

Indiana University OpenFlow Campus Trials



Overview

The Indiana University OpenFlow Campus Trials focuses on three areas:

- Operations
- Inter-campus networking
- Distributed Monitoring

Operations

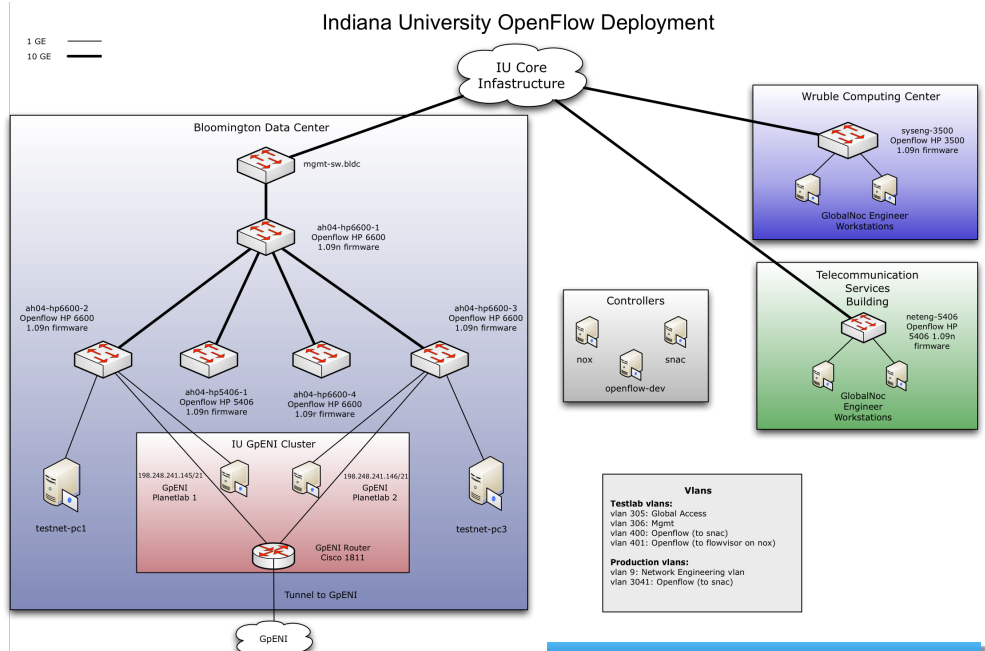
We are leveraging the experience at the Indiana University GlobalNOC in operating campus, regional, national and international networks to integrate OpenFlow enabled equipment into network operations. We are deploying test and production OpenFlow switches that will be integrated into the standard tools used by the GlobalNOC. Tool integration will allow network managers to easily deploy OpenFlow networks without changing their existing workflow and practices. We will target widely used operational tools such as Nagios^[1], SNMP monitoring tools including SNAPP^[2] which is created and used by the GlobalNOC and is publicly available, and layer 2 management tools such as NetDisco^[3].

Inter-Campus Networking

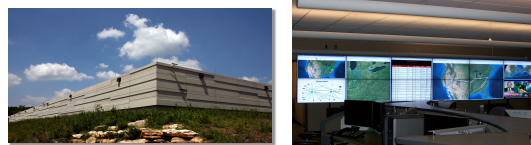
We will deploy equipment in 2 geographically separated campuses and explore the issues with inter-campus OpenFlow networking. We are planning to utilize equipment in the IU Testlabs and I-Light fiber between the IU Bloomington and IUPUI (Indianapolis) campuses to deploy an inter-campus OpenFlow test network. We are also investigating how OpenFlow will interoperate with existing inter and intra campus provisioning tools such as Sherpa^[4] (used on NLR) and GMPLS tools such as the Internet2 ION service^[5].

Distributed Measurement

Deployment of OpenFlow enabled networks will allow for a rich set of tools for the distributed capture of measurement data. Measurement data would be useful both to operators of the networks and for researchers studying the data. We are working with researchers to deploy measurement frameworks such as cSamp^[6] and the OnTimeMeasure^[7] suite of tools.



IU Bloomington Data Center Testlab



Bloomington Data Center

IU GlobalNOC Service Desk

GEC7 Demo

We are illustrating, in our GEC7 demo, an example layout of an experiment running in the Indiana University testlab. We use the GpENI cluster deployed in the IU Bloomington Campus trial to create a mock experiment that integrates Planetlab hosts and the IU OpenFlow network. In our demo we generate test traffic but the idea is to show how a real experiment can reserve and use different GENI components. Traffic is manipulated using the NOX Policy Manager running on snac.testlab.gncc.iu.edu. We plan in the future to demonstrate real experiments using the integrated components and advanced management tools.

References

1. Nagios, <http://www.nagios.org>
2. SNAPP, <http://tools.globalnoc.iu.edu/snapp.html>
3. NetDisco, <http://netdisco.org>
4. Sherpa, <http://globalnoc.iu.edu/nlr/>
5. Internet 2 ION, <http://www.internet2.edu/ion/>
6. "cSamp: A System for Network-Wide Flow Monitoring" by Vyas Sekar, Michael K. Reiter, Walter Willinger, Hui Zhang, Ramana Rao Kompella, and David G. Andersen. In *Proc. 5th USENIX NSDI*, (San Francisco, CA), Apr. 2008.
7. OnTimeMeasure, <http://groups.geni.net/geni/wiki/OnTimeMeasure>