GENI Infrastructure and Operations Update

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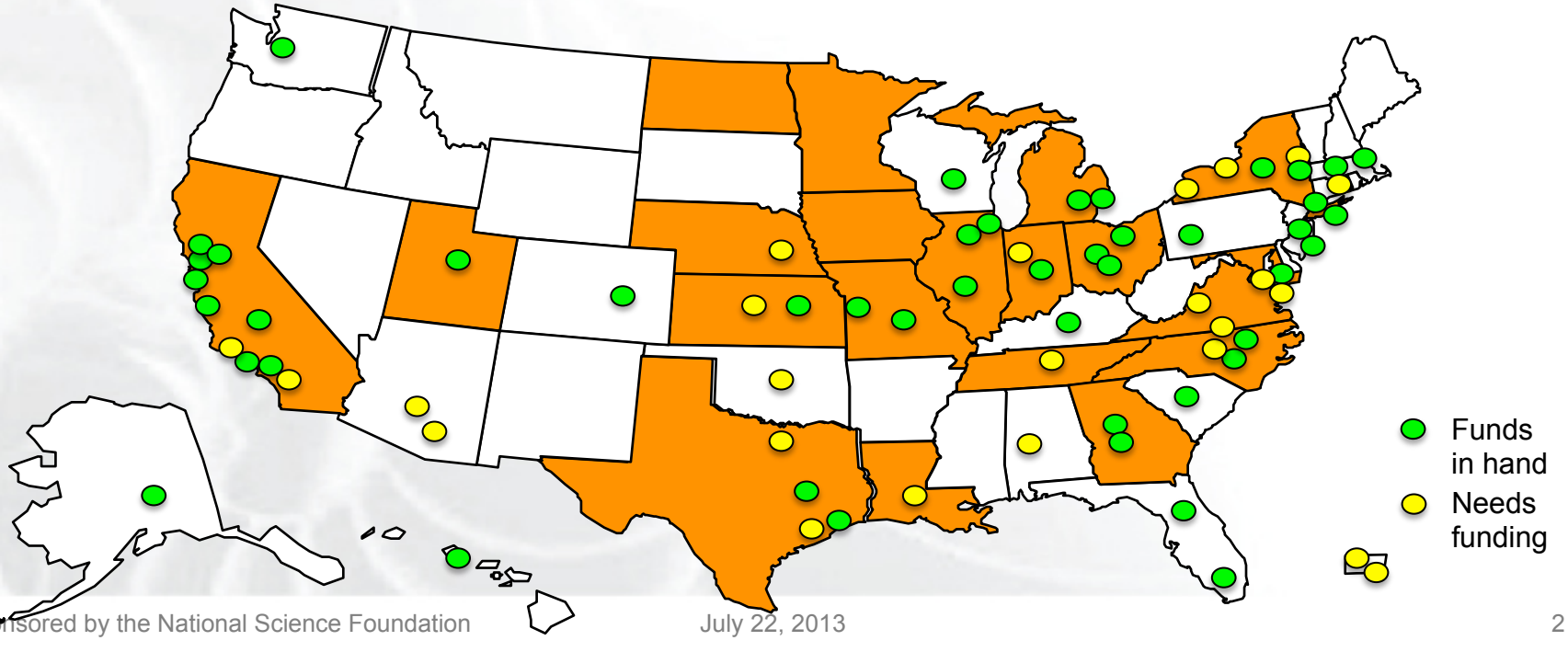
www.geni.net

GENI Rack Deployment

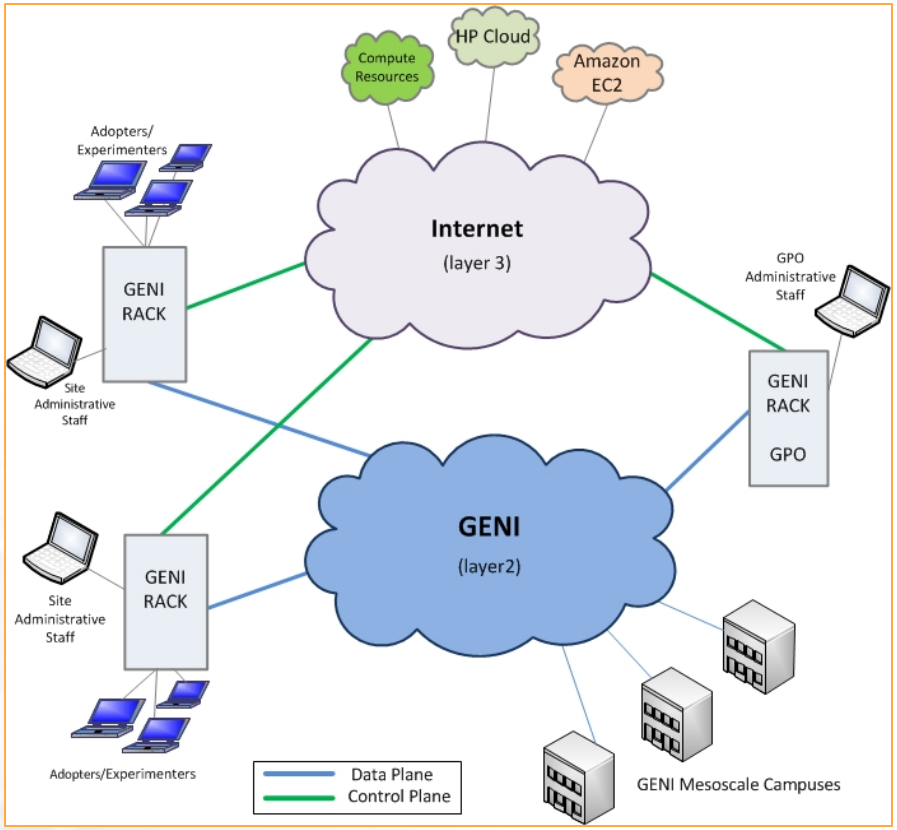
- Sites provide space, power, security (as with other campus IT resources)
- Provide at least 1Gbps OpenFlow/SDN path from rack to campus boundary
- Provide connection from rack to on-campus resources (varies by campus, usually SDN)
- Operate with up-to-date GENI-specified software (e.g. AM API, OpenStack)
- Provide no-cost access to rack resources for GENI authorized users at other campuses
- Provide points of contact for GENI response team (see http://groups.geni.net/geni/attachment/wiki/ComprehensiveSecurityPgm/Aggregate Provider Agreement v3.pdf)



GENI Rack Progress

- 52 racks installed/in-progress (includes self-funded)
  http://groups.geni.net/geni/wiki/GENIRacksHome/RacksChecklistStatus
- Production: InstaGENI, ExoGENI
  Provisional: Dell, Cisco
- Site resource and access details
  http://groups.geni.net/geni/wiki/GeniAggregate
- Site confirmation tests with logs and RSPECs
  http://groups.geni.net/geni/wiki/GENIRacksHome/InstageniRacks/ConfirmationTestStatus

  http://groups.geni.net/geni/wiki/GENIRacksHome/ExogeniRacks/ConfirmationTestStatus



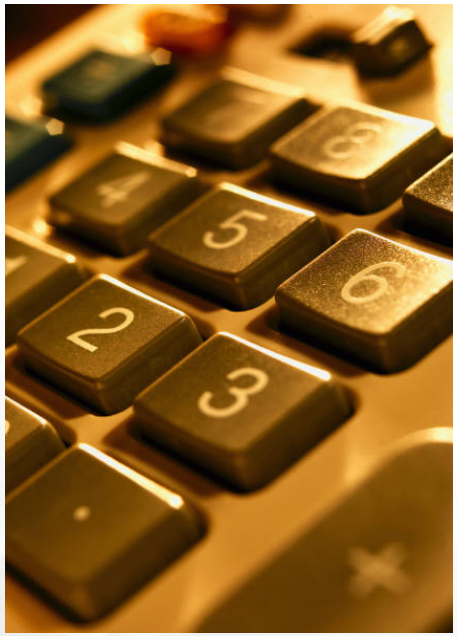
HP Delivers 31 GPO-Funded Racks

Thanks to:

Nicki Watts

Jack Brassil

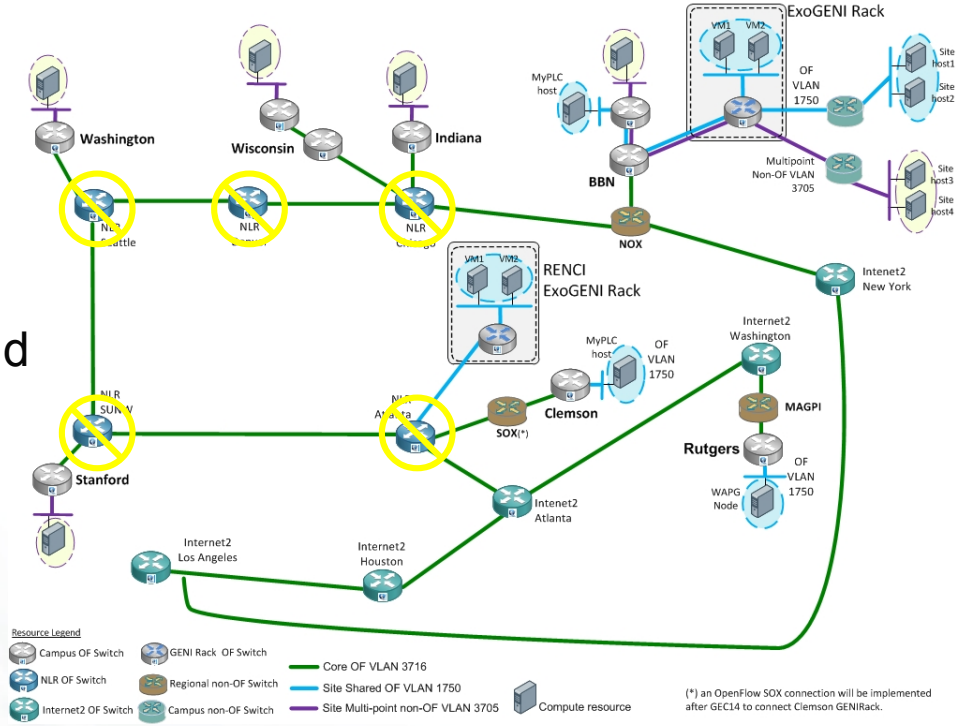
Rick McGeer

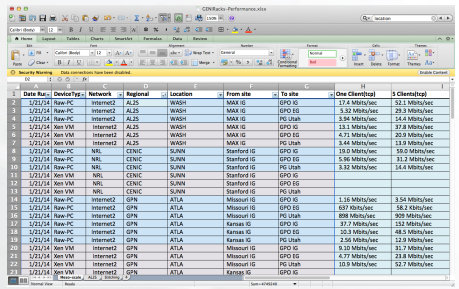


GENI Network Engineering

- NLR Shutdown
  - OpenFlow core topology
  - Rack L2 dataplane connections
- Internet2 AL2S cross-connects
  - Additional testing between ION and AL2S

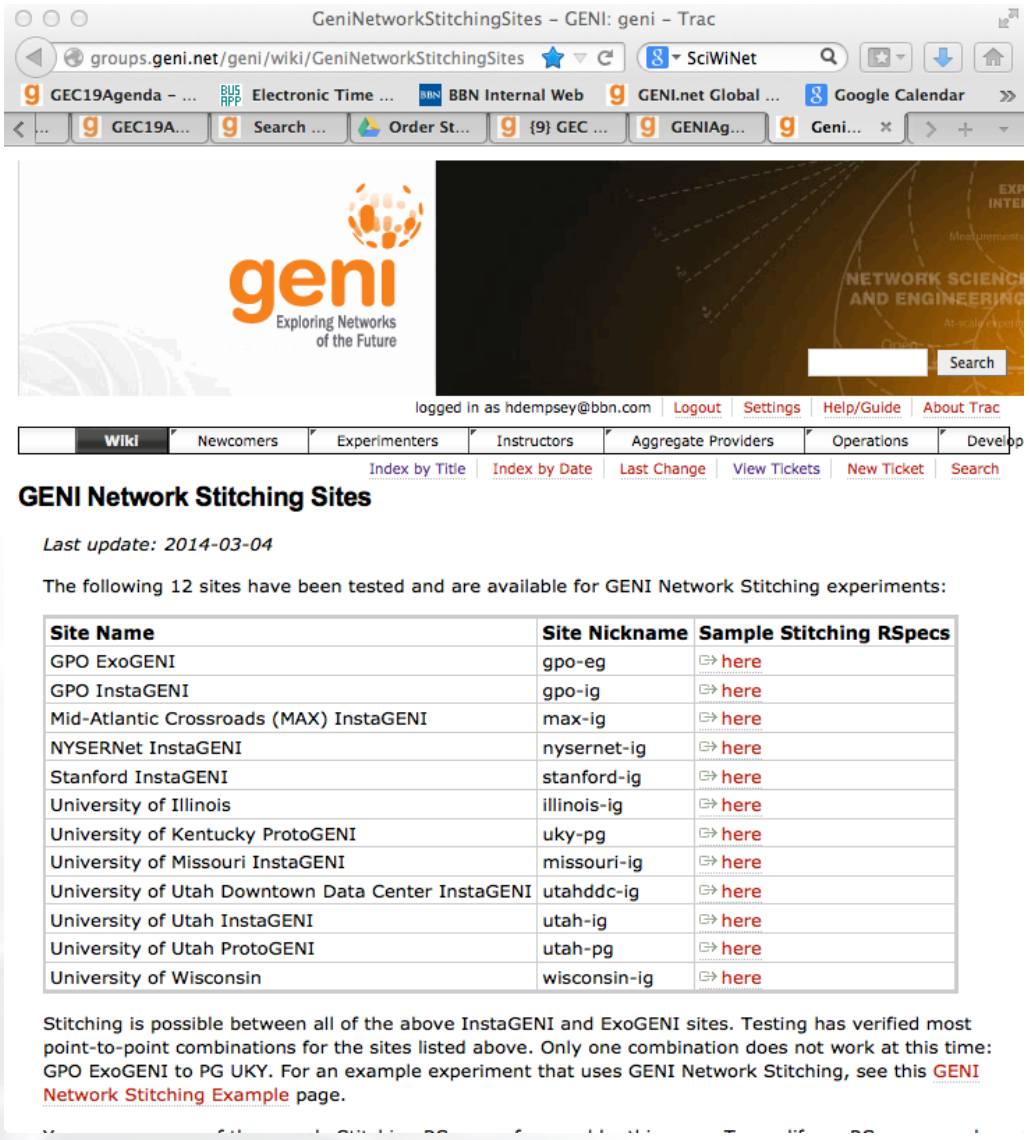
    http://groups.geni.net/geni/wiki/GENIOESSTopologiesPerformance - IONtoAL2SPerformance
  - OpenFlow core transition pending Flowspace Firewall and FOAM
- Regional Integration for VLANs, OpenFlow, DYNES, demos
  - CENIC, FLR, KanREN/GPN, LEARN, LONI, MAX, MOXI, NCREN, NoX, NYSERNet, SoX/SLR, KyRON, StarLight, UEN
  - SDX Exchanges (Panel Today!)





GENI Network Engineering (continued)

- GENI stitching available at 12 racks via Internet2 ION
  http://groups.geni.net/geni/wiki/GeniNetworkStitchingSites
- Over 16,000 stitched slivers since November, 2013
- OESS GENI Stitching Aggregate coming soon
- Stitching operations monitoring prototyping with MAX, I2

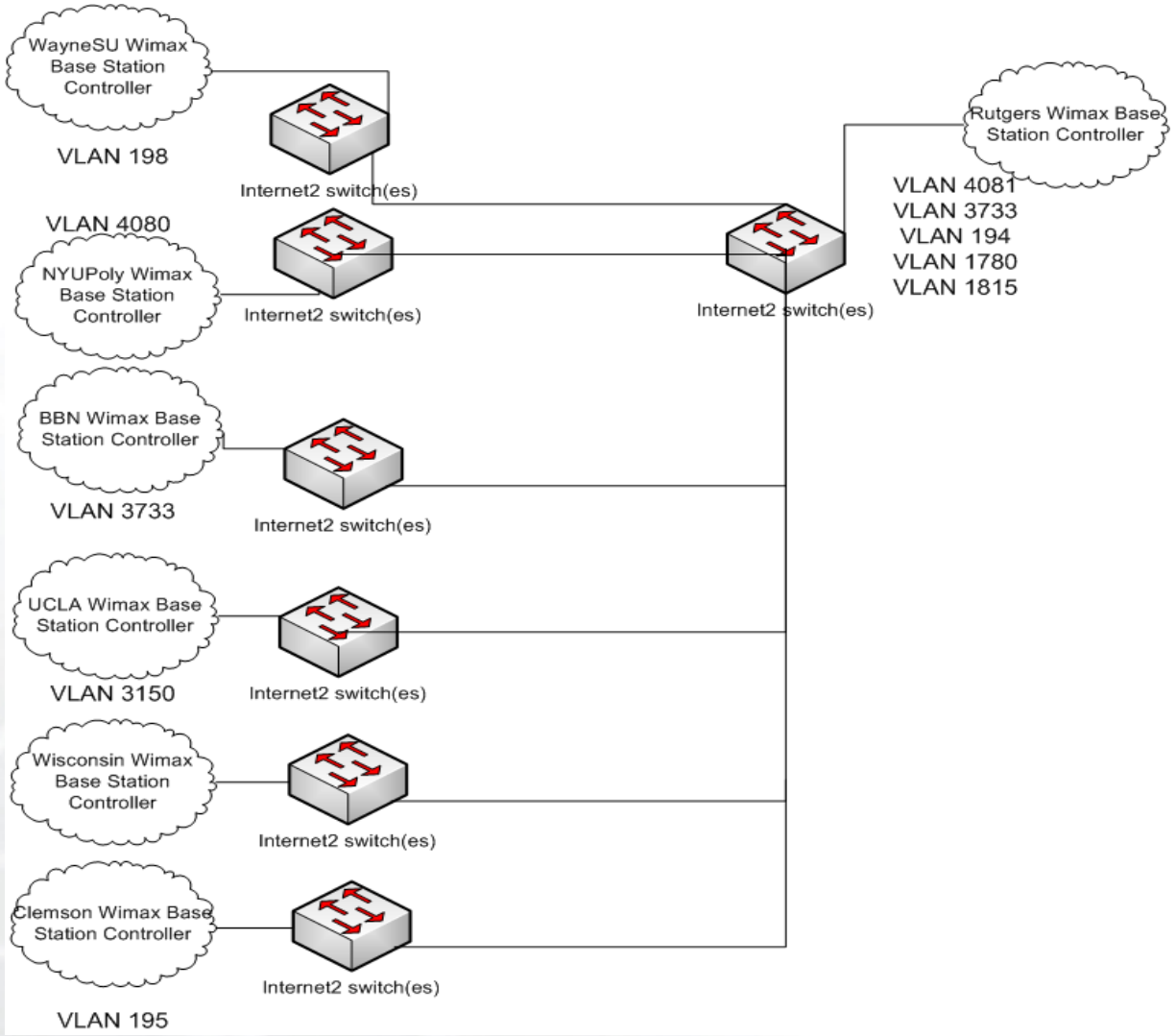


GENI WiMAX

- All 10 WiMAX sites have setup 4 OMF nodes for experimenters.
- Planning to move I2 mesh VLANs over to AL2S, which supports multi-point VLANs
- Planning to use GENI racks at WiMAX sites as nucleation points for dataplane VLANs.
- Ordered 90 Samsung Galaxy SII 4G phones
- Supporting SciWiNet and academic experiments
- Debian packaging and release of Airspan BS software

  wimaxrf_1.0~beta2

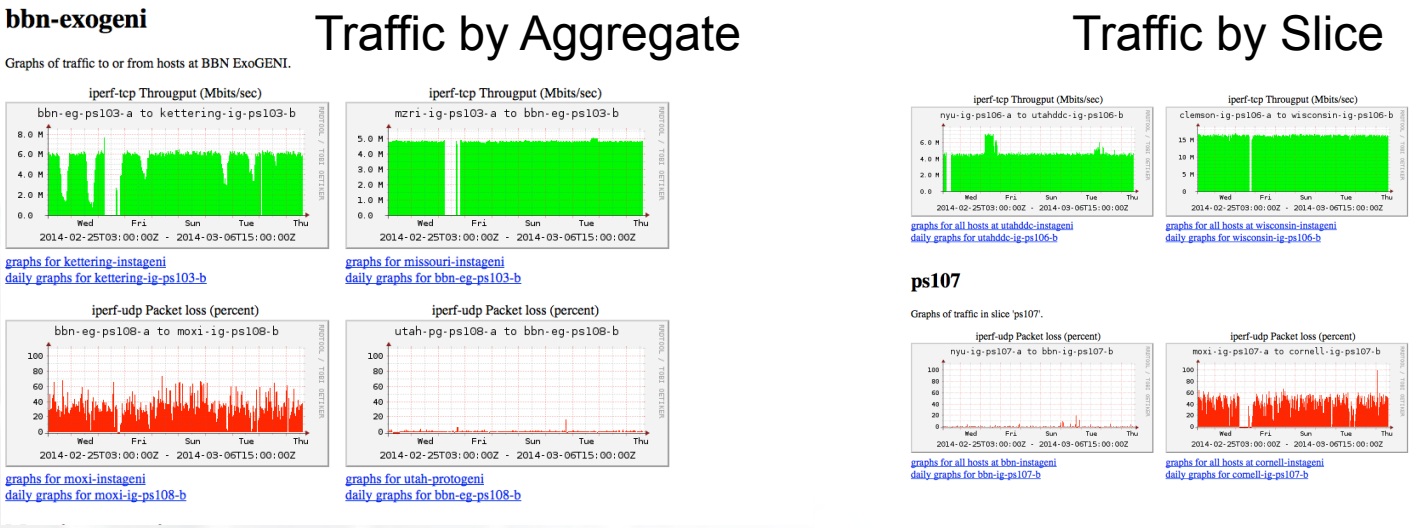
  click_2.1~gitc



UMASS, Columbia and Colorado remote base stations have no campus VLAN

OpenFlow Integration and Test

- Plastics Slices OpenFlow tests all available racks with many small flows through musicale



- http://www.gpolab.bbn.com/plastic-slices/continuation/standing-015/
- http://www.gpolab.bbn.com/plastic-slices/continuation/standing-016/
- OpenFlow switch firmware:
  - NEC:
    - Version 7.4.1.1 on newer models (e.g. PF5820s in SoX)
    - "Product" version 11.1.C.Af on older OpenFlow campus switches (IP8800) and
  - HP: Version K.15.06.5008 in InstaGENI racks
  - IBM: Version 7.6.1.0 in ExoGENI racks (FIXME: check with RENCI)
  - Brocade: !NEW! Version 5.6.00b at CENIC

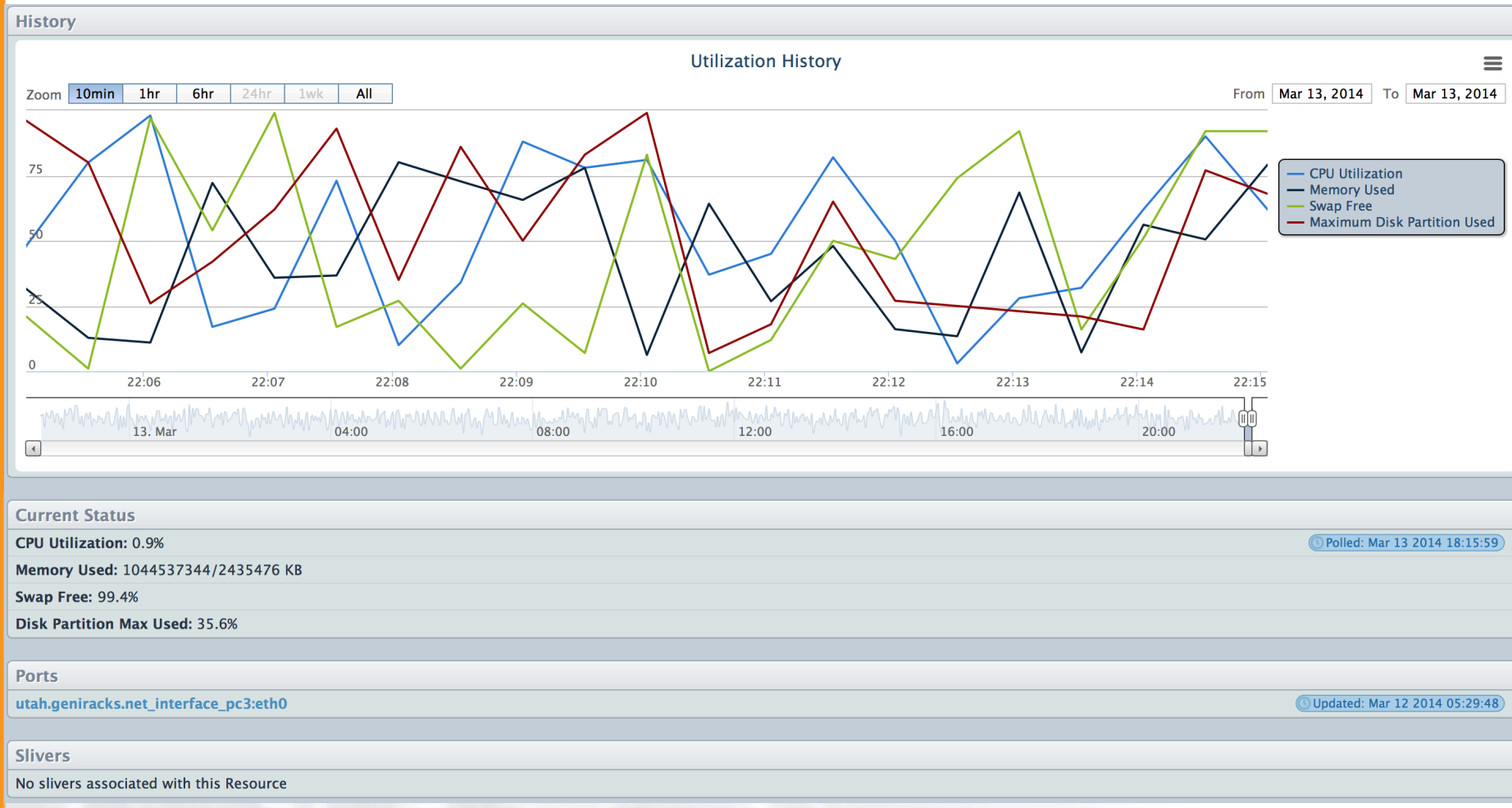
OpenFlow Integration and Test (cont.)

- FlowVisor
  - Recommended version: 0.8.17
  - Likely to be the last version deployed on GENI Meso-scale
  - More info: https://github.com/OPENNETWORKINGLAB/flowvisor/wiki
  - Roadmap: https://github.com/OPENNETWORKINGLAB/flowvisor/wiki/RoadMap
- FOAM (FlowVisor OpenFlow Aggregate Manager) :
  - !NEW! GENI recommended version: 0.14.0
  - Includes bug fixes a few minor features since 0.12.3
  - More info: http://groups.geni.net/geni/wiki/OpenFlow/FOAM
  - Roadmap: https://barnstorm.atlassian.net/wiki/display/FOAM/Roadmap
- OpenFlow monitoring (tango-monitor-foam)
  - Reports data about FOAM and FlowVisor to GMOC
  - Recommended version: 0.5.4
  - Instructions: http://groups.geni.net/geni/wiki/TangoGeniMonitoring/FoamConfiguration
- Available GENI OpenFlow controller that forwards using L1 information to address MAC learning issues on some switches

GENI Evolving Network Operations

- GENI Admin tutorial offered online and in person
- Admin info and how-to wiki pages improved
- Monitoring redesign, implementation, and deployment
  - I2 (AL2S, ION, meso-scale), MAX, IG, EG Local Datastores active
  - UK Ops Dashboard collects and presents data from Utah IG and I2 aggregates
  - Reference Implementation available
  - See more at the Ops Session this afternoon

University of Kentucky Ops Monitoring



Dashboard of Collector

GENI Network Operations (continued)

- GMOC contributing to monitoring redesign
- GMOC LLR Exercise completed successfully
- Reporting, based on existing GMOC and GPO data
  - GMOC rack turn-ups
  - GENI Usage http://groups.geni.net/geni/wiki/AggregateUsage
  - OpenFlow aggregate and network availability for mesoscale http://groups.geni.net/geni/wiki/AggregateAvailability
  - ION stitching utilization
- More at the Operations Session this afternoon

Operations Transition

- Shared operations starting up with InstaGENI, ExoGENI, GMOC, GPO, and University of Kentucky
- Goals are to provide:
  - Operations help for campus IT staff and experimenters
  - Operations monitoring and reporting tools
  - At-scale operations services and incident response
  - Documented operational procedures for GENI as-built
  - Leverage existing campus wireless (originally WiMAX) operations and extend monitoring to campus base stations
- More at the Ops Session and the Coding Sprint