

GENI

Global Environment for Network Innovations

Milestone S2.a and S2.b Draft Plan for VLAN Setup over LEARN and Integration with Cluster D

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“Programmable Measurements over Texas-based Research Network: LEARN”

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1 Document Scope

This section describes this document's purpose, its context within the overall GENI project, the set of related documents, and this document's revision history.

1.1 Executive Summary

This technical note presents the results obtained in work package "Milestone S2.a&b: Draft Plan for VLAN Setup over LEARN and Integration with Cluster D" of Project Nr. 1733, "Programmable Measurements over Texas-based Research Network: LEARN".

This milestone is on the Spiral 2 plan for the setup of VLANs between aggregates, to be carried by the Internet 2 (or NLR) backbone network between the aggregates in collaboration with the GPO. In addition, since the second milestone of this project is directly related to this collaboration, we have included the plan here: 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.

In Section 2, we explain how VLANs will be setup on LEARN and then provided to the aggregates in Cluster D. Different options of LEARN being connected to other aggregates in the Cluster D will be presented. Static and dynamic options for VLAN setup will also be provided in this section.

In Section 3, a Spiral 2 plan for the use of LEARN will be presented. ...

LEARN will use resources that will not add any cost to the project for initial development of ORCA integration. As real-time application and user demand (experimenters over LEARN) grows, additional resources such as NLR C-WAVE can be easily added to meet the demand.

1.2 Related Documents

The following documents are related to this document, and provide background information, requirements, etc., that are important for this document.

1.2.1 GENI Documents

Document ID	Document Title and Issue Date

1.3 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	16 Nov 09	D. Gurkan	Initial draft

2 VLAN Setup and Integration with Cluster D

LEARN will use resources that will not add any cost to the project for initial development of ORCA integration. As real-time application and user demand (experimenters over LEARN) grows, additional resources such as NLR C-WAVE can be easily added to meet the demand.

There are different options available for GENI researchers from Cluster D to access end resources connected to LEARN over national research backbones. Also, VLAN identifiers can be setup in dynamic or static fashion over LEARN.

2.1 Access to End Resources on LEARN

We have identified different ways of connecting with the rest of the GENI infrastructures with resources on LEARN as follows:

- (i) Internet2's ION – IDC installation is in progress on TAMU, UT-Austin, Rice, and UH; eventually, this will provide layer 2 and layer 1 services to these end resources.
- (ii) NLR's FrameNET – through one node at Houston PoP.
- (iii) NLR's C-WAVE – which has a PoP in Houston.
- (iv) NLR's Sherpa – through Houston.
- (v) ESNNet
- (vi) Direct access from Rice University and UH to NLR, ESNNet, and I2 PoPs through Greenspoint (north of Houston) and Houston PoP (Hardy St).

The most straightforward initial connection is through NLR's FrameNET at this time. All deliverables during this year (10/2009-09/2010) will be provided through NLR. However, extensions to other connections will be realized as ORCA control framework grows to meet user demand: e.g., Sherpa interface will not be ready over ORCA until July 2010.

NLR FrameNet connection will be through one node in Houston and then relayed over LEARN's FrameNET service to end points at UH, TAMU, UT-Austin, Rice University. There are composed of both shared and dedicated layer 2 (VLAN) services. The other end points of these VLANs will be at Duke and RENCIBEN. VLAN tag range available for this project from LEARN is 3200-4000. NLR VLAN tag range will be coordinated between LEARN and NLR keeping in mind of the range in use by RENCIBEN and Duke.

2.2 VLAN Setup on LEARN

NLR VLANs will be relayed via LEARN to UT-Austin and TAMU. Also, they will be relayed via LEARN and SETG (SouthEast Texas Gigapop) to Rice and UH. VLAN identifier ranges from LEARN for this project are 3200-4000. Mapping among other aggregates will be accomplished after GEC6 with coordination between NLR and LEARN. This will provide **static** setup of VLANs over NLR/LEARN/SETG.

Dynamic (ORCA-controlled) VLAN assignments will be planned at GEC6. Architectural details of ORCA implementation on BEN/RENCI and Duke over NLR will provide this project the possible mappings of VLAN tags/pools when LEARN is integrated as an aggregate.

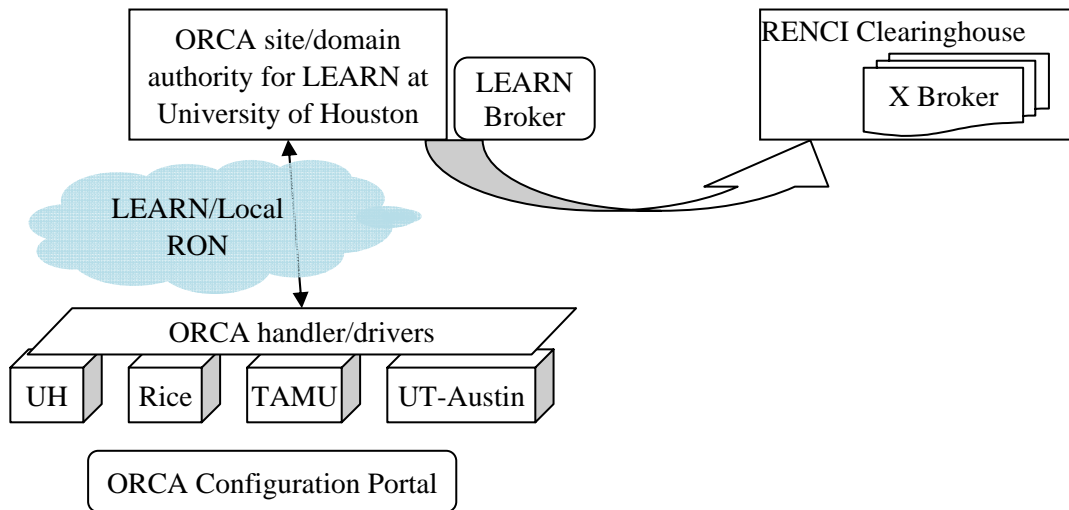


Figure 1. Draft components of ORCA *elements* (actors, site authority, broker, etc) during integration of LEARN into GENI. (to be updated after Cluster D meeting on November 17, 2009).

3 Spiral 2 Plan for LEARN Integration

Figure 1 illustrates the draft components of ORCA elements for LEARN integration [geni09_4]. These elements and their connectivity will be clarified during design discussions at GEC6 with Cluster D group. Specifically, site authority implementations will be required for each university (i.e., UH, Rice, UT-Austin, and TAMU) participating over LEARN in addition to an overall site authority for LEARN itself. The goal is to have each university delegate their resources on their own over ORCA.

LEARN will provide VLANs to GENI users using the outlined methods in Section 2. The integration with ORCA to setup LEARN as a new aggregate to GENI will be achieved in phases:

- (i) Implement a local ORCA control framework in Dr. Gurkan's lab.
 - a. ORCA domain authority for LEARN as well as other university site authorities
 - b. LEARN broker
- (ii) In parallel with the first step, deploy switch and computing resources at the volunteering sites on LEARN: University of Houston, Rice University, TAMU, and UT-Austin.
- (iii) Develop ORCA handlers/drivers for the resources and network nodes to be added to the LEARN nodes.
- (iv) Test ORCA domain authority in lab environment with the to-be-deployed network resources.
- (v) Deploy network resources to LEARN sites and test ORCA control framework integration with LEARN.

3.1 Switches

Low-end switches will be deployed on LEARN to be controlled through ORCA on the volunteering nodes around Texas: TAMU, UT-Austin, Rice University, and University of Houston. Necessary handlers and/or drivers will be developed with the help of Cluster D (RENCI-BEN). Initial plan is to share available Cisco 3750 switches and PCs already deployed for DCN implementations on these

nodes. The switches will be controlled by ORCA when an experimenter through ORCA is being served. Otherwise, the DCN setup can be utilized.

3.2 Deployment and Connection

The switches and PCs are already at the sites. The site authorities will be built at Dr. Gurkan's lab and eventually will be deployed on the nodes.

4 Summary and Conclusions

This milestone document is on the VLAN capabilities available on LEARN that can be made available for GENI users. Also, a ORCA integration plan has been provided in this document.

5 Bibliography

[1] [geni09_4] Global Environment for Network Innovations – Wikipedia, “Deploying a Vertically Integrated GENI “Island”: A Prototype GENI Control Plane (ORCA) for a Metro-Scale Optical Testbed (BEN) (Project Nr. 1582)” (2009, March) [Online]. Available: <http://groups.geni.net/geni/wiki/ORCABEN>