

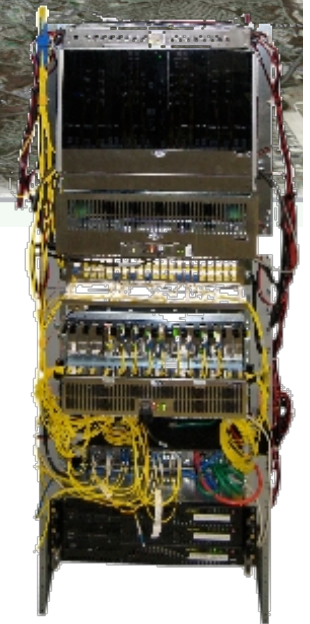
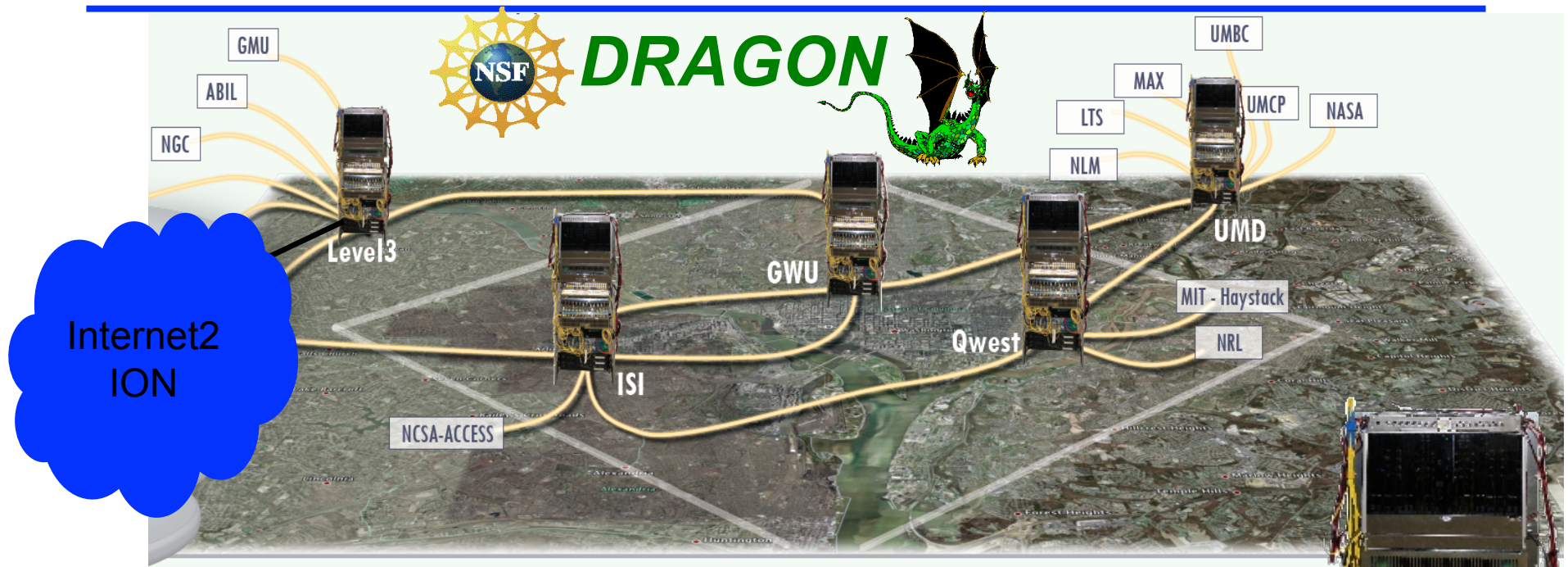
Mid-Atlantic Crossroads (MAX) and GENI

The Quilt GENI Workshop

July 22, 2010

Tom Lehman
(USC/ISI, Arlington VA)

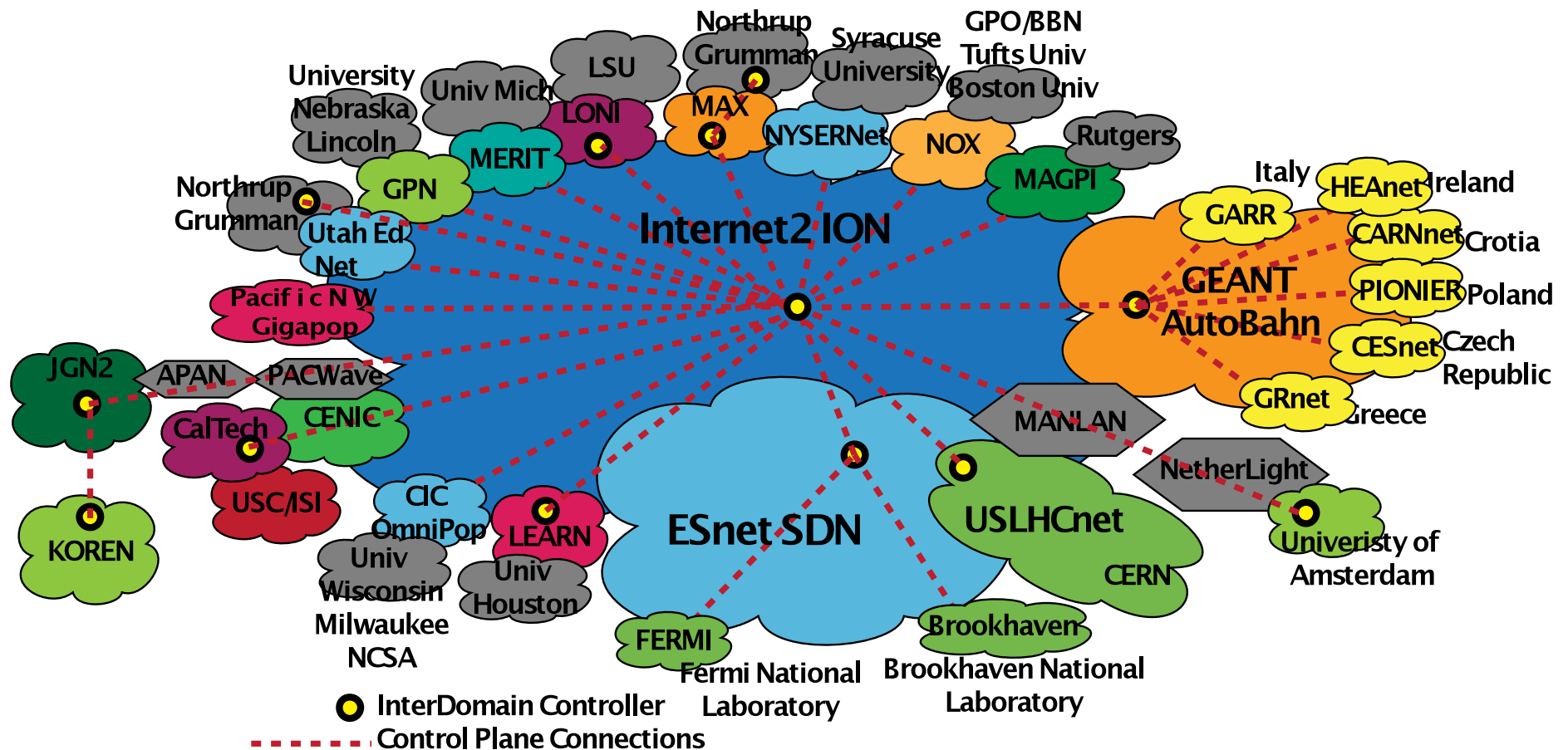
MAX Dynamic Network Services



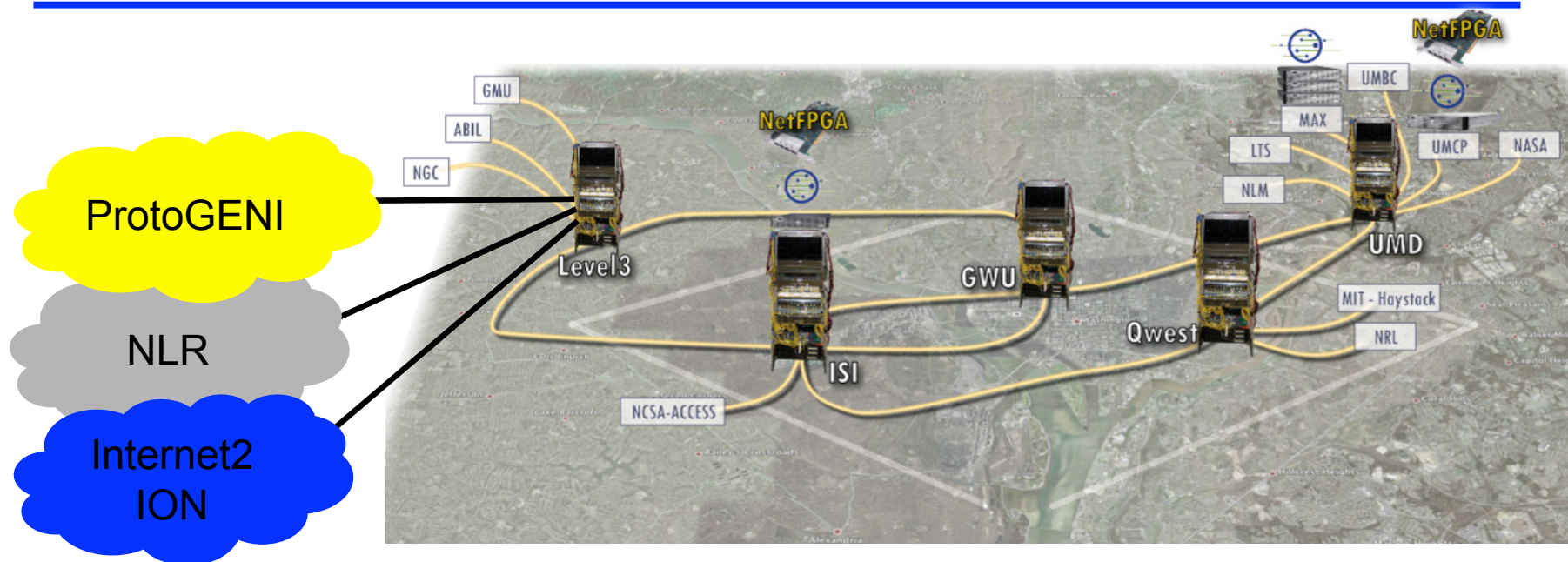
- Multi-layer network (Layer 1- lambda, Layer 2 - Ethernet)
- Dedicated Lambda Connections (Ethernet Framed and Pure Optical Interfaces)
 - Dynamic Layer 2 Ethernet Connections
 - Interconnect to Internet2 ION Service
- Dynamic Circuit Provisioning via InterDomain Controller (IDC) Based Control Plane (www.controlplane.net)



Global Dynamic Network Footprint



MAX GENI Substrate



GENI additions to MAX Capabilities/Services

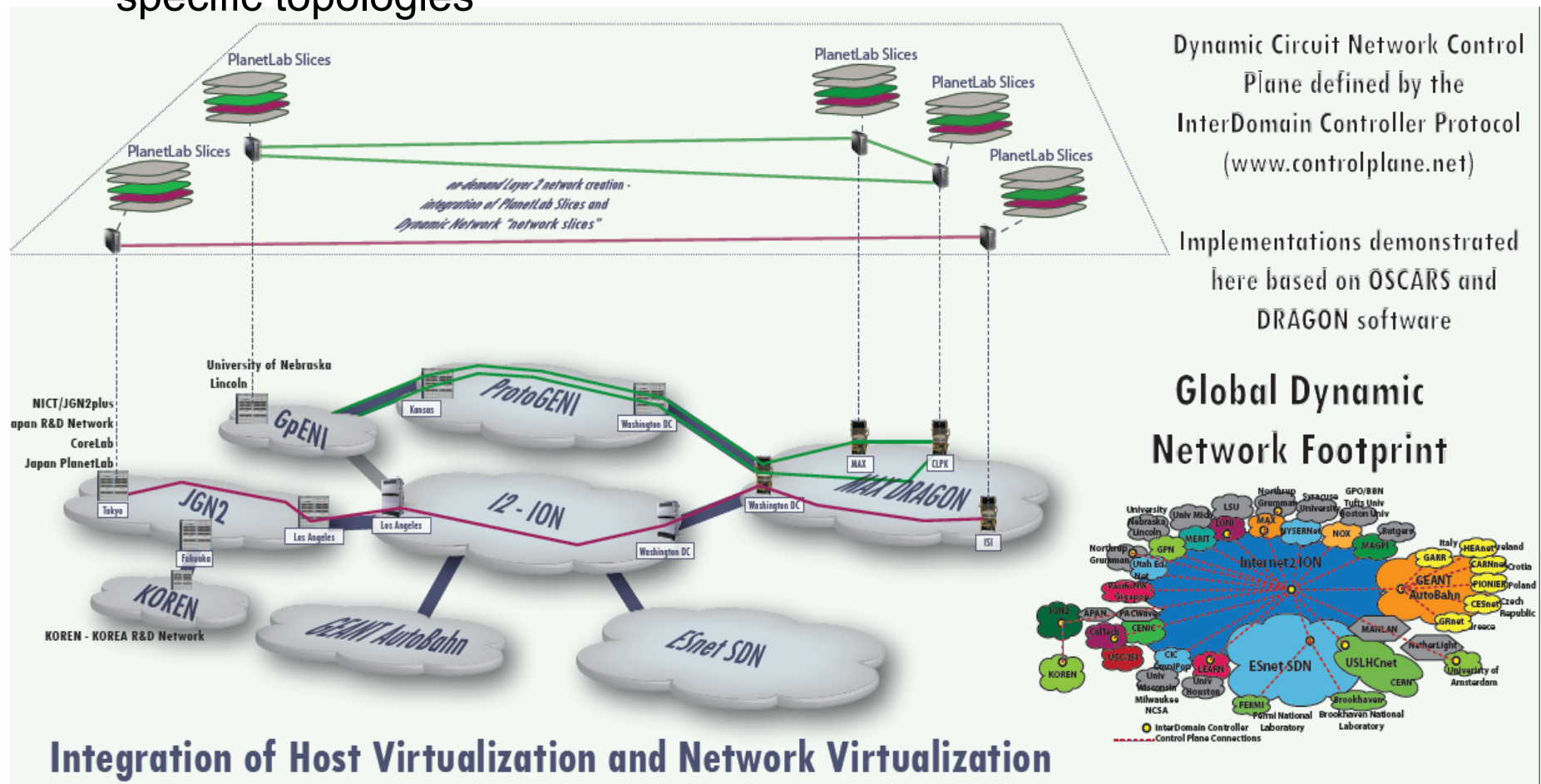
- PlanetLab hosts and MyPLC Controller
 - NetFPGA hosts
- Interconnect to ProtoGENI
 - Interconnect to NLR
- MAX GENI Aggregate Manager to integrate MAX base and GENI specific capabilities into a unified set of GENI Services
 - Accessible via the GENI Control Framework



Mid-Atlantic Crossroads

Integration of Host and Network Slivers

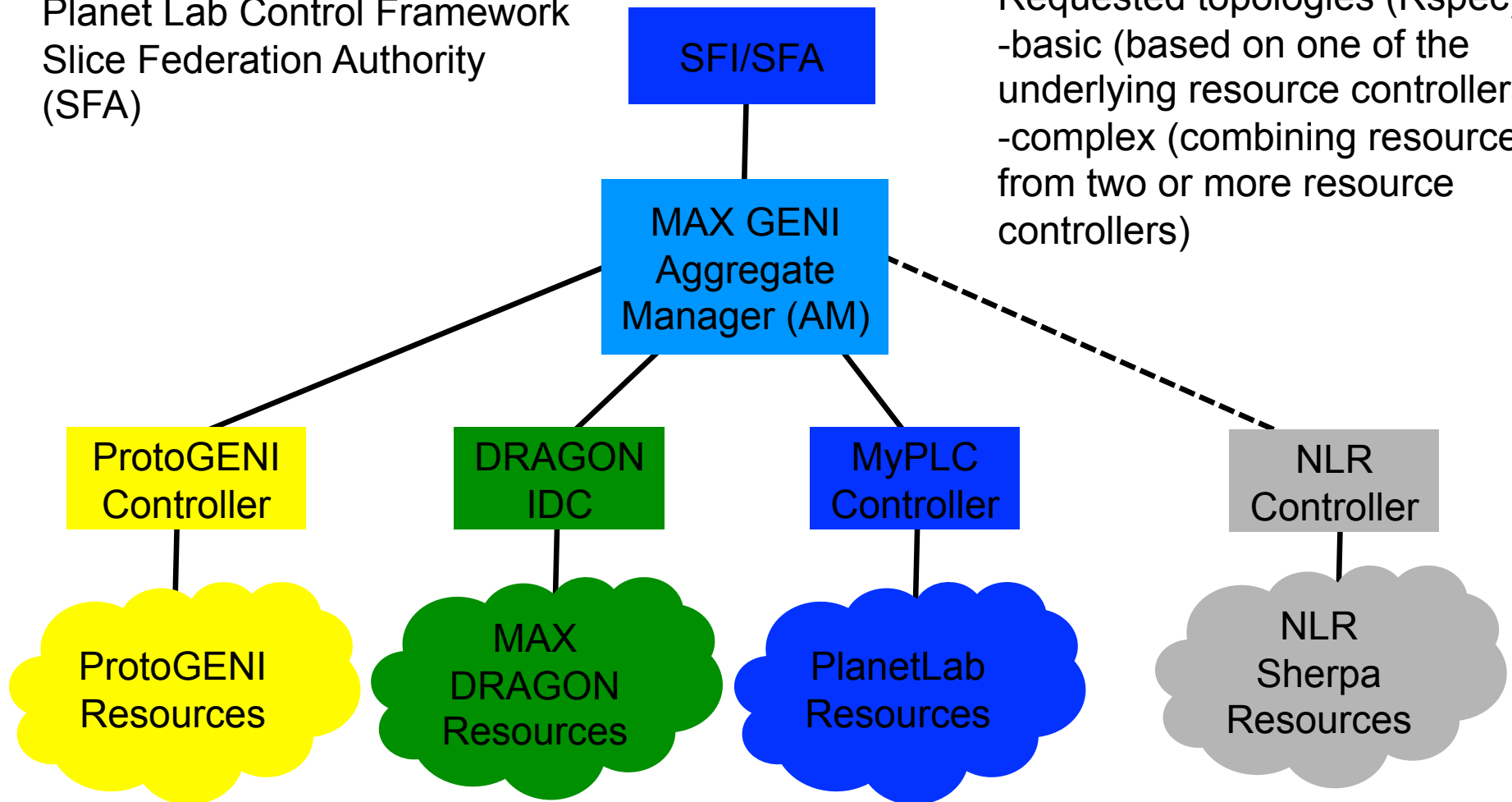
- Leveraging deployed dynamic circuit capability
- Integrate with host based capabilities, PlanetLab, to build experiment specific topologies



MAX GENI Aggregate Manager

Planet Lab Control Framework
Slice Federation Authority
(SFA)

Requested topologies (Rspec):
-basic (based on one of the
underlying resource controllers)
-complex (combining resources
from two or more resource
controllers)





MAX Aggregate Manager GENI Control Framework

- PlanetLab Control Framework
 - <http://svn.planet-lab.org/svn/sfa>
 - Rspec: max.xml – complete
 - SFA MAX-AM Plugin – underway
- <http://geni.maxgigapop.net/twiki/bin/view/GENI/AggMgrSFA>
- MAX GENI AM native API
 - <https://geni.dragon.maxgigapop.net:8443/axis2/services/AggregateGENI?wsdl>

createSlice
deleteSlice
getRSpec

SFI/SFA



MAX GENI
Aggregate
Manager (AM)

CreateSliceNetwork
DeleteSliceNetwork
GetResourceTopology
others

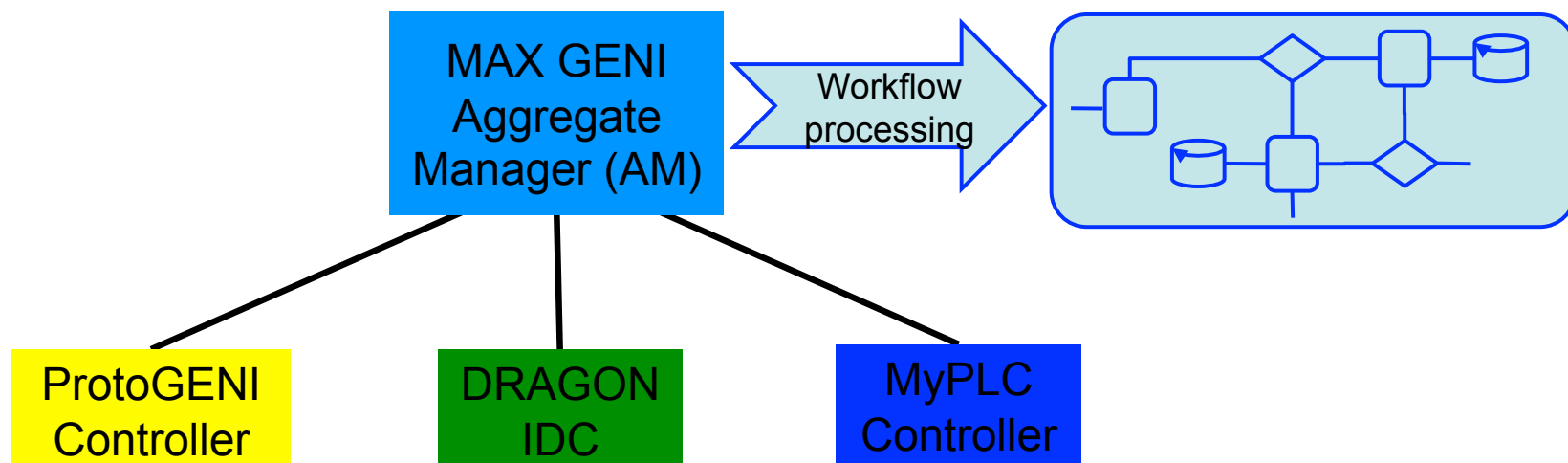


MAX AM Services

- 16 Services
- ListCapabilities, ListNodes, ListSlices, CreateSlice, DeleteSlice, UpdateSlice, StartSlice, StopSlice, QuerySlice
CreateSliceVlan, DeleteSliceVlan
QuerySliceVlan, CreateSliceNetwork
DeleteSliceNetwork, QuerySliceNetwork
GetResourceTopology

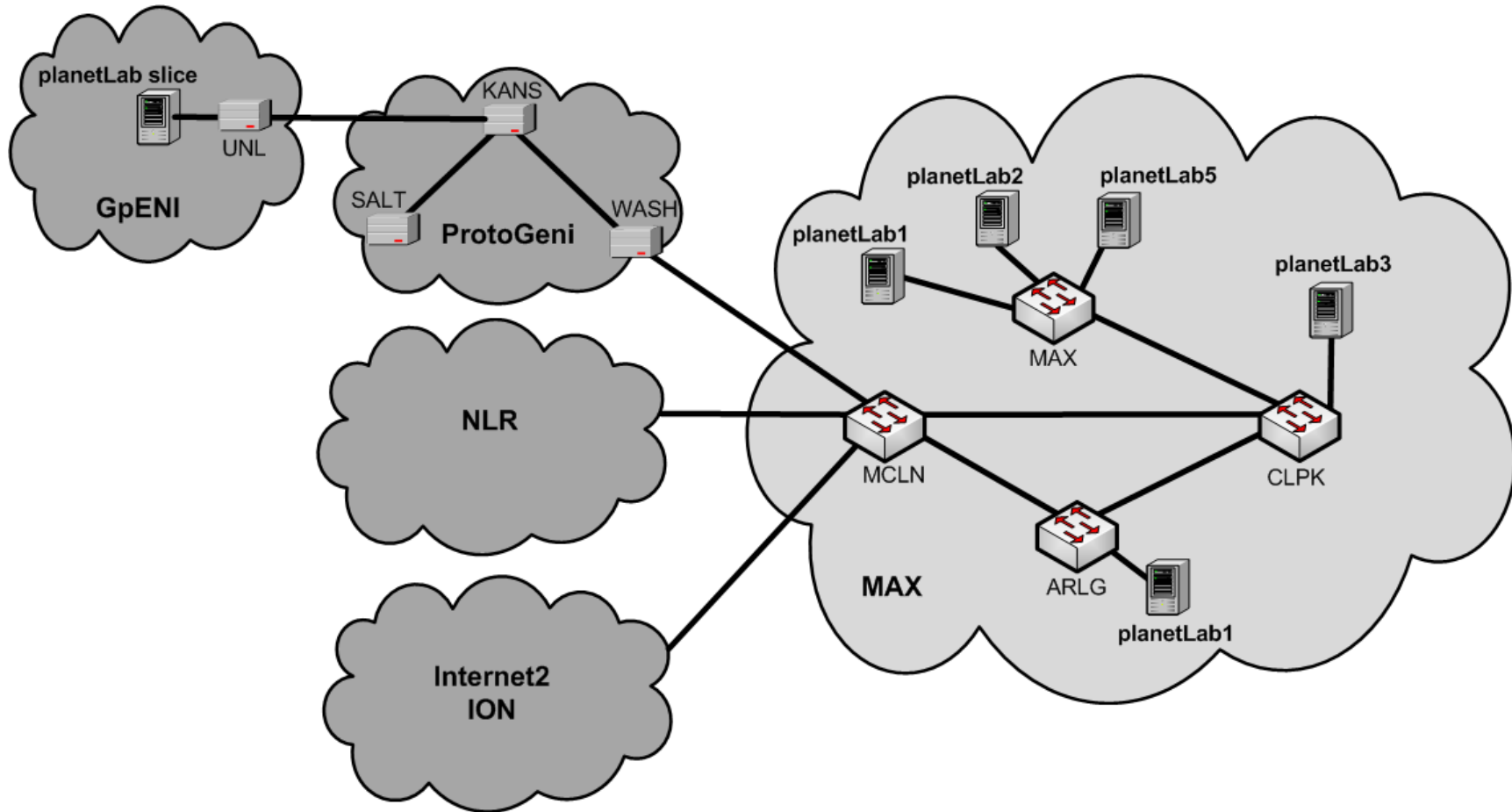
MAX GENI

Aggregate Manager

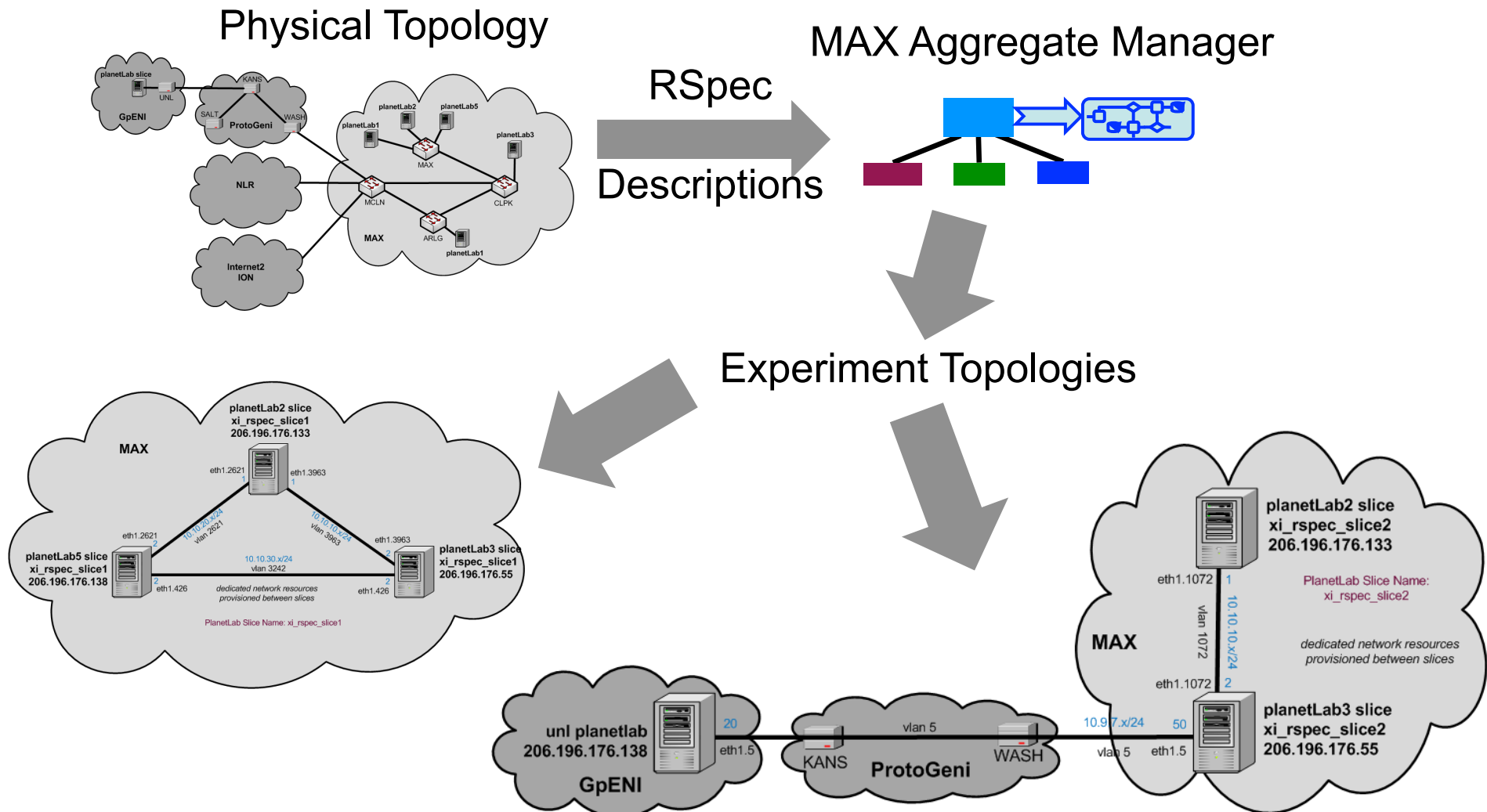


- MAX GENI AM communicates with various resource controllers via their native APIs
- DRAGON IDC: <https://idc.dragon.maxgigapop.net:8443/axis2/services/OSCARS>
- MyPLC Controller: <https://max-myplc.dragon.maxgigapop.net//PLCAPI/>
- ProtoGENI:
 - Slice manager - <https://www.emulab.net:443/protogeni/xmlrpc/sa>
 - Aggregate Manager - <https://www.emulab.net:443/protogeni/xmlrpc/cm>

Physical Topology View



Experiment Topology View





Demo

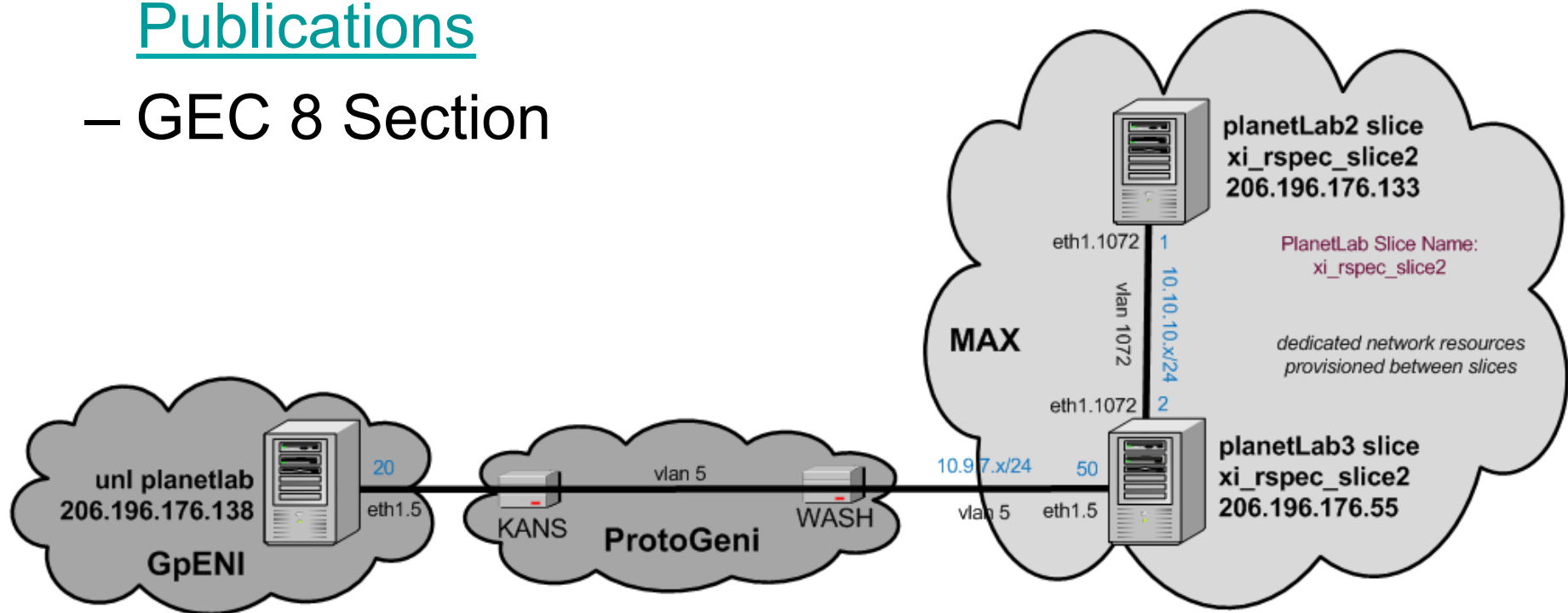
Request Rspec

[http://geni.maxgigapop.net/twiki/pub/GENI/Publications/
max_rspec_protogeni_anyvlan_stiching.xml](http://geni.maxgigapop.net/twiki/pub/GENI/Publications/max_rspec_protogeni_anyvlan_stiching.xml)
(use FireFox to view)

```
- <rspec id="xi_rspec_slice2">
  <aggregate>geni.maxgigapop.net</aggregate>
  <description>Xi's test rspec</description>
  - <lifetime id="time-1271533930-1271563981">
    <CtrlPlane:start type="CtrlPlane:TimeContent">1271174406</CtrlPlane:start>
    <CtrlPlane:end type="CtrlPlane:TimeContent">1271563981</CtrlPlane:end>
  </lifetime>
  + <computeResource id="urn:aggregate=geni.maxgigapop.net:rspec=my-test-max-rspec-slice2"></computeResource>
  - <externalResource id="urn:aggregate=www.emulab.net:rspec=max_slice2" type="ProtoGENI">
    <sliceManager uri="https://www.emulab.net:443/protogeni/xmlrpc/sa"/>
    <aggregateManager uri="https://www.emulab.net:443/protogeni/xmlrpc/cm"/>
  </externalResource>
  - <rspecData>
    <rspec xmlns="http://protogeni.net/resources/rspec/0.1"> <node virtual_id="bbg1" component_urn="urn:publicid:IDN+emulab.net+node+bbg1" virtualization_type="emulab-vnode"
    exclusive="1"> <interface virtual_id="virt0"/> </node> <node virtual_id="bbg2" component_urn="urn:publicid:IDN+emulab.net+node+bbg2" virtualization_type="emulab-vnode"
    exclusive="1"> <interface virtual_id="virt0"/> </node> <link virtual_id="link0"> <bandwidth>1000000</bandwidth> <interface_ref virtual_interface_id="virt0" virtual_node_id="bbg1" />
    <interface_ref virtual_interface_id="virt0" virtual_node_id="bbg2" /> </link> </rspec>
  </rspecData>
</externalResource>
+ <stitchingResource id="urn:aggregate=geni.maxgigapop.net:rspec=my-test-max-rspec-slice2:stiching=" type="p2pvlan"></stitchingResource>
</rspec>
```

Experiment Topology View

- Movie of setting up the below Topology via MAX AM located here:
 - <https://geni.maxgigapop.net/twiki/bin/view/GENI/Publications>
 - GEC 8 Section





WorkFlow TimeLine

1. (0:00) send rspec to MAX Aggregate Manager (AM)
2. AM sends externalSliver rspec to ProtoGENI
3. (1:10) ProtoGENI replies with sliver creation success status and manifest
4. AM sends slice creation request to MAX-MyPLC
5. (1:20) MAX-MyPLC replies with slice creation success
6. AM sends stitching p2pVLAN creation request to MAX-IDC
7. (1:23) AM configures stitching VLAN interface on a planetlab node
8. (1:27) AM finished planetlab VLAN interface
9. AM sends internal p2pVLAN creation request to MAX-IDC
10. (1:30) AM configures internal-slice VLAN interfaces on all planetlab nodes
11. (1:40) AM finished all planetlab VLAN interfaces
12. (2:40) both stitching and internal-slice p2pVLANs go active
13. (3:30) Vservers are created on all planetlab nodes

Notes:

- ProtoGENI reply may take up to 3 minutes
- PlanetLab VSERVERs may take up to 4 minutes to be ready



MAX Aggregate Manager – Misc Links

- GENI/PlanetLab Control Framework MAX Rspec
 - <http://svn.planet-lab.org/svn/sfa/trunk/sfa/rspecs/aggregates/>
- MAX Aggregate Manager Service Interface:
 - Human Readable Service Definition via Web Browser (FireFox)
 - <https://geni.dragon.maxgigapop.net:8443/axis2/services/AggregateGENI?wsdl>
- MAX MyPLC Service Interface
 - <https://max-mypc.dragon.maxgigapop.net/>
- DRAGON Network Provisioning Interface
 - <https://idc.dragon.maxgigapop.net:8443/OSCARS>
 - Human Readable Service Definition via Web Browser (FireFox):
 - <https://idc.dragon.maxgigapop.net:8443/axis2/services/OSCARS?wsdl>
- MAX GENI Aggregate Manager Web Site
 - <https://geni.maxgigapop.net/twiki/bin/view/GENI/Software>
- The demo movies and slides presented here:
 - <https://geni.maxgigapop.net/twiki/bin/view/GENI/Publications> → GEC8

Deployment Considerations

- What GENI Services do your users desire?
 - Host based resources (compute nodes, virtual environments, NetFPGA hosts)
 - Network based resources (dynamic provisioning)
 - Others
- Technology selection
- Deployment expertise
- System and User support



Thanks

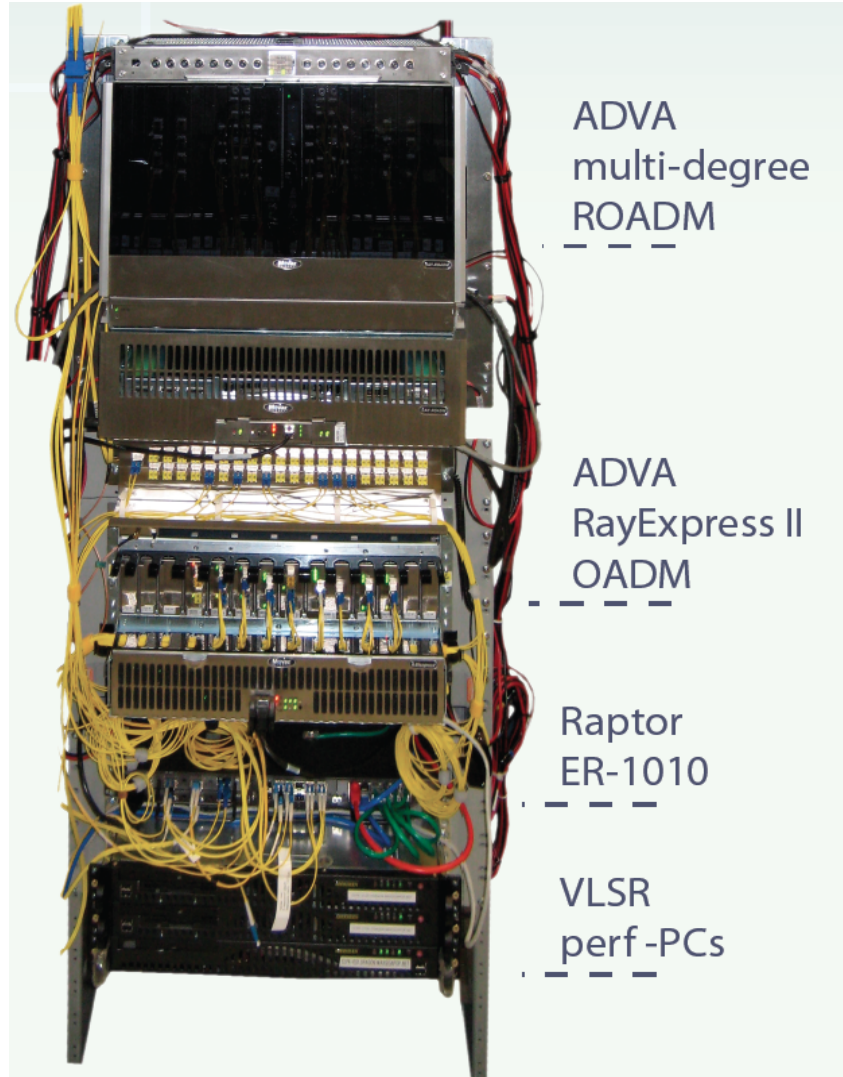
More Information:

<http://geni.maxgigapop.net>



Extras

MAX DRAGON Node



ADVA
multi-degree
ROADM
_ _ _

ADVA
RayExpress II
OADM
_ _ _

Raptor
ER-1010
_ _ _

VLSR
perf-PCs
_ _ _