

Quarterly Reports

From GpENI



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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

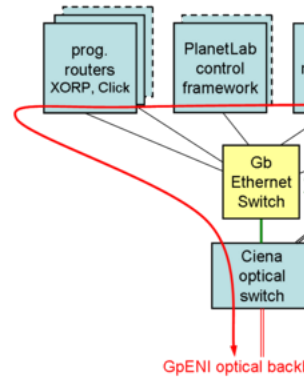
GENI Resource catalogue posted on https://wiki.ittc.ku.edu/gpeni_wiki/index.php/Node_Cluster

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 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 Module 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 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
- 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, (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 and tcpdump. These experiments demonstrate that PlanetLab provides a level of support for networking experiments comparable to running on dedicated hardware. KSU is beginning 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 at UNL 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 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

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 M. GpENI: *Great Plains Environment for Network Innovation (Proposal)* (<http://www.ittc.ku.edu/resilinet/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 M. Archuleta
 “GpENI: Great Plains Environment for Network Innovation” (<http://www.ittc.ku.edu/resilinet/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 is available 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 now 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.ittc.ku.edu>

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 public Internet.
- 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 to modify 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 ONS1545 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 of the 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 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 same broadcast 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 on 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 for the nodes as necessary for experimentation. KU, KSU, UNL, and information technology have been instrumental in local connectivity.

