

GENI-enabling Universities

Internet2 Fall Member Meeting

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Internet Issues

- TCP is not the protocol of choice for gigabit applications
- IP is not the protocol of choice for
 - Data centers / clouds
 - Wireless and mobile networks and applications
- Scaling– e.g., routing
- Inter-domain routing
- Security
- IPv6 transition

Our Approach

- Build on Layer 2 – Ethernet+
- Software-defined (SDN), programmable, sliceable
- New Protocols - OpenFlow, WiMax
- Already used experimentally at more than 14 universities
- Incorporate GENI Racks via current funding cycle
- GENI-enable = OpenFlow/WiMax + GENI Racks

We are at the same stage with respect to exploration of this new technology as we were in 1984 for the Internet technology

There are many unsolved problems: security, addressing, inter-domain routing, distributed end-end control, quality of service, etc

But there are also potential benefits

Benefits to Universities

- More control over production networks
- Less complex networks that are easier to manage e.g., no need for spanning trees or VLANs.
- Simplification of security mechanisms with less reliance on firewalls, IDS, IPS, etc.
- Reduced costs through the commoditization of network devices and simplified management
- Ability to dynamically create and modify virtual network topologies that can be used independently by campus IT, education and research applications

GENI Goals

- National scale, virtualizable, programmable, sliceable GENI-enabled network spanning campuses, regional and national backbones
- Support wide range of research
 - Network and other computer science
 - Data intensive science
 - Gigabit application development and use
- Efficiently support campus IT operations/services
- Based on GENI experience, infrastructure and technology
- Support US IGNITE
- Understand relation to the future Internet

Universities – The Missing Piece

- GOAL: OpenFlow / WiMax deployment on production university networks
- Build on experience of 14 “GENI-enabled” universities
- Extend OpenFlow/WiMax/GENI Rack deployment beyond CS/Engineering buildings
- Partnership between GENI, CIO organizations and researchers is critical

Process

- Workshop for CIOs (July 2011)
 - GENI update
 - OpenFlow, WiMax technologies
 - University case studies
- Mentor visits to 18 universities
- Workshop for network engineers at GEC
- GPO Solicitation 4? – Support for university production network deployments
- Goal: 20-30 GENI-enabled universities by end of 2012

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<https://mywebspace.wisc.edu/pchrist2/web/Openflow/>

Contains documents prepared for the CIO meeting plus
campus cost-related documents

[CampusBacboneCaseStudy.pdf](#)

[CampusGENIEnablingSpreadsheet.xlsx](#)

[CampusOpenFlowDeploymentCost.docx](#)