

# **iGENI Quarterly Report**

## **GENI Project #1719**

**For the Period Oct 1, 2009 through Dec 31, 2009**

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### **1. Major Accomplishments**

This project has taken the initial steps to define, design and implement iGENI, a distributed network research infrastructure, which will be integrated with current and planned GENI resources and operated for the use of GENI researchers, who will conduct experiments that involve multiple aggregates (at multiple sites). The iGENI infrastructure is being defined in collaboration with the GPO and other GENI projects to expand the controllable transport services available to GENI researchers, and to make GENI available to more research communities.

#### **Current Capabilities**

The preliminary infrastructure architecture and design concepts have been developed for the iGENI US infrastructure and presented and discussed at various forums, including at the GEC 6 workshop in Salt Lake City, November 16-18, 2009. Preliminary concepts are being developed for international path implementations.

#### **1. Milestones Achieved**

iGENI milestones are described on the GENI wiki.

iGENI: S2.a The initial design of the iGENI infrastructure has been developed and reviewed.

iGENI: S2.b Initial cluster plans for vLANs among testbeds have been developed and presented at the GEC 6 workshop in Salt Lake City, November 16-18, 2009. During the next two months, iGENI will be integrated as an aggregate with the ORCA control framework in Cluster D, with persistent L1/L2 paths initially between StarLight and RENCIBEN. This first implementation will serve as a demonstration model for establishing similar connections to other Cluster D sites. This initial implementation will be designed, implemented, and tested in time for a demonstration at GEC 7 workshop, March 16-18, 2010 at RENCIBEN, Chapel Hill, NC. Initially, the ORCA clearinghouse at RENCIBEN will be used for this resource. The ORCA GENI Cluster D implementation includes one Broker, multiple Service Managers, and multiple Site/Domain Authorities.

iGENI: S2.c The first steps to integrate iGENI with ORCA have been taken, through an initial lab implementation at iCAIR.

### **2. Description of Work Performed During 1<sup>st</sup> Quarter**

## 2.a. Activities and Findings

The iGENI initiative is developing plans for integrating core resources with an ORCA based control plane framework, including L2/L1 paths. These plans specify that resources will selectively advertise their external interfaces, including vLANs interconnecting dedicated GENI resources provided by regional networks, national R&E networks, international R&E networks, non-profit R&D organizations, corporate R&D organizations, and other sites, facilities and institutions. Consideration is being given also for supporting multiple types of L1/L2 paths, including vLANs, tunneling services, e2e lightpaths, standard optical L2 framing, and others. Plans are also being developed to enable core L1/L2 resources to be identified using standard L1/L2 resource addressing while experimental L1/L2 core resources will be identified by using a method that allows for a level of abstraction that will be integrated into an XML-based resource description language. The ORCA control framework will provide for the network resource allocation. Within the iGENI infrastructure, calls will be mapped onto an addressable L1/L2 path infrastructure, using static, semi-dynamic and dynamic infrastructures. Edge resources will use a private addressing scheme. This scheme will be implemented under common agreement among participants. The addressing will be incorporated into an XML-based description language. The core resource infrastructure framework and the experimental research infrastructure will be operated by distributed operational NOC processes. Core infrastructure will be addressed by a management plane based on common L3 secure channels in addition to the control plane framework. The initial prototype is being designed and the plan is to implement two L1/L2 paths between the StarLight communications exchange facility in Chicago and RENCi in North Carolina. Planning for this implementation has been initiated at both sites. A demonstration of this initial implementation is being planned for the GEC workshop in March 2010.

More specifically, Q1 activities focused on core infrastructure architecture design and implementation plans. The iGENI community started planning connections from existing resources at the StarLight national and international communications exchange with current GENI backbone transport resources, with an initial path based on NLR Layer 2/Ethernet VLANs) using 10 Gbps NLR FrameNet and C-Wave lightpaths. The first steps have been taken to design, configure and implement L2 paths between BEN/RENCi in North Carolina and the StarLight facility. Discussions have also been initiated about providing an L2/L1 path to the BBN lab in Cambridge, MA. In addition, discussions have taken place about connections to other Cluster D sites and several international sites, including those participating in EU FIRE research network activities.

Plans have been initiated to integrate the ORCA control framework with the iGENI infrastructure. A preliminary version of ORCA was installed on a server in one of the iCAIR research labs and plans have been made for establishing switches and servers at a core node in the StarLight facility. By Q2, iGENI will be integrated as an aggregate with the ORCA control framework in Cluster D, with L1/L2 paths between StarLight and RENCi/BEN. This initial implementation will serve as a model for establishing connections to other sites. This initial implementation will be tested over the next two months and demonstrated at the next GEC workshop in March 2010. Through ORCA, available resources in iGENI will be discovered; services will be setup and managed; and, individual traffic streams will be controlled and managed. This project will implement interfaces to ORCA that allow dynamic control of network services involving iGENI, associated transport resources and GENI aggregates. It will be possible to setup services using prepackaged or customized configurations and topologies.

## **2.b. Project Participant Activity**

The primary activities in Q1 have been planning meetings with GENI Cluster D partners, national research networking organizations, and international research network organizations, as well as conference calls and meetings at GEC with the ORCA framework developers at the SC09 international supercomputing conference, and at the international 2009 GLIF Workshop in Korea.

## **2.c. Publications and Presentations**

A presentation on the iGENI initiative was made at the at the GLIF 9th Annual Global LambdaGrid Workshop 27-28 October 2009 in Daejeon, South Korea. The presentation is posted on the GLIF organization's web site.

## **2.d. Outreach Activities**

The iGENI community presented the iGENI project at several international forums. In particular, the iGENI project was presented and discussed at the GLIF 9th Annual Global LambdaGrid Workshop, 27-28 October 2009 in Daejeon, South Korea. GLIF (Global Lambda Integrated Facility) participants include National Research and Education Networks (NRENs), consortia and institutions who are creating a globally distributed infrastructure testbed facility based on optical-fiber lightpaths and are involved in multiple, innovative communication services and technology projects.