G E N I

Global Environment for Network Innovations

GENI Quarterly Status Report

Document ID: GENI-QSR-LEARN-Jan08-2010

January 08, 2010

Prepared by:
D. Gurkan[1], G. P. Roberts[1], M. S. Wang[2], C. P. Lai[2], and K. Bergman[2]
1: University of Houston: College of Technology
2: Columbia University: Dept. of Electrical Engineering
Under Project Nr. 1733
“Programmable Measurements over Texas-based Research Network: LEARN”

Document Revision History

The following table provides the revision history for this document, summarizing the date at which it was revised, who revised it, and a brief summary of the changes. This list is maintained in chronological order so the earliest version comes first in the list.

Revision	Date	Revised By	Summary of Changes
1.0	08 Jan 2010	D. Gurkan	Initial draft
1.0	10 Jan 2010	C. Lai	Revised update
1.0	10 Jan 2010	M. Wang	Revised update

Programmable Measurements over Texas-based Research Network: LEARN
GENI Quarterly Status Report
Project no: 1733

PI: Deniz Gurkan
Department of Engineering Technology, University of Houston, Texas

1 Major Accomplishments

This project involves collaboration with three other GENI projects: (i) ORCA-BEN for integration with LEARN [LEARN_1] and measurement handler testing/implementation on Infinera Digital Transport Node (DTN) units; (ii) ERM [ERM_1] and (iii)IMF on interface definitions between measurement handler software (MHS) modules and the integrated and unified measurement frameworks. All projects integrate with ORCA in Cluster D with extensibility considerations towards integration with any cluster in the future.

With respect to the ORCA-BEN integration with LEARN: initial planning of Texas sites that have volunteered to host ORCA network elements and corresponding VLAN connections have been achieved. The integration plans were presented during GEC6. We are in collaboration with the GPO system engineer, Harry Mussman, to complete the integration of LEARN into GENI using the ORCA control framework.

With respect to the Infinera DTN remote access through ORCA-BEN: VPN mechanisms, access to BEN, and access to the DTNs have been achieved. An NDA with Infinera was established. We collaborated with the ORCA-BEN project, and RENCI provided sample Perl modules/scripts to follow when accessing the Infinera DTN for measurement handler software implementation.

With respect to the ERM and IMF projects: a data format for the measurement handler software module has been determined and presented during GEC6. This is a collaboration with Columbia University as a co-PI of this project and a PI of ERM. This format will be used to program MHS to retrieve measurements from the Infinera DTN and then provide them to the ERM project's Unified Measurement Framework (UMF).

2 Milestones

Milestone LEARN: S2.a Cluster plan for VLANs between testbeds (*Completed on* 11/16/09, GEC6)

Collaborate with GPO and other projects in Cluster D, to complete a Spiral 2 plan for the setup of VLANs between aggregates, to be carried by the Internet 2 (or NLR) backbone network between the aggregates.

> We contributed to the planning of VLANs between testbeds using LEARN's resources to connect to the rest of the research networks through NLR and Internet2. We decided to use NLR's FrameNet connection to access LEARN resources at four sites in Texas through ORCA-BEN. [LEARN_3]

Milestone LEARN: S2.b Plan for VLANs on LEARN (*Completed on* 11/16/09, GEC6)

Collaborate with the LEARN network, and complete a Spiral 2 plan for the use of LEARN to carry VLANs between GENI aggregates that are connected to LEARN.

> A plan for VLAN establishment on LEARN has been delivered at GEC6. There will be three other sites in Texas (in addition to the University of Houston) hosting ORCA nodes for VLAN establishment on LEARN: TAMU (Texas A&M University), UT-Austin (University of Texas, Austin), and Rice University. [LEARN_3]

Milestone LEARN: S2.h Draft measurement data file format (*Completed on* 11/16/09, GEC6)

Collaborate with the ERM project to draft data file format for transfer of measurement data between the Measurement Handler software and the Integrated Measurements Framework; complete specifications for the Measurement Handler software, which will utilize an existing interface (TL1 over SSH) into the Infinera Digital Transport Node (DTN) to make optical measurements.

> A draft data file format has been delivered at GEC6 in collaboration with Columbia University. The data file format follows the TL1 command/response format of the Infinera DTN. [LEARN_2]

> Specifications for the MHS part of the deliverable was delayed due to lack of equipment access by the LEARN team. When this milestone was first drafted, Dr. Gurkan's lab was hosting an Infinera DTN through an evaluation agreement between LEARN of Texas and Infinera. However, the evaluation period expired at the same time as start of the project. ORCA-BEN project has graciously given the LEARN team access and a login to their DTN boxes to perform this milestone. An NDA has been issued between the teams and Infinera during the second week of December of 2009.

Milestone LEARN: S2.c Establish ORCA framework (*Due on* 3/16/10, GEC7)

Establish local ORCA control framework, for eventual integration with LEARN network.

> Work is in progress for this milestone in University of Houston. We have successfully installed an ORCA framework on one computer. An isolated demonstration of the ORCA control framework with 3 nodes in Dr. Gurkan's lab will be available by GEC7.

Milestone LEARN: S2.i Implement and integrate Measurement Handler (*Due on* 3/16/10, GEC7)

Collaborate with the ERM project to complete specification of the data file format for transfer of measurement data between the Measurement Handler software and the Integrated Measurements Framework; implement the Measurement Handler software to make optical measurements using Infinera Digital Transport Nodes (DTNs); integrate the Measurement Handler software with the UMF provided by the ERM project; demonstrate the Measurement Handler software using DTNs that are part of BEN (at RENCI). (*Modified after Infinera DTN has been removed from Dr. Gurkan's lab.*)

Work is in progress to deliver the measurement handler to ERM project in order to be integrated with the UMF. There will be a demonstration of the MHS during GEC7 with measurements from the DTNs in BEN at RENCI.

Milestone LEARN: S2.j Deliver release of Measurement Handler (*Due on* 5/1/10)

Deliver release of Measurement Handler code for Infinera DTN and documentation to GPO.

Milestone LEARN: S2.k List of measurement handlers for GENI (*Due on* 7/20/10, GEC8)

Based upon results of Data Plane Measurements project, collaborate with GPO and other projects in Cluster D, to establish a list of measurement handlers that are needed for commercial transport and measurement equipment that will be used in GENI.

Milestone LEARN: S2.d Initial integration LEARN into ORCA (*Due on* 7/20/10, GEC8)

Complete initial integration of the LEARN network into the ORCA control framework (GENI Cluster D), to enable GENI researchers to utilize the LEARN network for L2 (VLAN) transport between a limited number of sites, e.g., University of Houston and Rice University.

Milestone LEARN: S2.e Move broker to clearinghouse (*Due on* 9/30/10)

Move broker to Cluster D clearinghouse, and make control of L2 (VLAN) connections in LEARN available via the ORCA control framework to other GENI users.

Milestone LEARN: S2.f POC to GENI response team (*Due on* 9/30/10)

Provide POC to GENI Prototype Response and Escalation team.

Milestone LEARN: S2.g POC to GENI security team (*Due on* 9/30/10)

Provide POC to Security team.

Milestone LEARN: S2.l Contribution to GENI outreach (*Due on* 9/30/10)

Specific contribution to GENI outreach plan for Spiral 2.

3 Deliverables Made

Milestone LEARN: S2.a Cluster plan for VLANs between testbeds (*Completed on* 11/16/09, GEC6)

Milestone LEARN: S2.b Plan for VLANs on LEARN (*Completed on* 11/16/09, GEC6)

Milestone LEARN: S2.h Draft measurement data file format (*Completed on* 11/16/09, GEC6)

4 Description of Work Performed During the Last Quarter

Work with GPO and GENI Engineering Conference:

VLAN assignments and integration of LEARN with the GENI infrastructure have been planned with GPO and presented during GEC6.

Measurement Handler Software Module:

A data format has been established to be the TL1 command/response structure for remote access to Infinera DTNs in collaboration with Columbia University. The remote access mechanism for the BEN DTNs has been achieved through BEN VPN and user memberships in collaboration with RENCI (Ilia Baldine and Yufeng Xin). An Infinera NDA has been executed. An outline of the measurement software specification is to be submitted within the week of this QSR in collaboration with Columbia University and RENCI (Part 2 of Milestone S2.h). Initial testing of the Perl scripts is ongoing at the time of this report.

Work with LEARN of Texas:

A project plan has been presented to LEARN Chief Technology Officer (Akbar Kara) together with University of Houston's LEARN liaison, Paul Roberts. Based the on the project plan, LEARN sites at TAMU, UT-Austin, and Rice University have volunteered to host GENI access with ORCA.

5 Activities and Findings

The measurement handler software (MHS) module will be based on Perl scripts because Perl will also be used at other projects (RENCI and Columbia) within Cluster D. This gives us the opportunity to have a common interface mechanism for all control framework related software components. We obtained the existing Perl scripts used at RENCI (provided by Yufeng Xin at RENCI) to control their network elements as a starting point.

6 Project Participants

PI: Deniz Gurkan, University of Houston, Texas, dgurkan@uh.edu

co-PI: Keren Bergman, Columbia University, New York, bergman@ee.columbia.edu

Senior Personnel: G. Paul Roberts, University of Houston, Texas, gproberts@uh.edu

Michael S. Wang, Columbia University, New York, msw2138@ee.columbia.edu

Caroline P. Lai, Columbia University, New York, caroline@ee.columbia.edu

7 Publications

M.S. Wang, D. Gurkan, C.P. Lai, K. Bergman, "Draft Measurement Data File Format," (Project Nr. 1733, Milestone S2.h), November 2009.

D. Gurkan and G. Paul Roberts, "Cluster plan for VLANs between testbeds and Plan for VLANs on LEARN," (Project Nr. 1733, Milestone S2.a and b), November 2009.

8 Outreach Activities

None.

9 Collaborations

Cluster D: Renaissance Computing Institute (RENCI) and Duke University: Ilia Baldine, Yufeng Xin, Jeff Chase, and Varun Marupadi.
We are working with RENCI on finding a common software interface definition between physical remote access to Infinera DTNs on BEN and then delivering the outputs to UMF and IMF. Specifically, Yufeng Xin has provided us with the Perl scripts that RENCI uses to access their specific network elements. Ilia Baldine provides us the tools to become ORCA users on BEN with remote access through VPN. We are working with Varun Marupadi in Jeff Chase's group on the installation and implementation of the ORCA framework in Dr. Gurkan's lab and then on LEARN of Texas.

GENI ERM Project: Columbia University: Michael Wang, Caroline Lai, and Keren Bergman
We work closely with Columbia University as Prof. Bergman is a co-PI in this project. Interfacing with ERM deliverables and specifications of the measurement handler software module are the main collaborations. We delivered milestone S2.h of LEARN through our collaborative work.

GPO: Harry Mussman
We closely cooperated with Harry Mussman to create an updated version of the GENI Wikipage and to submit milestone reports and quarterly status reports. Discussions via e-mail on the design and planning of LEARN VLAN delivery to the GENI infrastructure were conducted.

LEARN of Texas: Akbar Kara, CTO of LEARN and G. Paul Roberts, University of Houston
We present developments to integrate LEARN to the GENI infrastructure to the constituents of LEARN community. During Technical Advisory Group meetings and otherwise, LEARN is updated on its developing presence in GENI.

10 Other Contributions

None.

11 Bibliography

[1] [LEARN_1] Programmable Measurements over Texas-based Research Network: LEARN [Online]. Available: http://groups.geni.net/geni/wiki/LEARN
[2] [ERM_1] C. P. Lai, M. S. Wang, K. Bergman, "Unified Measurement Framework: NetFPGA Cube Prototype," Dec. 2009 [Online]. Available: http://groups.geni.net/geni/attachment/ticket/279/ERM_S2a_Dec09.pdf
[3] [LEARN_3] D. Gurkan and G. Paul Roberts, "Cluster plan for VLANs between testbeds and Plan for VLANs on LEARN," November 2009 [online]. Available: http://groups.geni.net/geni/attachment/ticket/270/GENI_MS2andb_LEARN_Nov09.pdf
[4] [LEARN_2] M. Wang, D. Gurkan, C. P. Lai, K. Bergman, "Draft Measurement Data File Format," November 2009 [online]. Available: http://groups.geni.net/geni/attachment/ticket/270/GENI_S2H_LEARN_Nov09.pdf