OpenFlow Campus Trials at Indiana University Quarterly Report

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Summary

- *Deployment of initial testlab and production user equipment*
- *Deployment of NOX controller and OpenFlow VLANs*
- *Discussions with possible research users*
- *Tentative Equipment decisions*

Major Accomplishments

Milestones Achieved

Tentative Selection of vendors: While this milestone was delayed due to issues with CPU contention we are conducting preliminary tests with HP Procurve 3500, 5400 and 6600 switches. If issues with CPU contention are resolved on the HP Procurve switches we use those switches in testlab and production deployment.

Deliverables Made

Testlab Deployment: We have deployed a HP Procurve 5406 switch with the latest OpenFlow firmware in the testlab environment. A server to act as a traffic generator has been deployed. All equipment in the testlab have serial console and the ability to cycle power remotely.

Project site: A project site at http://e-geni.grnoc.iu.edu has been created. Documentation of the IU openflow topology, configuration documentation and code developed will be posted at this location.

NOX controller deployed: the latest NOX code has been deployed to a dedicated server running Fedora 12. We have also attempted to resolve some of the dependency issues for NOX on Redhat Enterprise Linux, our standard distribution.

Description of Work Performed During Last Quarter

Activities and Findings

Initial Deployments: Diagram of current hardware deployments

IU Openflow Deployment
Dec 2009
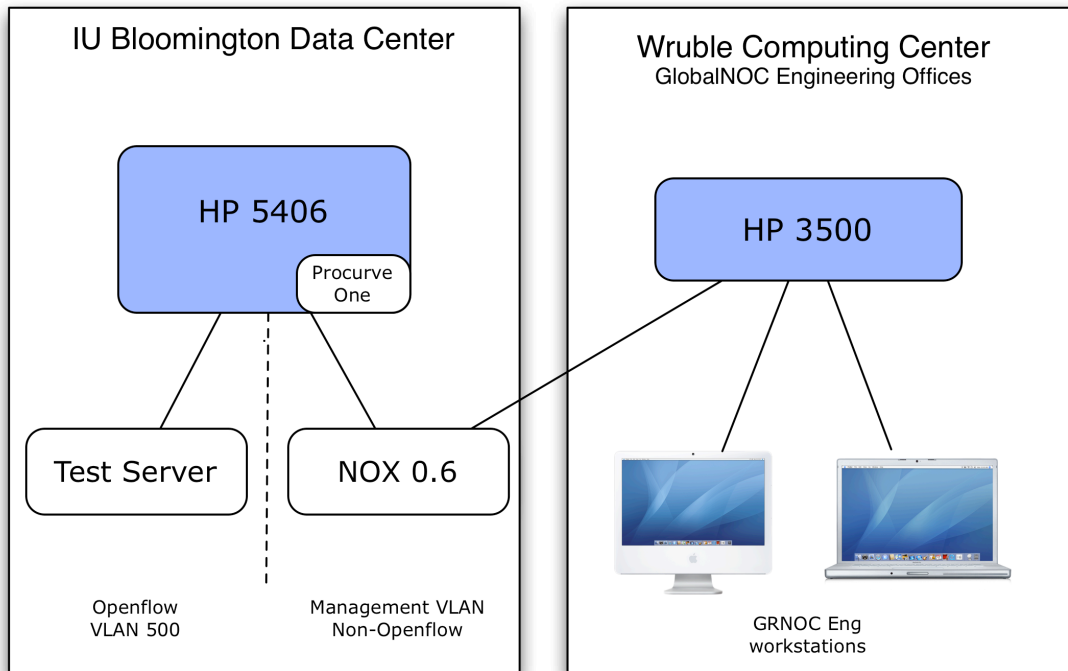
Research and Engineering projects:
Initial discussions with researchers and engineers for possible uses of the OpenFlow infrastructure.

- cSamp implementation – had discussions with Michael Reiter (UNC-Chapel Hill) and Ramana Rao Kompella (Purdue U) about implementation of cSamp system for network-wide flow monitoring using OpenFlow enabled switches. http://www.cs.cmu.edu/~dga/papers/csamp-nsdi2008.pdf

- IPTV – Worked on design with IU Campus Network Architecture group for using OpenFlow as a mechanism for fine-grained control of IPTV related traffic flows. OpenFlow would be used for Layer 2 switching decisions to avoid issues of multicast flooding and non-optimal topologies.

- Data capture – Collaboration with Minaxi Gupta (IU) on designs for using OpenFlow as a mechanism to capture cybersecurity data sets on campus networks.

Wide Area Connectivity: Explored options for connectivity to OpenFlow enabled infrastructure on the internet2 and NLR backbones. Looking at possible ways to interconnect campus and national OpenFlow regions through dynamic provisioning tools over the regional networks.

Project Participants

During this time, key participants in the OpenFlow campus trial included:

Chris Small, PI
Matt Davy, Co-PI
Ian Bobbitt

Publications & Documents

Small, C. (2009, Oct 23) *The Indiana University GlobalNOC* Presented to Indiana University School of Informatics Security Group meeting
http://groups.geni.net/geni/attachment/wiki/OFIU/GRNOC_security_informatics.pdf

Small, C. (2009, Nov 17) *Indiana University OpenFlow Campus Trials* Presented at Campus/Operations, Management, Integration, and Security Working Group meeting during GEC6
http://groups.geni.net/geni/attachment/wiki/OFIU/IU_Openflow_GEC6_OMIS.pdf

GENI Documents:

None

Outreach Activities

None

Collaborations

Worked with OpenFlow Internet 2 and NLR about possible backbone projects on possible groups to deploy hardware to be co-located in the Internet2 network.

Discussed collaboration with Researchers at Indiana University on using OpenFlow for creation of cybersecurity datasets. Made presentation to the weekly meeting of the Security Informatics group.

Met with Michael Reiter (UNC-Chapel Hill) and Ramana Rao Kompella (Purdue U) to discuss implementation of cSamp on OpenFlow enabled switches.

Met with network engineers at IUPUI who are deploying a production IPTV to all dorms. Working on collaboration to deploy a test environment in the testlab with

Discussions with HP Labs about the possible use of the Procurve One cards for use in an OpenFlow network.

Planned Activities for Q2

Connectivity to other networks: Develop a plan to achieve connectivity to other OpenFlow projects. Initially this will be to get access to national backbone deployments through regional networks. Contingent on the exact configuration of national backbone deployments

Additional switch deployment: Deploy switches purchased under Campus Trial networks if CPU issues are resolved.

Test hardware: Deploy UNIX servers to allow for further testing. This will include a virtualized server to allow multiple parallel tests and a dedicated server to conduct high throughput tests.

Operational tool integration: We will survey existing operational tools and write a document describing an initial design for integration of OpenFlow software into monitoring and administrative interfaces used by IU Campus Operations.

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