GENI Transition Activities
UMD/MAX

GENI Engineering Conference 25

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MAX
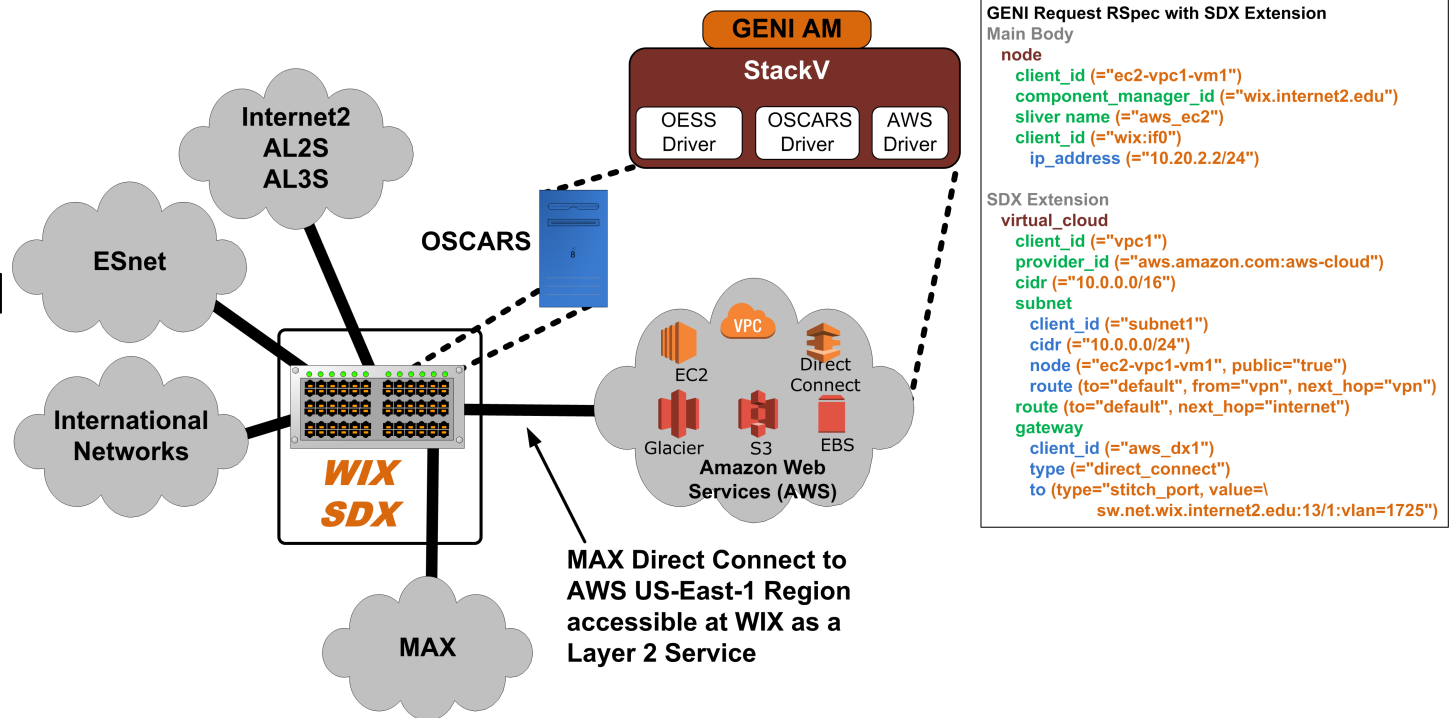MID-ATLANTIC CROSSROADS

GENI Transition Activities

- Support, maintenance, and updates for Stitching Computation Service (SCS)
  - Production SCS (run by GRNOC)
  - Test SCS (run by UMD/MAX)
  - Software: https://github.com/xi-yang/MXTCE-GENI-SCS
- General GENI Stitching support and troubleshooting
- MAX DCN GENI Aggregate Manager
  - Software: https://github.com/xi-yang/GENI-DCN-AM
  - For OSCARS and NSI network regions
  - GRAM GENI AM based
- Information: https://wiki.maxgigapop.net/twiki/bin/view/GENI/NetworkStitchingSoftware

WIX SDX

- WIX is a production Exchange Point in McLean, Virginia (jointly operated by Internet2 and MAX)

- Includes OSCARS service enabling Dynamic Cross Connects

- MAX has made its AWS Direct Connect Service available at the WIX via Layer2 VLAN service

- MAX runs a GENI AM/StackV instance with OSCARS and AWS drivers

- GENI Stitching to WIX for GENI Slice with with AWS attachment

GENI AM

StackV

OESS Driver | OSCARS Driver | AWS Driver

Internet2 AL2S AL3S

OSCARS

ESnet

International Networks

WIX SDX

MAX

VPC

EC2

Direct Connect

Glacier   S3   EBS

Amazon Web Services (AWS)

MAX Direct Connect to AWS US-East-1 Region accessible at WIX as a Layer 2 Service

```
GENI Request RSpec with SDX Extension
Main Body
  node
    client_id (="ec2-vpc1-vm1")
    component_manager_id (="wix.internet2.edu")
    sliver name (="aws_ec2")
    client_id (="wix:if0")
        ip_address (="10.20.2.2/24")

SDX Extension
  virtual_cloud
    client_id (="vpc1")
    provider_id (="aws.amazon.com:aws-cloud")
    cidr (="10.0.0.0/16")
    subnet
      client_id (="subnet1")
      cidr (="10.0.0.0/24")
      node (="ec2-vpc1-vm1", public="true")
      route (to="default", from="vpn", next_hop="vpn")
    route (to="default", next_hop="internet")
    gateway
      client_id (="aws_dx1")
      type (="direct_connect")
      to (type="stitch_port, value=\
              sw.net.wix.internet2.edu:13/1:vlan=1725")
```

WIX SDX – Transition to GENI Operational Status

- GENI Enabled WIX SDX
  - Hopefully transition to GENI Operational Status
  - Add WIX Aggregate Manager and inter-aggregate links to AL2S, MAX to GENI Operational topologies
  - Work with GRNOC to figure out how to monitor and maintain
  - Make WIX SDX including access to AWS Direct Connect (with some local access policies) generally available to GENI Federation
  - MAX AM - SDX open source at https://github.com/xi-yang/GENI-DCN-AM/tree/SDX-0.2
  - UMD/MAX developed StackV is an open source model driven orchestration system: github.com/MAX-UMD/stackV.community

GENI Development

- MAX InstaGENI Rack
  - Move dataplane connections to the UMD/MAX Software Defined ScienceDMZ (SD-SDMZ)
  - Add multiple dataplane connections to facilitate building of topologies to WIX SDX, AL2S, and UMD/MAX SD-SDMZ
  - Possibly upgrade dataplane connections to 10G
- GENI Enabled Software Defined ScienceDMZ (SD-SDMZ)
  - Continued development for GENI AM on top of Software Defined ScienceDMZ at UMD/MAX
- GENI Enabled Software Defined Exchange (SDX) at WIX
  - Additional policy granularity
  - Dynamic policy adjustments
  - Integrate additional external resources, possibly including Rackspace, Microsoft Azure, Google Cloud, or Equinix Cloud Exchange
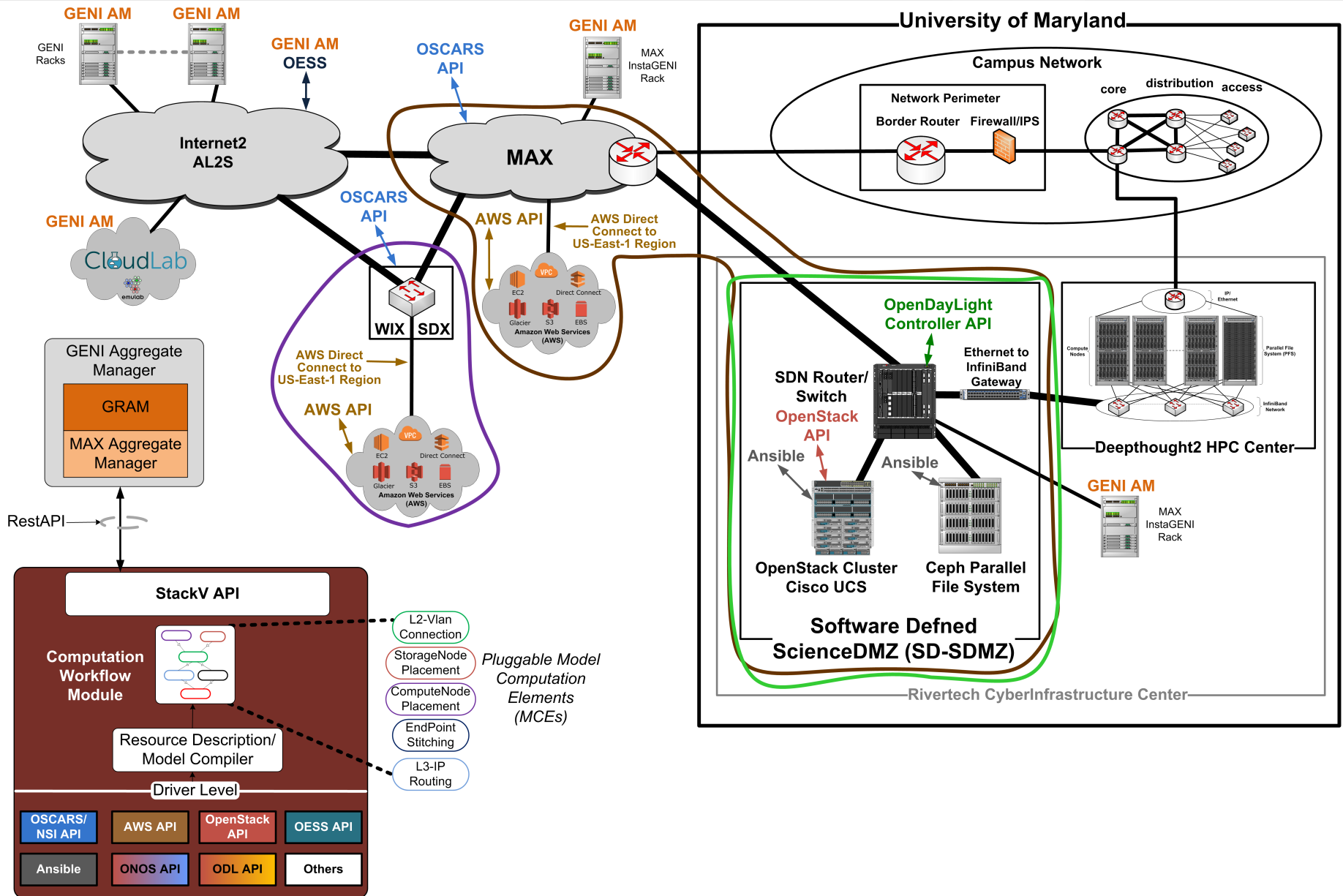
Extras

GRAM based GENI AM Policy Control for SDX and SD-SDMZ

- GRAM with ABAC like policy features for resource access control:
  - Federation(Clearinghouse), Virtual Organization (Project), Slice, User
  - VLANs (total), Bandwidth, VMs, Ceph Storage, SR-IOVs
- Future Features Desired:
  - Realtime policy adjustments
  - More policy granularity (specific VLANs, resources)
  - SDXs with compute and storage embedded

Software Defined in Context of R&E Cyberinfrastructure

Thanks