

I&M Developer Topics

Marshall Brinn and Jeanne Ohren

GPO

GEC20, Davis CA

July 23rd, 2014

- Ramp-down of GEMINI and GIMI projects
 - How do the tools live on after the projects wind down?
- Transition of services and support
 - What needs to be transitioned and how?
- Experimenter Feedback
 - A mini-panel of experimenters share feedback on the tools, how they are using them, how they would like to use them
 - Discuss what we want to keep doing, what we can try to improve
- OpenFlow I&M
 - Discussion of how we can measure OpenFlow and SDN in experiments
 - How can OpenFlow help us measure experiments

Ramp-down of GEMINI and GIMI Projects

- What output do we need from the projects to enable the tools to live on after the projects?
 - Maintenance and support of services
 - Documentation of services and tools
 - Collection of software repositories
 - Plan for ongoing experimenter support
 - Plan for ongoing image maintenance
 - Plan for ongoing service maintenance
 - What else?

Transition of services and support

- Each project has a set of services that need ongoing support and maintenance
 - Monitoring resources and events
 - Security updates
 - Certificate maintenance
 - Critical defects
- As experimenters continue to use and hopefully increase usage of the tools, issues will arise and need to be addressed.
 - Experimenters will have questions on how to use the tools to perform measurements in their experiments

- **Services**

Service	Location
Labwiki	Umass (emmy10)
Job Service	Umass (emmy10)
AMQP Server	Umass (emmy10)
OML Server	Umass (emmy10)
GES	Umass (emmy10)

- **Images**

- **Services**

Service	Location
GENI Desktop	Kentucky
GENI Desktop Parser	Kentucky
UNIS	IU
GEMINI Repository Server	Kentucky
GENI Desktop Archive Server	Kentucky

- **Images**

Service	Location
iRODS Server	RENCI (geni-gimi)
iRODS REST Interface	RENCI (geni-gimi)

- A discussion with those who have used or work with those who use the I&M tools about their experience with the tools.
- Vic Thomas
 - GPO Experimenter Support Group
 - Supports experimenters using I&M tools
 - Supports classes using GENI tools
- Satyajeet Padmanabhi
 - Univ. of Houston
 - Simulation, Detection, and Denial of Ping Attack
 - Using GIMI tools

- How have you been using the I&M tools?
- What is working well?
- Where are the stumbling blocks?
- What would make things a little easier for the experimenters?
- How would you like to use the tools?

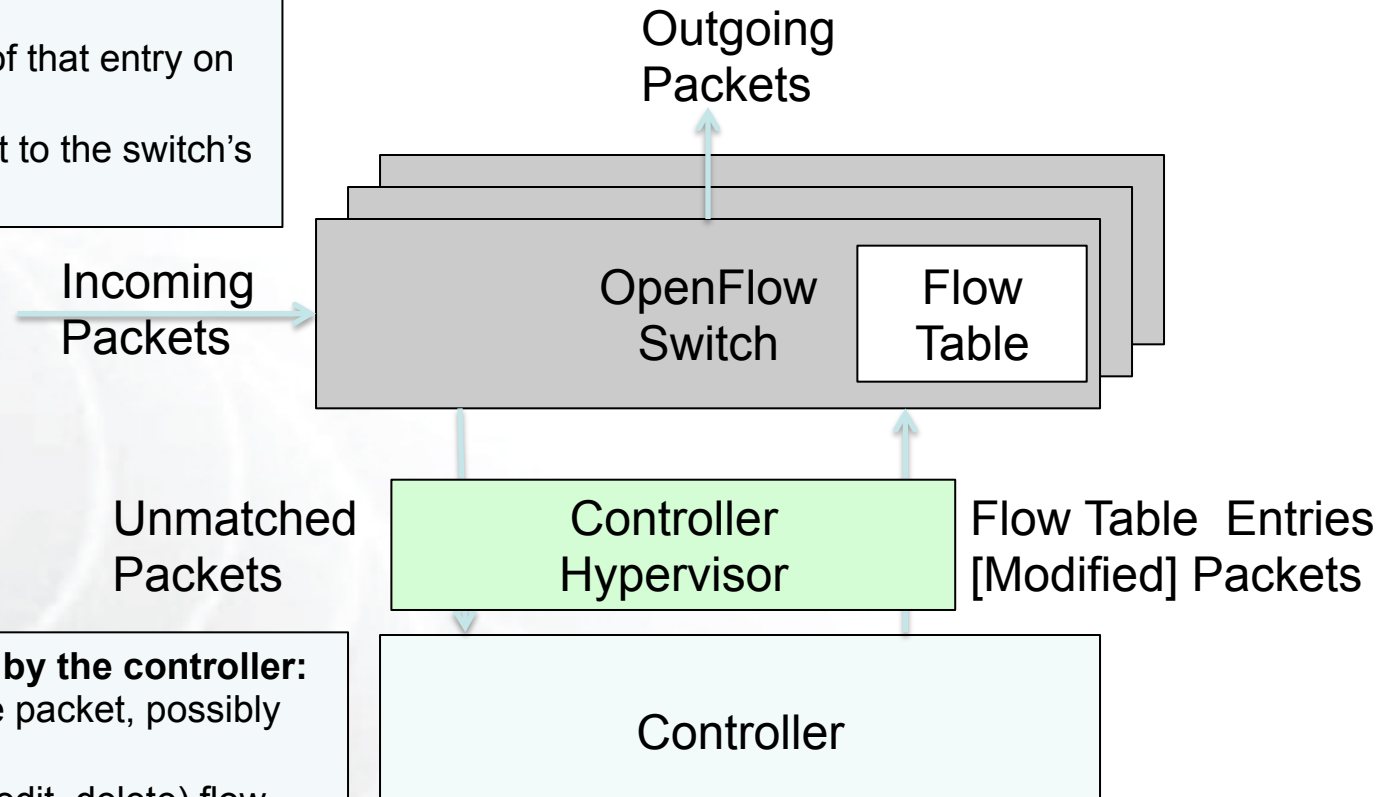
Future I&M Directions: SDN/OpenFlow

- OpenFlow (OF) and Software-defined Networking (SDN) in general are becoming a critical part of commercial and research networking infrastructure
 - Including GENI.
- I suggest we explore the overlap of I&M and OpenFlow/SDN
 - How they might enhance one another?
 - How they might challenge one another?

OpenFlow Essentials: Schematic

When a packet is received by the switch:

- It sees if any flow entries match the action.
- If so, it takes the action of that entry on that packet
- If not, it sends the packet to the switch's controller.



When a packet is received by the controller:

- The controller returns the packet, possibly modified.
- It may also modify (add, edit, delete) flow entries that allow the switch to handle packets like this in the future without consulting the controller.

Controller Hypervisor (e.g. FlowVisor)

- Serves as a Controller to the Switch and a Switch to the Controller.
- Effectively slicing the switch (along some dimension, e.g. VLAN) to support many controllers
- Giving the impression to the controller that it controls the whole switch.
- Protecting switch against misbehaving controllers

OpenFlow Essentials: Flow Entry

Flow Entries consist of three parts:

- The **Match criteria** determine which packets are applicable to a given entry

In Port	VLAN ID	Ethernet	IP	TCP
		SRC DST TYPE	SRC DST	SRC DST

- The **Action rules** specify the actions to be taken on the packet if they match:
 - Pass packet to controller
 - Modify packet header
 - Drop packet
 - Send packet out a given port
- The **Priority** determining the order in which entries are applied.

- What can we measure about OpenFlow (determining the impact of OF vs non-OF topologies)?
- How can we use OpenFlow to help perform Monitoring, Instrumentation, Orchestration, Analysis?
- Are there ways in which OpenFlow and I&M may be at cross-purposes (different notions of control, inherent limitations, things that are harder to measure because of OF).

- Is there a natural 'OpenFlow-multiplexer' (think: FlowVisor) that makes sense in an I&M context for a specific experiment? Otherwise, how can we support I&M on a large number of OF-enabled experiments with a limited number of HW switches?
- Does incorporation of OpenFlow into experimental topologies change the KIND of experiments we can run, or only the ways we can instrument/monitor them?

- Let's take a moment to consider these and related questions
- Then let's try to discuss this critical area of the future of I&M in network experimentation.