Quarterly Reports

From GpENI

This page is for archival of publicly available quarterly reports to the GPO ***only***. GpENI project members should click on the **discussion** tab for preparation of new reports before public release.

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December 2008

Note: this is the first quarterly report and is a short quarter consisting of approximately 10 weeks activity.

MAJOR ACCOMPLISHMENTS

Milestones Achieved

None due in this quarter; significant progress made toward two milestones:

- Purchase switch and complete end-to-end connections: first Ciena CoreDirector purchased and installed at UNL, KU node cluster installed and operational, KSU, UNL and UMKC node clusters in process of installation
- GpENI: Integrate GpENI with PlanetLab control framework: KSU has installed MyPLC and PlanetLab nodes

Deliverables Made

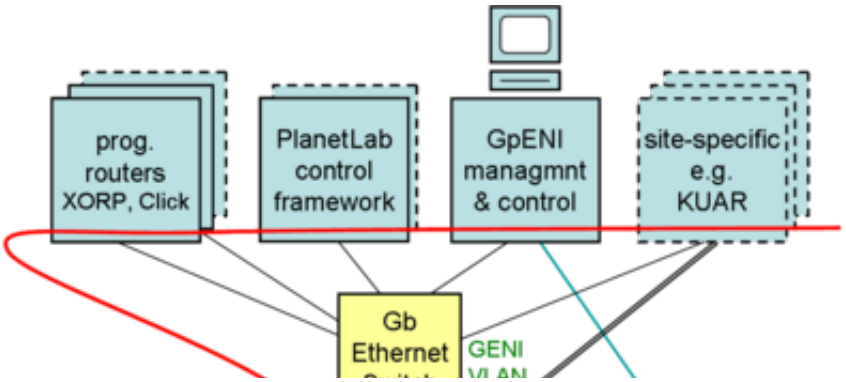
GENI Resource catalogue posted on https://wiki.ittc.ku.edu/gpeni_wiki/index.php/Node_Cluster

DESCRIPTION OF WORK PERFORMED DURING LAST QUARTER

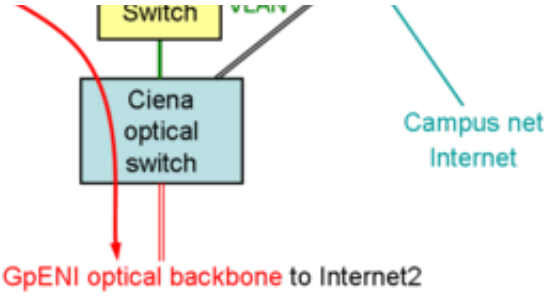
Activities and Findings

This first quarter has been devoted to planning, ordering, and installing the basic infrastructure (this activity will continue into the second quarter). Major activities included:

- Installation of KU node cluster (10 PCs plus Ethernet switch), partial installation of KSU node cluster, identification of equipment for the UNL node clusters, and planning for



the UMKC node cluster has taken place. Full node cluster details, including DNS names, IP addresses, configuration, and operational status is maintained on the Node Cluster



(https://wiki.ittc.ku.edu/gpeni_wiki/index.php/Node_Cluster) wiki page. Each cluster consists of at least 5 PCs and switches:

- control-1.<node>.gpeni.net – node cluster controller (master controller at KU)
- optical-switch.<node>.gpeni.net – Ciena optical switch (UNL installed and operational, KU in planning stages)
- vlan.<node>.gpeni.net – Netgear GSM7224 Gigabit Ethernet switch with VLAN and SNMP capabilities
- geni-myplc.ksu.gpeni.net – MyPLC control at KSU (geni-myplc.ku.gpeni.net backup at KU); GENIwrapper installation is in planning stages
- geni-planetlab-*n*.<node>.gpeni.net – PlanetLab nodes (at least two per node cluster); GENIwrapper installation is in planning stages
- router-*n*.<node>.gpeni.net – programmable routers

- DNS names have been allocated to node cluster components with KU ITTC as DNS server for gpeni.net. DNS redirects will be installed as soon as GpENI addresses become globally routable.

- IP address allocation has been obtained from KanREN consisting of 198.248.240.0/20. We have made the decision to make all GpENI components globally routable rather than using private IP addresses to make end-to-end GENI connectivity easier. As soon as each node cluster is physically connected to KanREN through the I2 POP in Kansas City, KanREN will reassign through ARIN. Full IP address allocation tables are maintained on the Physical Topology and Network Infrastructure (https://wiki.ittc.ku.edu/gpeni_wiki/index.php/Physical_Topology_and_Network_Infrastructure) wiki page. Each of the four node clusters will use a /24 as follows:
  - 198.248.240.0/24 – *.ku.gpeni.net
  - 198.248.241.0/24 – *.ksu.gpeni.net
  - 198.248.242.0/24 – *.umkc.gpeni.net
  - 198.248.243.0/24 – *.unl.gpeni.net
  - 198.248.255.0/24 – infrastructure

- The Ciena CoreDirector CI (CDCI) optical switch was installed at UNL in October. The Line Modules contained in the switch are 10Gbps Optical Interface, 2 Controller Modules, 160Gps XC modules, 10Gps Ethernet interface. The CDCI switch has CoreDirector 5.2.1 software version in its controller. The provisioning of the interfaces are managed through both the Node Manager software package and TL1 interface. A new Ethernet 10G Line Module and a Controller have been ordered from Ciena and they will be installed soon. Planning has begun for early acquisition of the KU Ciena optical switch.

- Basic topologies over DRAGON GMPLS Control Plane Software were tested in a user-mode Linux environment at UNL. This involved interactions with our Cluster-B partner, the MANFRED group (Chris Tracy, MAX).

- MyPLC and PlanetLab have been installed and are running on the KSU node cluster, and throughput and traffic characteristics measurement tests have been performed, using iperf, ping, traceroute, and tcpdump. These experiments demonstrate that PlanetLab provides a level of support for networking experiments comparable to running on dedicated hardware. KSU is beginning to investigate the use of VINI in GpENI and will determine with UMKC if VINI should be part of the programmable routers in GpENI. KSU will begin direct collaboration with Princeton in the next quarter.

- We have begun to work with university and research network staff to arrange short-term connectivity of the node clusters, since optical switch installation is now being phased and not fully funded due to the ubiquitous budget cuts in the GENI program. This will be necessary to achieve global routability of GpENI nodes anticipated early in the next quarter.

- KU has begun to install and test basic node cluster monitoring tools using the SNMP capabilities of the Ethernet switch.

Project Participants

- KU: James P.G. Sterbenz (PI); Joseph B. Evans (co-I); Ronqing Hui, Gary Minden (faculty), Egemen Çetinkaya, Abdul Jabbar, Justin P. Rohrer (GRAs); Michael Hulet, Wesley Mason, Rick McMullen, Travis Berkley, Bill Farris, Dilawar Grewal (network infrastructure)

- KSU: Caterina Scoglio, Don Gruenbacher (co-PIs); Tricha Anjali (faculty); Yunzhao Li, Karim Morcos, John Sherrell, Nidhi Tare (GRAs); Sam Hays, Richard Becker (network infrastructure)

- UMKC: Deep Medhi (co-PI); Baek-Young Choi (Co-I); Cory Beard, Khosrow Sohraby (faculty); Haiyang Qian (GRA), Jim Schonemann (network infrastructure)

- UNL: Byrav Ramamurthy (co-PI); Pragatheeswaran Angu (GRA); Dale Finkelson (network infrastructure)

- GPN: Greg Monaco (co-PI)

- Ciena: Jeff Verrant (co-PI); Jim Archuleta (co-I); John Lankford (network infrastructure)

- KanREN: Cort Buffington, Brad Fleming (network infrastructure)

- MOREnet: Hank Niederhelm, PJ Clayton, Rex Peterson, Shannon Spurling (network infrastructure)

Full information on all project participants is available on the People and Institutions (https://wiki.ittc.ku.edu/gpeni_wiki/index.php/Main_Page#People_and_Institutions) section of the GpENI wiki.

Publications (individual and organizational)

James P.G. Sterbenz, Deep Medhi, Greg Monaco, Byrav Ramamurthy, Caterina Scoglio, Baek-Young Choi, Joseph B. Evans, Don Gruenbacher, Ronqing Hui, Wesley Kaplow, Gary Minden, Jeff Verrant
GpENI: Great Plains Environment for Network Innovation (Proposal) (http://www.ittc.ku.edu/resilinets/reports/GpENI-prop-public-tr.pdf)

ITTC Technical Report ITTC-FY2009-TR-0061349-01, The University of Kansas, October 2008.

James P.G. Sterbenz, Joseph B. Evans, Deep Medhi, Baek-Young Choi, Jim Schonemann, Greg Monaco, Byrav Ramamurthy, Dale Finkelson, Caterina Scoglio, Don Gruenbacher, Wesley Kaplow, Jeff Verrant Jim Archuleta
"GpENI: Great Plains Environment for Network Innovation"
(http://www.ittc.ku.edu/resilinets/presentations/Sterbenz-GpENI-GEC3-2008-display.pdf) ,
Third GENI Engineering Conference (GEC-3), Palo Alto, CA, October 2008.

Outreach Activities

The GpENI wiki (https://wiki.ittc.ku.edu/gpeni) was created and is publicly accessible to document project activities and infrastructure status.

James P.G. Sterbenz and Don Gruenbacher attended GEC-3. Presentation was given by given by Sterbenz, poster was attended by Gruenbacher and Sterbenz. A revised version of the poster will be put online soon.

Collaborations

- GpENI PIs have begun participation with Cluster B coordination led by Jon Turner at Washington University
- Byrav Ramamurthy at UNL has begun direct collaboration with Cluster-B partner Chris Tracy (MAX) in the MANFRED project to use DRAGON control plane software

Other Contributions

No other contributions to report.

March 2009

MAJOR ACCOMPLISHMENTS

Milestones Achieved

We have completed the first two milestones, which have been demonstrated at GEC-4:

- Purchase switch and complete end-to-end connections: in addition to the first Ciena CoreDirector purchased and installed at UNL, KU, KSU, UNL and UMKC node clusters are all operational
- GpENI: Integrate GpENI with PlanetLab control framework: The KSU PLC is now able to create slices across all GpENI node clusters; dynamic status and demo at http://control-1.ksu.gpeni.net/gec4/

Deliverables Made

None due.

DESCRIPTION OF WORK PERFORMED DURING LAST QUARTER

Activities and Findings

GpENI Node Cluster

This second quarter has been devoted to making the basic GpENI infrastructure operational and meeting our first two milestones. Major activities included:

- Installation of KSU, UNL, and UMKC node clusters. Full node cluster details, including DNS names, IP addresses, configuration, and operational status is maintained on the Node Cluster wiki page.
- DNS redirection for GpENI nodes is operational.
- IP addresses of GpENI nodes in the KanREN address space are now globally routable. Thus all GpENI nodes are visible to the public Internet.
- UNL are in contact with Chris Tracy of MANFRED group to control the Ciena CoreDirector switch with DRAGON software, and have received instructions and configuration details. UNL is working on modifying DCN 0.5 to include the support for Netgear GSM7224 switch.
- UNL received two Ethernet cards from Ciena and they are installed successfully in the CoreDirector. There is a 10 GigE SFP installed in one of the modules. The Cisco ONS15327 Multi-service Provisioning Platform (courtesy of UNL funds) has been rack-mounted and it has a 1 GigE SFP and an OC12 optical interface. The Cisco equipment can be used on the client side to interface with CoreDirector in optical domain. In order to connect to the GpENI network we require 1GigE SFPs and we are in communication with Ciena to obtain them.
- End-to-end connectivity has been established between all of the GpENI node clusters; KanREN has been instrumental this process. UNL connects to Kansas City via DWDM Lambda, and UMKC is connected to Kansas City with an L2TPv3 VPN tunnel. MOREnet fiber connectivity is expected to come online in a few weeks. In Kansas City, UNL and UMKC are connected to the KanREN MPLS domain, where a VPLS exists that connects Kansas City with KU, KSU over fiber, and a gateway to I2 and the public Internet at the IP layer. All four of the nodes communicate with each other over the same broadcast domain, enabling them to operate on the same network-layer segment. This enables L2 connectivity between all nodes, and the ability to create Layer 3 environments within and between the nodes as necessary for experimentation. KU, KSU, UNL, and information technology have been instrumental in local connectivity.
- The KSU MyPLC is able to create slices across all of the GpENI node clusters. KSU have created a Web-based application that dynamically shows the status of the PlanetLab node and a demonstration slice that allows arbitrary paths to be set up among GpENI nodes.
- GUSH is running on GpENI

Project Participants

- KU: James P.G. Sterbenz (PI); Joseph B. Evans, Rick McMullen (co-Is); Ronqing Hui, Gary Minden (faculty), Egemen Çetinkaya, Abdul Jabbar, Justin P. Rohrer (GRAs); Michael Hulet, Wesley Mason, Travis Berkley, Bill Farris, Dilawar Grewal (network infrastructure)
- KSU: Caterina Scoglio, Don Gruenbacher (co-PIs); Tricha Anjali (faculty); Yunzhao Li, John Sherrell, Nidhi Tare (GRAs); Sam Hays, Richard Becker (network infrastructure)
- UMKC: Deep Medhi (co-PI); Baek-Young Choi (Co-I); Cory Beard, Khosrow Sohraby (faculty); Ramkumar Cherukuri, Can Kanli, Xuan Liu, Haiyang Qian (GRAs), Jim Schonemann (network infrastructure)
- UNL: Byrav Ramamurthy (co-PI); Pragatheeswaran Angu, Mukesh Subedee (GRAs); Dale Finkelson (network infrastructure)
- GPN: Greg Monaco (co-PI)
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Publications (individual and organizational)

James P.G. Sterbenz, Deep Medhi, Greg Monaco, Byrav Ramamurthy, Caterina Scoglio, Cort Buffington, Jim Archuleta, Don Gruenbacher, Rick McMullen, "Deployment status of GpENI: Great Plains Environment for Network Innovation", Fourth GENI Engineering Conference (GEC-4), Miami, FL, March 2009.

Outreach Activities

The GEC-4 demo page is publicly accessible.

James P.G. Sterbenz, Abdul Jabbar, and Justin Rohrer (KU), John Sherrell, Nidhi Tare (KSU) attended GEC-3. Sterbenz reported on GpENI deployment status to the Cluster B meeting. Students Sherrel, Tare, Rohrer, and Jabbar demonstrated GpENI.

Collaborations

- GpENI PIs have continued participation with Cluster B coordination led by Jon Turner at Washington University

- Byrav Ramamurthy at UNL is continuing direct collaboration with Cluster-B partner Chris Tracy (MAX) in the MANFRED project to use DRAGON control plane software
- KU and KSU have begun working with Jeannie Albrecht to run GUSH on GpENI, have given her early access to create slices on GpENI

Other Contributions

No other contributions to report.

June 2009

MAJOR ACCOMPLISHMENTS

Milestones Achieved

None due.

Deliverables Made

None due. Progress is being made on the CoreDirector management interface document deliverable.

DESCRIPTION OF WORK PERFORMED DURING LAST QUARTER

Activities and Findings

- The DCN control plane is operational on the Netgear GSM7224; we are awaiting the arrival of additional 1GigE SFP for the UNL CoreDirector CI to permit testing on the optical switch. UNL team contributed to the source code of the Internet2 Dynamic Circuit Network (DCN) software to extend its support for the Netgear GSM7224 switch. A mini testbed has been deployed in the UNL Networks lab for testing purposes. DRAGON CLI commands were used in testing to provision VLAN circuits and the configuration of switch was verified after provisioning of VLAN circuits. The Netgear GSM7224 has been added to the list of DCN supported switches in their wiki: https://wiki.internet2.edu/confluence/display/DCNSS/DRAGON+Supported+Switches by the DCN development team.
- UMKC has been actively pursuing options for the programmable router platform, and we have decided that a VINI based-platform is the logical first step. After several rounds of discussion with Princeton, we have installed our first VINI client node – this required us to get a new set of IP addresses outside UMKC's firewall. Since then, we have a second public VINI node up and running. hese have been helpful in understanding the critical configuration options. UMKC has installed our own VINI central for GpENI and successfully connected a local VINI client to our GpENI-VINI-central. We're doing a few more tests before we can allow our GpENI partner institutions to connect to this environment.
- Network connectivity has remained an issue for UMKC. UMKC's upstream provider, MOREnet, has

moved to a better fiber optic connectivity by April/Mid-May. At the end of May, it was identified that for this to be available, new optical interface cards were needed for the ADVA switchs managed by UMKC campus IT and MOREnet. This upgrade has now been completed, and UMKC now has full optical connectivity to GpENI.

- KSU has upgraded the GEC4 demo to visualise the paths established on the map, and is preparing for the GEC5 demo.
- GUSH was installed on GpENI by Jeannie Albrecht of Williams and KSU.
- Million node GENI is running on GpENI, which means that there may already be some limited external use.
- KSU has installed the current version of GENIwrapper and begun testing its functionality using the Slice Facility Interface (SFI) command line interface.

Project Participants

- KU: James P.G. Sterbenz (PI); Joseph B. Evans, Rick McMullen (co-Is); Ronqing Hui, Gary Minden (faculty), Egemen Çetinkaya, Abdul Jabbar, Justin P. Rohrer (GRAs); Michael Hulet, Wesley Mason, Travis Berkley, Bill Farris, Dilawar Grewal (network infrastructure)
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Presentations and Publications (individual and organizational)

James P.G. Sterbenz, Deep Medhi, Byrav Ramamurthy, and Caterina Scoglio, “GpENI: Great Plains Environment for Network Innovation”, GPN (Great Plains Network) 2009 Annual Meeting, Kansas City, MO, May 2009.

James P.G. Sterbenz, “Resilience, Survivability, and Heterogeneity in the Postmodern Internet”, 4th International Conference on Future Internet Technologies (CFI 2009), Seoul, Korea, June 2009.

Outreach Activities

- James P.G. Sterbenz, Abdul Jabbar, and Justin Rohrer (KU), Don Gruenbacher, Nidi Tare, and John Sherrell (KSU), Deep Medhi attended GEC4. Don Gurenbacher and James Sterbenz presented the GpENI poster. Sherrell, Tare, Rohrer, and Jabbar demonstrated GpENI.
- James P.G. Sterbenz, Abdul Jabbar, and Justin Rohrer, Egemen Çetinkaya (KU), Caterina Scoglio and John Sherrell (KSU), Deep Medhi attended the Great Plains Network 2009 Annual Meeting. Sherrell, Rohrer, Jabbar, and Çetinkaya demoed GpENI and presented the GpENI poster as done in GEC-4.
- Discussions have begun with regional and international institutions to expand the scope of GpENI.

Collaborations

- GpENI has begun discussions with MAX (Peter O'Neil and Chris Tracy) and ProtoGENI (Robert Ricci) to arrange physical interconnection.
- GpENI has begun discussions with RAVEN (John Hartman) to run RAVEN
- James P.G. Sterbenz, Byrav Ramamurthy, Caterina Scoglio, and Deep Medhi participated in the 25 June 2009 Chicago Rspec meeting by teleconference.
- James P.G. Sterbenz attended the 30 June 2009 GENI planning meeting at the GPO in Cambridge Mass. Byrav Ramamurthy, Caterina Scoglio, and Deep Medhi contributed by skype chat with James Sterbenz.

Other Contributions

No other contributions to report.

- This page was last modified 20:47, 1 July 2009.