

GENI Network Stitching: Demonstration

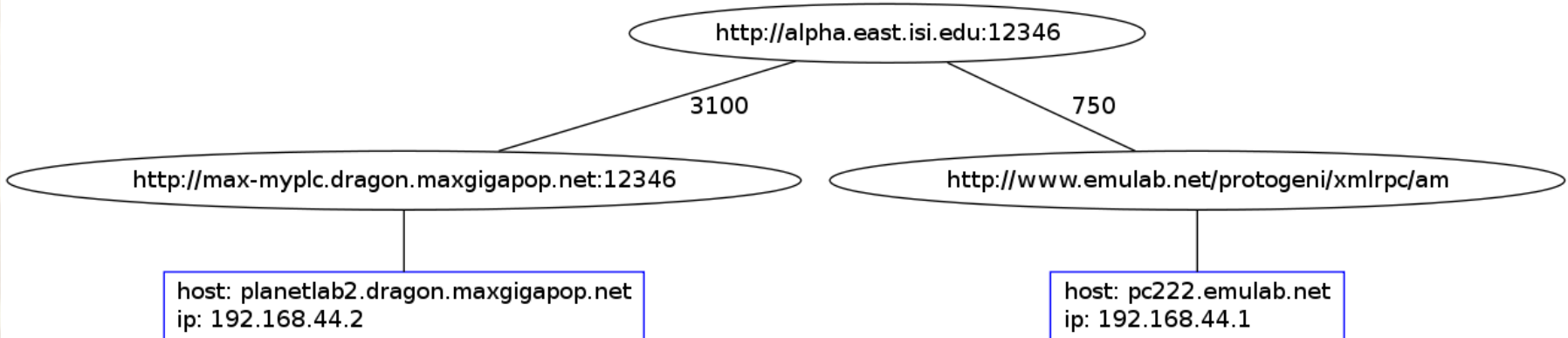
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- **Stitching Schema**
 - ProtoGENI Utah and Kentucky aggregates support (beta)
- **Stitching Client / Workflow Manager**
 - Uses Omni
 - No negotiation
- **Dynamic cross aggregate VLANs between different Aggregates and a backbone**
 - Based on developer access, capabilities and connections, we selected Internet2, ProtoGENI, and MAX

- Use only GENI AM API to talk to aggregates
- Includes a prototype Internet2/ION aggregate from ISI
 - IDC API under the covers
 - GENI AM API for clients
 - Would work with any IDC compatible network



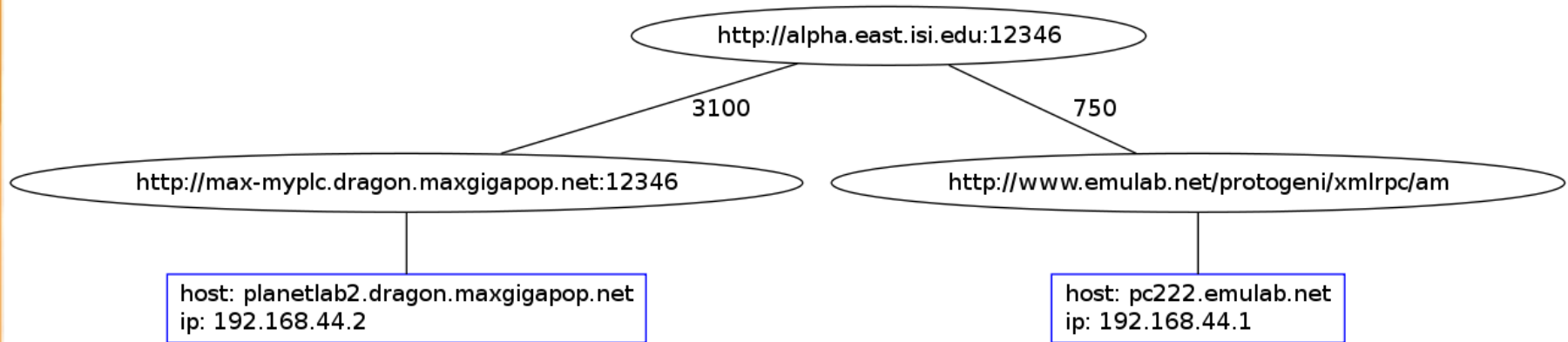
- Stitching Schema implementation incomplete
- No topology or path computation functions
- Components only prototypes
- No chain workflow implemented

- Based on Omni 1.3
 - Use Omni to do CreateSliver and ListResources at aggregates
- Assumes Topology information extracted elsewhere
 - Could be done from AM advertisements
 - Could come from the topology service
- Assumes complete requests for each aggregate
- Computes dependencies, ordering of requests
 - Based on having VLAN translation only
 - Could use number of connections, size of available VLAN range

- Find dependencies: Foreach aggregate
 - Note restrictions: like if can't do VlanTranslation
 - Loop through its neighbors (in the current topology)
 - If this aggregate does VLAN translation and the neighbor does not, then this aggregate depends on that neighbor
- Find an ordering: Foreach aggregate:
 - If it is not on the list yet:
 - Go through its dependencies: if any are not on the list yet, recurse for each
 - Add this aggregate to the list
- When aggregates that don't do VLAN translation return with a selected VLAN tag, that is edited into the request for the neighboring aggregate that does do translation

- Script takes complete request RSpecs
- Computes order
- Calls AM API CreateSliver at MAX and then PG
- MAX and PG assign VLANs to their link to ION
- Script takes those assigned VLAN IDs and inserts them in the ION request
- Calls CreateSliver at ION – Completes the Layer 2 Path
- SSH in to nodes at PG and MAX
- Traceroute shows single hop.
- ‘Layer 2 ping’ tool ‘pingPlus’ sends arbitrary Ethernet packets to show the link really is layer 2 and complete

- Stitching Schema works
- Tree Mode works now if no negotiation is needed
- Architecture works



- The current proposal for network stitching for GENI would allow reserving and instantiating (slices of) circuits across both regional and backbone networks. The proposal would allow circuits to be reservable through aggregate managers - either as part of an aggregate at a campus, or through stand-alone aggregate managers for each regional and backbone.
- The proposed GENI network stitching architecture aims to optimize interoperability between GENI aggregates that provide connections in backbone, regional, and local networks. The proposed architecture represents and acts on concepts in a way that is intended to be compatible with OSCARS and the various IDC interfaces in use in Internet2, ESNet, and others.
- For this GEC11 proof of concept demonstration, ISI has built a prototype GENI aggregate manager that talks the IDC API to reserve VLANs. This same aggregate could be used in future with any IDC API compatible network. Here, this aggregate is being used to provide backbone connectivity between ProtoGENI in Utah and the MAX network MyPLC nodes in Maryland. Specifically, this demo uses an OSCARS and IDC API compatible RSpec element to describe the requested circuit, and then uses the Internet2 ION API to reserve a path across Internet2 that provides VLAN translation.