
GENI Stitching and Computation Enhancements

GENI GEC18

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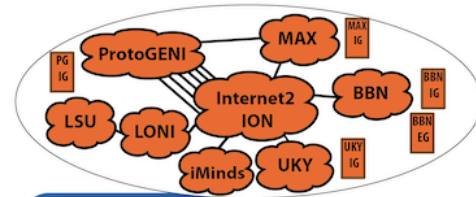


GENI Stitching

- **Objective for GENI Stitching is to provide "network interconnects" between Slivers across multiple Aggregates:**
 - "network interconnects" today means Layer2 VLANs circuits
- **These Layer 2 VLANs paths may cross a large variety of network types**
 - campus, regional, wide area, exchange points
 - multiple methods for provisioning VLANs
 - static pre-configuration of a range of VLANs
 - dynamic VLAN provisioning (OSCARS, OESS, OpenFlow, NSI, others)
 - some networks will have a GENI AM

Stitching

Architecture



Advertisement RSpec w/stitching

AMs

- pulled via GENI AM ListResources
- preloaded for all DCN w/o GENI AM
- indicates DCN true or false

Topology Service

Stitching Computation
workflow computation



1 Request RSpec

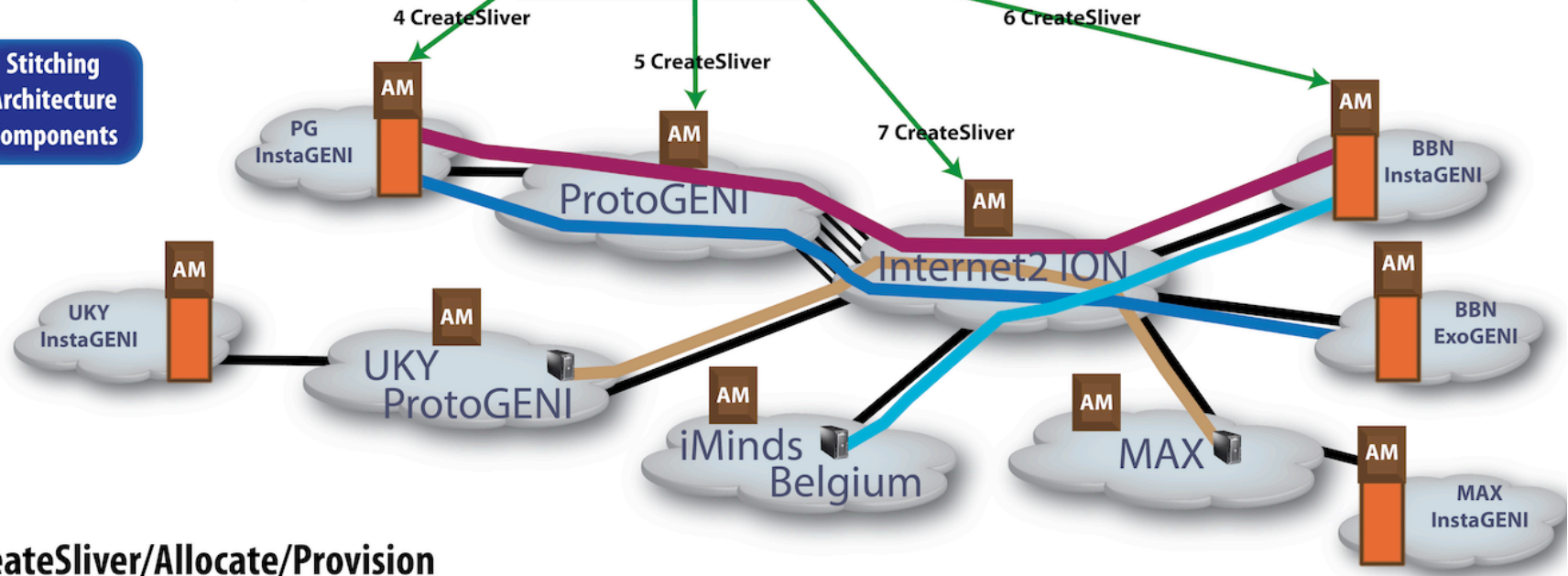
OMNI (client tool)
workflow

3 (Request RSpec Expanded)
CreateSliver/Allocate/Provision WorkFlow Rules



- workflow logic**
- CreateSliver (v2 API)
 - Allocate/Provision (v3 API)

Stitching Architecture Components



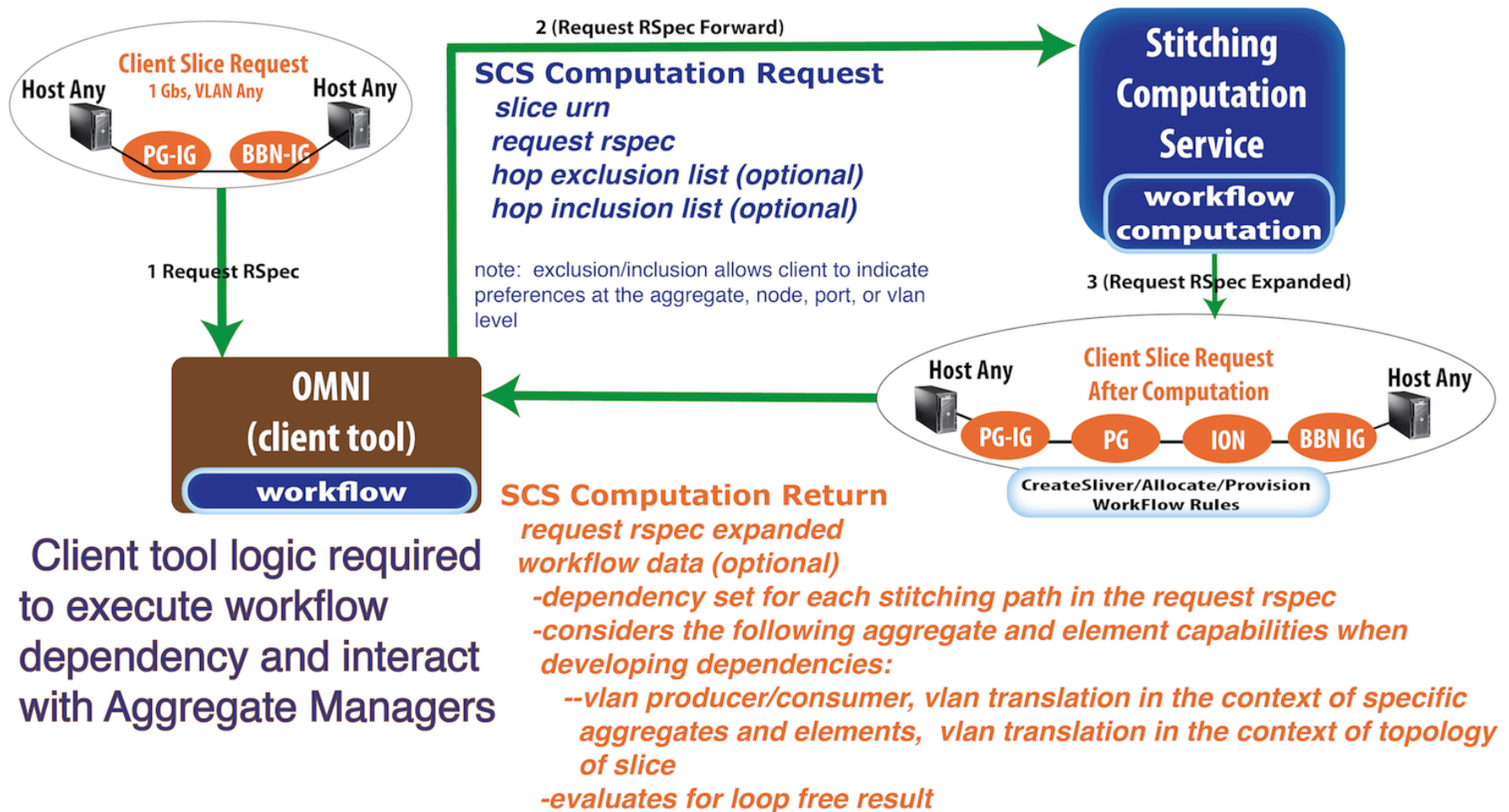
→ CreateSliver/Allocate/Provision

Stitching Architecture Components

- **Stitching Extension**
 - for Advertisement, Request, and Manifest RSpecs
- **Stitching Computation Service**
 - with workflow rule generation
- **Workflow Execution Stitching Functions**
 - for integration into clients such as OMNI, Flack, GENI Portal, and others
- **Stitching Topology Service**
 - collects Advertisement RSpecs from GENI AMs
- **GENI AM API (v2, v3) Stitching Processing**
 - v3 has features to facilitate Stitching with negotiation

Stitching Computation Service (SCS)

SCS used at slice instantiation time by tools like OMNI



Stitching Computation Service

- Includes a workflow data generation option, which provides guidance to client tools (Omni) for interaction with AMs.
- Workflow data returns array of recursive dependencies indicating proper sequence and associated actions for Aggregate requests
- **The following information/capabilities are utilized to calculate dependencies**
 - vlan producer/consumer status
 - vlan translation capabilities
 - vlan continuity (position of specific aggregates in the expanded RSpec and available vlan range size)
 - evaluates for loop free result
- **Advertisement RSpec information is utilized as needed to calculate expanded RSpec and dependencies**
- **Implementation Status**
 - prototype under test now
 - details available here:
 - <http://geni.maxgigapop.net/twiki/bin/view/GENI/NetworkStitchingAPI>

Stitching Service

Enhancement Focus Areas

- **Expand Stitching Technologies to include other options beyond VLANs**
 - OpenFlow
 - GRE Tunnels
 - Stateless Transport Tunneling (STT), Virtual Extensible LAN (VXLAN), NVGRE, others
- **Support for multi-point topologies with bridged broadcast domains of different types**
- **Include more precise definition of path types and characteristics**
- **Support interactions associated with AM APIv3**

Stitching Service Enhancement Focus Areas

- **These will required enhancements to multiple components of the GENI Stitching Architecture**
- **Stitching Extensions for the Advertisement, Request, and Manifest RSpecs**
- **Stitching Computation Service**
 - Topology Computation and Workflow Rule generation
- **Workflow Processing**
- **Aggregates will also have to support other stitching technologies**

Stitching Computation Service Enhancement Focus Areas

- **Currently Stitching Computation is utilized at Slice Instantiation time by tools, like OMNI, during the "Tool to Aggregate Interaction Phase"**
- **Tool to Aggregate Interaction Phase**
 - After tool has received Request RSpec from user
- **We plan to enhance the SCS to make it useful during the "Experimenter to Tool Interaction Phase" phase as well**
- **Experimenter to Tool Interaction Phase**
 - where experimenters may be exploring their options for Experiment topologies and possible stitching options
 - prior to submitting Request RSpec to tool
- **And possibly during the Experiment Operation Phase**

Stitching Computation Service Enhancement Focus Areas

- **Experimenter to Tool Interaction Phase**
- **As part of Request RSpec build process, Experiment (via Tools integration) can query SCS to learn about options such as:**
 - Options for stitching between two or more aggregates
 - Queries may include exclude or include constraints
 - Constraints may be specific aggregates, or stitching technology types, bandwidth parameters
 - Upon review of options gathered from SCS during this phase, a Request RSpec can be generated for submission to slice set up tool.

Thank you
