

Quarterly Status Report

Project Quarter: #1 (Oct – Dec, 2008)

Report Submission Date: December 31, 2008

Project Title: Instrumentation and Measurement for GENI

PIs: Paul Barford (UW-Madison), Mark Crovella (BU), Joel Sommers (Colgate)

Project Overview

The objective of our project is to develop, test and deploy a prototype implementation of the *network* instrumentation and measurement systems that will eventually be widely available in the GENI infrastructure. The specific components of the instrumentation and measurement system include sensor nodes that will gather packets from links in a network, a measurement data repository and the experimental interfaces that enable users to specify the data that will be gathered for their experiments. The major milestones in this project are, 1) to produce a specification describing the requirements and capabilities of the systems, 2) to build and test the measurement systems in the Wisconsin Advanced Internet Lab (WAIL), and 3) to deploy a limited number of measurement systems in NLR. The objectives for the project in year 1 are as follows:

- a) Develop system interface design specification and distribute via appropriate GENI working groups. (4 mo. from start date)
- b) Develop measurement system design specification and distribute via appropriate GENI working groups. (4 mo. from start date)
- c) Develop repository system design specification and distribute via appropriate GENI working groups. (4 mo. from start date)
- d) Develop basic instrumentation and measurement test suites for evaluating measurement implementations in WAIL. (6 mo. from start date)
- e) Develop a prototype with basic measurement functionality, including interface to a GENI control framework (v 1.0). Test implementation in WAIL. (10-12 mo. from start date)
- f) Make basic functionality prototype available to GENI users in WAIL testbed. (11-12 mo. from start date)

QSR #1 Executive Summary

The project officially started in the final week of October when funds were received at UW-Madison from the GPO. Prior to that date, the PIs had initiated weekly conference calls to start

the process of specifying the requirements and capabilities of the GENI Instrumentation and Measurement systems (GIMs). Mike Blodgett at UW-Madison (WAIL lab manager) – who is the only person other than the PIs who is partially funded by our GENI grant – began the process of investigating the control framework interface and sensor components of GIMs. In particular, the initial version of GIMs will be developed as part of the ProtoGENI control framework. Since Mike has worked extensively with Emulab and the Utah developers, he already has a substantial working knowledge of the underpinnings of ProtoGENI. Mike has been in regular contact with the Utah ProtoGENI group about the integration of the GIMs capabilities. In terms of sensor components, Mike and PI-Barford have been investigating several possible alternatives including general-purpose PC-based systems and more specialized packet capture/inspection systems. Co-PIs Crovella and Sommers along with Mike Blodgett participated in the GENI Engineering Workshop at the end of October.

OSR #1 Major accomplishments

Milestones achieved: None

Deliverables made: None

OSR #1 Description of Work Performed During Last Quarter

Activities and findings: The majority of the activities that have taken place since the official inception of this project (end of October, '08) have revolved around the planning and organization of the specification documents of the GENI measurement and instrumentation systems. This activity has been facilitated by weekly conference calls between the PIs. An initial draft of the GIMs Specification is underway and will be completed by early January, 2009.

Investigations of possible hardware platforms for the sensor nodes that will be deployed on network links in GENI have begun. The two primary possibilities are general-purpose PC-based systems and more specialized measurement systems (e.g., Endace and Bivio). Considerations for the platform selection include performance, programmability, measurement accuracy, and timing accuracy and cost. Two students will begin work on developing the initial functional capabilities of the sensor nodes in the first quarter of 2009.

Investigations of the ProtoGENI control framework (GIMs initial integration target) have also begun. Mike Blodgett's extensive experience with Emulab and the Utah developers gives him a substantial working knowledge of the underpinnings of ProtoGENI. Unfortunately, since much of ProtoGENI exists only in the form of a specification, progress on specifying details of the ProtoGENI/GIMs interface has been limited.

An important first step in ProtoGENI integration was to upgrade the WAIL testbed to the 5.X series of Emulab code. This clears the path to integrate our router-based testbed into the ProtoGENI ecosystem. Since WAIL's extensions to Emulab include many site-specific changes, and the integration of some external systems, the upgrade process is complicated. The work to remove these local issues, either by replacing their functionality or contributing changes upstream is ongoing and should streamline future updates of our systems.

Finally, Co-PIs Crovella and Sommers along with Mike Blodgett participated in the GENI Engineering Workshop at the end of October. A poster was generated and co-PI Sommers gave a talk on the GIMs project.

Project participants: Paul Barford (UW-Madison), Mike Blodgett (UW-Madison), Mark Crovella (BU), Joel Sommers (Colgate)

Publications (individual and organizational): None

Outreach activities: None

Collaborations: Mike Blodgett is participating in bi-weekly ProtoGENI conference calls. WAIL is hosting two ProtoGENI nodes

Other Contributions: None