

GENI: Slivers and Slices in a Diverse, Outdoor, Mobile Network Environment (DOME) Testbed

Quarterly Status Report Year 2, Quarter 1 January 2010

Project Number 1599
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Major Accomplishments

The major tasks for October 2009 through December 2009 are summarized below.

- Completed milestone 1a (ORCA integration).
- Completed milestone 2a (Internet2 / VLAN).
- Further progress was made on Internet2 / VLANs (per milestone 2c).
- Initial deployment of XTend radios (per milestone 2g).
- Additional management capabilities have been added to DOME, for both users and administrators (per milestone 2e).
- Work by REU toward multi-testbed experimentation.
- Inclusion of Million Node GENI (project Seattle) on DOME.
- Improvement of testbed reliability (ongoing).

Milestones Achieved, Deliverables Made

Completed milestone 1a: Complete integration of your testbed with broker in cluster clearinghouse, contingent upon ORCA implementation of needed broker policy, so that your testbed becomes federated with the other associated testbeds, and demo functionality of your testbed in this environment.

We are using DOME in production with a federated ORCA. DOME and ViSE share an instance of ORCA at UMass. DOME (and ViSE) use the ORCA clearinghouse at RENCI, which hosts DOME, ViSE, Kensei and BEN.

Completed milestone 2a: Assist GPO and cluster projects to complete a plan for the setup of VLANs between testbeds to be carried by Internet 2 (or NLR) backbone network between the testbeds.

Since the completion of this milestone, additional progress has been made. We now have two active ports in the CS department (the VLAN is shared by ViSE and DOME). Brian Mollo (NoX) established a VLAN from NoX to BBN for the UMass traffic. A subnet

was successfully established with the VLAN that encompassed both UMass and BBN systems.

Description of Work Performed During Last Quarter, Activities and Findings

Completed milestone 1a.

See above.

Completed milestone 2a .

See above.

Further progress on Internet2 / VLANs .

See above.

Initial deployment of XTend radios.

Milestone 2g has DOME supporting 900 MHz (a.k.a. XTend) radios. These radios provide a proprietary low bandwidth, long-range wireless technology for use by DOME experiments. We have implemented a scheme for specifying and provisioning the radios for use with DOME. We have developed an interface that allows access to the radios from within virtual machines. We have installed the software and radios on buses, and we have executed test experiments to verify the process and interface.

Additional management capabilities.

We have implemented quite a few additional management capabilities for use by experimenters and those administering the DOME testbed. Some of the capabilities include:

- Bus status overview. This can be used to see which buses are currently on the road, their routes, their current GPS coordinates, if anyone has an experiment executing, and the status of critical hardware.
- Individual bus reports. This provides per-bus reports that include hardware status, DOME-generated messages, and information about the bus's activity.
- DOME-generated messages. A user can view all of the status and error messages generated by DOME that have been logged to the portal. A user can also choose to filter by bus or category.
- Uptime and route reports. This provides graphs of when buses were scheduled to be on the road, when the DOME systems were active, time-based location of the buses, and bus check-ins.
- Improved interface to the user experiment logging on the portal, with the new ability to delete and recover messages.

- Experiment reports. Users can now generate graphical reports that show the leases they were assigned, which buses were active during those leases, and a timeline status of their experiments during the active lease.
- Improved interface for administrators for managing users and resources.

Work by REU on multi-testbed experimentation.

We have an REU student who has been executing experiments on DOME. The goal is to expand his experiments to include both DOME and ViSE, integrating GPS coordinates, WiFi beacons and the ViSE camera. He has performed initial testing with WiFi and the GPS, and is now beginning to learn to control the ViCE camera.

Inclusion of Million Node GENI (project Seattle) on DOME.

We have worked with Justin Cappos of the University of Washington to include Seattle with DOME. Whenever DOME is not running a user experiment, a "default" experiment executes, which includes running the Seattle software within a VM on the buses.

Improvement of testbed reliability (ongoing).

We continue to work to improve the reliability of the testbed. This is an iterative process: as we add additional management capabilities we are better able to identify actual or potential problems. We are currently working to make the hardware on the buses easier to service. We are also testing software to improve 3G and GPS reliability. We are in the process of adding support for another 3G modem model.

Project Participants

The project participants are Brian Levine (PI), Mark Corner (PI) and Brian Lynn (engineer).

Outreach Activities

We have an undergraduate as part of the GENI REU program. We meet regularly with the student to provide guidance and ensure progress.

We continue to use DOME to offer Internet access on the UMass buses, and our data continues to show increased usage of the service.

Collaborations

As always, we work very closely with the GENI ViSE project. We are using a single instance of ORCA for the two projects. We are collaborating with ViSE and UMass OIT on the UMass VLAN solution.

We continue to use ORCA hosted by RENCI.

We work closely with the UMass PVTA, planning joint projects and working to ensure symbiotic collaboration. We've been providing information to the PVTA to improve the accuracy of their exported bus routes. This helps us, since we use the bus routes in our management tools, and it helps the PVTA have a more reliable live bus-tracking tool (a tool that was originally developed by us for the PVTA).

We also continue to work with UMass OIT and the Town of Amherst in order to have access to the campus and town WiFi networks.

As mentioned above, we have collaborated with Justin Cappos to run Million Node GENI on DOME.