RFI”) is preferred. All electronic responses must be delivered in **PDF** file format and must be delivered by email to: [rfi@maxgigapop.net](mailto:rfi@maxgigapop.net).

Responders who elect to send printed must send set it to the following address.

Mid-Atlantic Crossroads  
8400 Baltimore Avenue Suite 102  
College Park, MD 20740  
Attn: L2 Switch RFI  
[rfi@maxgigapop.net](mailto:rfi@maxgigapop.net)

**All responses must be received no later than 5:00 PM eastern daylight time on July 5, 2011.  
Responses received after that will not be considered.**

Questions and requests for clarifications and/or additional information regarding this call for information should be addressed to: [rfi@maxgigapop.net](mailto:rfi@maxgigapop.net).

## **1 PURPOSE**

The Mid-Atlantic Crossroads (MAX) requests descriptive and pricing information from switch vendors to enhance existing Research and Education (R&E) metro network facilities with emerging 100 Gigabits per second (100Gb/s) equipment to support data intensive science exploration, modeling, and discovery.

MAX plans to upgrade the Next Generation Internet Exchange - East (NGIX-E) exchange point, operated by MAX, for the federal research networks. MAX supports a number of campuses with large scale data flow requirements for the astronomy, biological, environmental, computer science, engineering, geo-science, and physical science communities. MAX participants include forty seven universities, federal agencies, and government laboratories in Maryland, Virginia, and the District of Columbia.

## **2 PREPARING AND SUBMITTING A RESPONSE**

Responses must contain all information that the Responder wishes to be taken into account in evaluating their submission. The information provided must be responsive to all requirements described in this RFI.

## **3 RESPONSE SELECTION AND AWARD PROCESS**

### **3.1 PRELIMINARY EVALUATION**

The responses will first be reviewed to determine if mandatory requirements are met. Failure to meet mandatory requirements may result in the response being rejected.

### **3.2 RESPONSE EVALUATION**

An evaluation committee comprised of MAX engineering staff and participant technical advisory committee members will review all accepted responses. The committee may review and contact references, request oral presentations, or conduct an onsite visit and use the results in rating the responses.

The costs used for evaluation purposes will be the complete life cycle cost of the services required to fulfill all mandatory requirements. Separable costs associated with "desirable" or "optional" functionality will not be included in the calculation. However, these costs, and the availability of this functionality, may be taken into consideration in developing an overall evaluation of a response. The contract award, if made, will be made on the basis of the best cost/benefit value ratio as determined by MAX and as informed by the evaluation committee. The decision of MAX to bid to one bidder or to make no award at all is final. Bidders may not contest the award.

The following additional general criteria must be met:

- Responsible and responsive information that meets or exceeds specifications in all sections of the RFI document, including submission of data requested;
- Ability to deliver services in the time period requested;
- Demonstrated ability to provide responsive, flexible, and reliable services;
- Demonstrated experience in providing same or similar services;
- Demonstrated technical and control plane management expertise in the particular areas required by MAX; and

- Positive feedback from references

The evaluation of the responses and names of other bidders will not be made available to bidders at any time, whether before or after award, if any.

### **3.3 RIGHT TO REJECT RESPONSES AND NEGOTIATE CONTRACT TERMS**

MAX reserves the right to reject any or all responses. MAX may negotiate the terms of the contract, including the award amount, with the selected Responder prior to entering into a contract. If contract negotiations cannot be concluded successfully with the highest scoring Responder, MAX may negotiate a contract with the next highest scoring Responder or choose to make no award at all.

### **3.4 RESPONSE TO THE RFI SPECIFICATIONS**

The Responder shall explain in sufficient detail how their services meet the requirements and specifications stated in this RFI. All sections of this RFI should be addressed, whether such services are offered or not.

### **3.5 GENERAL INSTRUCTIONS ON PREPARING COST RESPONSES**

The cost response shall be submitted as a separate PDF file, sent and attached with, but separate from, the written response. All prices, costs, and conditions outlined in the response identifying all elements that are included in the vendor's switch offering shall remain firm and valid for 120 days starting on the due date for responses.

## **4 TECHNICAL DESCRIPTION**

MAX plans to upgrade the Ethernet switch used at the NGIX-East exchange point. MAX is looking for a dense Layer 2 switch, capable of supporting 1G, 10G, 40G and 100G interfaces.

## **5 REQUIRED FEATURES**

### **5.1 System Requirements**

- 5.1.1 Describe the product's dimensions and weight.
- 5.1.2 Describe both initial and operating power requirements for chassis common components and individual switching modules
- 5.1.3 Must support DC power (- 48 V).
- 5.1.4 Describe support for both AC and DC power

## **5.2 Interface Capabilities**

- 5.2.1 Must support 1 GbE, 10 GbE and 100 GbE interfaces
- 5.2.2 Must support at least 24 to 48 1 GbE ports in a standalone or modular form-factor.
- 5.2.3 Must support at least 24 to 48 10 GbE ports in a standalone or modular form-factor.
- 5.2.4 Must support multiple 100 GbE ports in a standalone or modular form-factor.
- 5.2.5 Describe the port counts / density for the different interface configurations.

## **5.3 Optical Requirements**

- 5.3.1 1 GbE pluggable optics must be SFP.
- 5.3.2 10 GbE pluggable optics can be SFP+ or XFP. SFP+ is preferred.
- 5.3.3 40 GbE pluggable optics may be QSFP or CFP (MSA).
- 5.3.4 100 GbE pluggable optics must be CFP. Describe all variants supported (MSA/LR-4, MSA/SR-10, LR-10).
- 5.3.5 For 100GbE please describe existing and planned support for varying form-factors and implementations. If support for other optics is planned (e.g., CXP), describe the support in similar detail, as well as their interoperability.

## **5.4 Switching Capacity**

- 5.4.1 Device must support non blocking switching between any pair of ports.
- 5.4.2 Device must support full duplex wire-speed switching between any two ports (regardless of module location) even at exclusively 64-byte frame sizes.
- 5.4.3 Describe the devices overall switching capacity and capabilities.
- 5.4.4 Describe individual slot/module's switching capacity and capabilities.
- 5.4.5 Describe the device's over-subscription policy.

## **5.5 Upgrade And Growth Requirements**

- 5.5.1 Must support in-service "hitless" upgrades, assuring non-stop forwarding of traffic during a software upgrade
- 5.5.2 Describe how the device supports in-service growth in switching capacity.
- 5.5.3 Is the growth achieved by "stacking" multiple smaller switches? If so, the "stacked" devices must be manageable as a single device. Will it still support non blocking switching between any pair of ports, regardless of the port location?
- 5.5.4 If a stacked chassis is utilized, please describe the virtual fabric connections between ports on adjacent switches.

## **5.6 Buffering Requirements**

- 5.6.1 Must support sufficient buffering for 100-to-1/10 GbE transmission.
- 5.6.2 Must support sufficient buffering for 40-to-1/10 GbE transmission, if 40 GbE is supported
- 5.6.3 Must support sufficient buffering for 100-to-40 GbE transmission, if 40 GbE is supported

## **5.7 Reliability Requirements**

- 5.7.1 Describe the device's support for data plane redundancy / reliability.
- 5.7.2 Describe the device's support for data plane – control / management plane isolation.

## **5.8 Layer 2 Feature Requirements**

- 5.8.1 Must support Layer 2 switching.
- 5.8.2 Must support both ingress and egress 802.1Q VLAN tag re-writing.
- 5.8.3 Must support stacked VLAN tags. This includes, but is not limited to, 802.1Q-in-Q VLAN tunneling.
- 5.8.4 Must support jumbo frames. Minimum support of 9018 bytes is required, while larger MTU's of up to 9192 are desirable.

## **5.9 Security**

- 5.9.1 What are the security protocols supported on the network element?
- 5.9.2 What are the security protocols supported on the northbound interfaces
- 5.9.3 Support for remote SSH.

## **5.10 Device Management**

- 5.10.1 Must allow switch management via both IPv4 and IPv6
- 5.10.2 What are the north-bound interfaces that are supported on the device (CLI, SNMP, TL1, HTTP, etc.)?
- 5.10.3 Does the device come with a complete EMS that support all its feature and capabilities
- 5.10.4 Is the EMS deployed on a UNIX-based platform?
- 5.10.5 What are the north-bound interfaces that are supported on the EMS?
- 5.10.6 Is the EMS capable of remote software back-up and restore?
- 5.10.7 What protocol does the EMS utilize to talk to the device?

## **5.11 Maintenance**

- 5.11.1 Please also describe the licensing or maintenance structures associated with the switch. Models such as “pay as you grow”, where the cost of modular components dictates the growth capability of the switch, must be described up-front.
- 5.11.2 Please describe the different response services along with their associated costs for all equipment listed in the response
- 5.11.3 What are is included in the standard maintenance package? Does it include installation and training in our site or your site?
- 5.11.4 Please describe the future software/firmware release structure and the cost associated for upgrades.

## **6 DESIRABLE FEATURES**

### **6.1 System Requirements**

- 6.1.1 MEF certification for Carrier Ethernet services (e.g., EPL, ELAN)
- 6.1.2 List the MEF standards supported by the device in the current software release? What is planned for the next software release?

### **6.2 Interface Capabilities**

- 6.2.1 Support 40 GbE interfaces are preferred

### **6.3 Optical Capabilities**

- 6.3.1 10 GigE WAN-PHY support
- 6.3.2 The ability to take fixed-wavelength or tunable DWDM optics
- 6.3.3 The ability to take fixed-wavelength or tunable CWDM optics
- 6.3.4 Support for third-party optics

### **6.4 Layer 2 Features**

- 6.4.1 Support for Multicast is desirable.
- 6.4.2 Support for Link Aggregation is desirable. If supported, describe the maximum bundle size. Also describe whether per-packet is supported in hardware as well as per-flow.
- 6.4.3 Support for STP

### **6.5 Layer 3 Features**

- 6.5.1 Describe support for Layer 3 routing if available.
- 6.5.2 Describe support for OSPF, BGP, RIP, etc. if available.
- 6.5.3 Describe support for IPv4 and IPv6 routing if available.
- 6.5.4 Describe support for Multicast is available.

## **6.6 Multiservice capabilities.**

6.6.1 Support for Ethernet over SONET / SDH.

6.6.2 Support for Ethernet over OTN.

## **6.7 Control Plane**

6.7.1 Support for GMPLS based control plane? Which features (RFCs) are supported?

6.7.2 Support of MPLS signaling. Which features (RFCs) are supported?

6.7.3 Do you provide access to some of the APIs for research purposes?

## **6.8 Device Management**

6.8.1 Must have existing or future Openflow support on roadmap. Provide information detailing Openflow support.