

Instrumentation Tools for A ProtoGENI Prototype (GEC- 6 Project Update)

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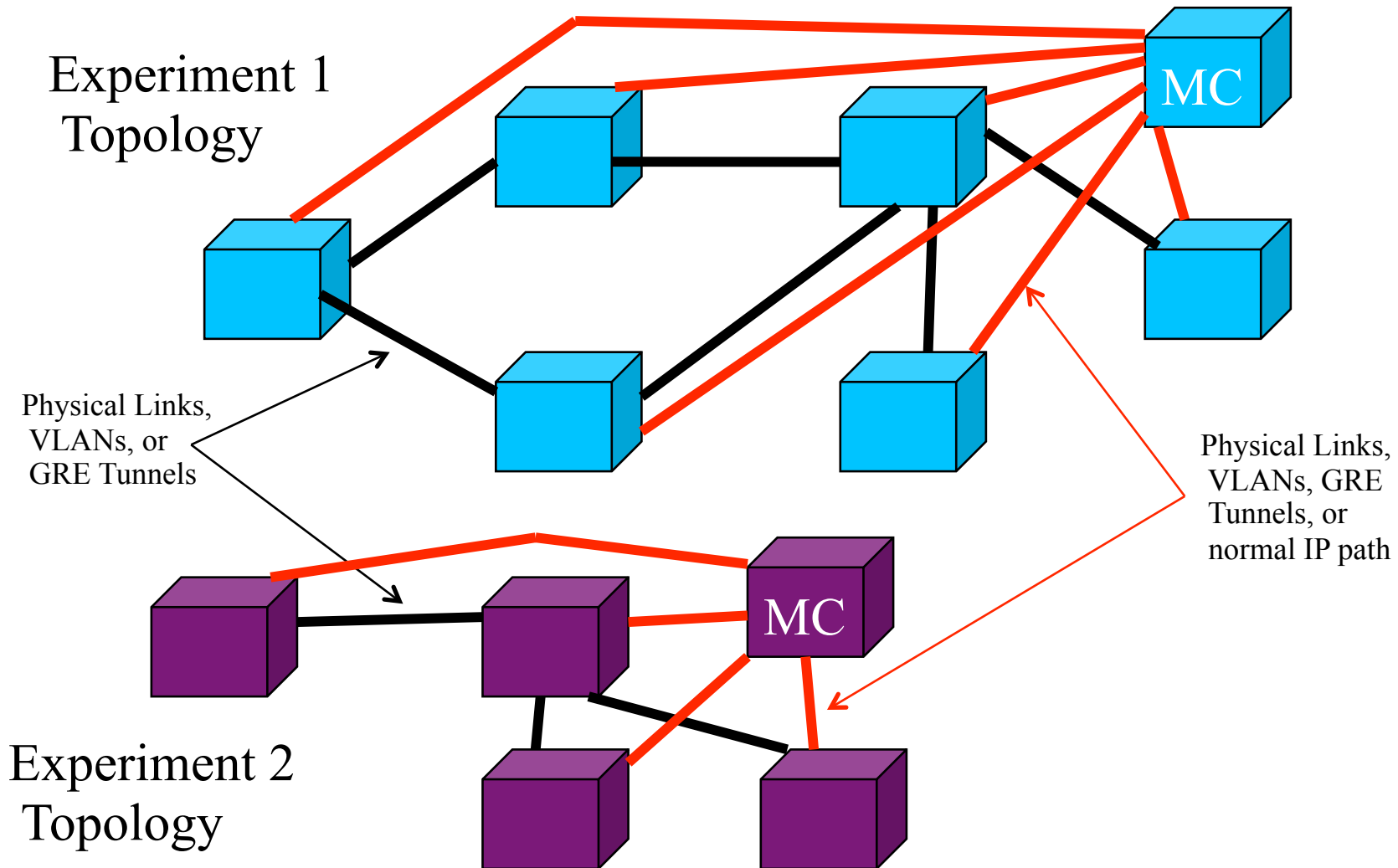
Context/Status

- ProtoGENI running on UK Emulab federated via the Utah Clearinghouse
- Implementing the Kentucky instrumentation and measurement interface.
- Initial version of the instrumentation software is running, but several workarounds regarding security (see demo later)

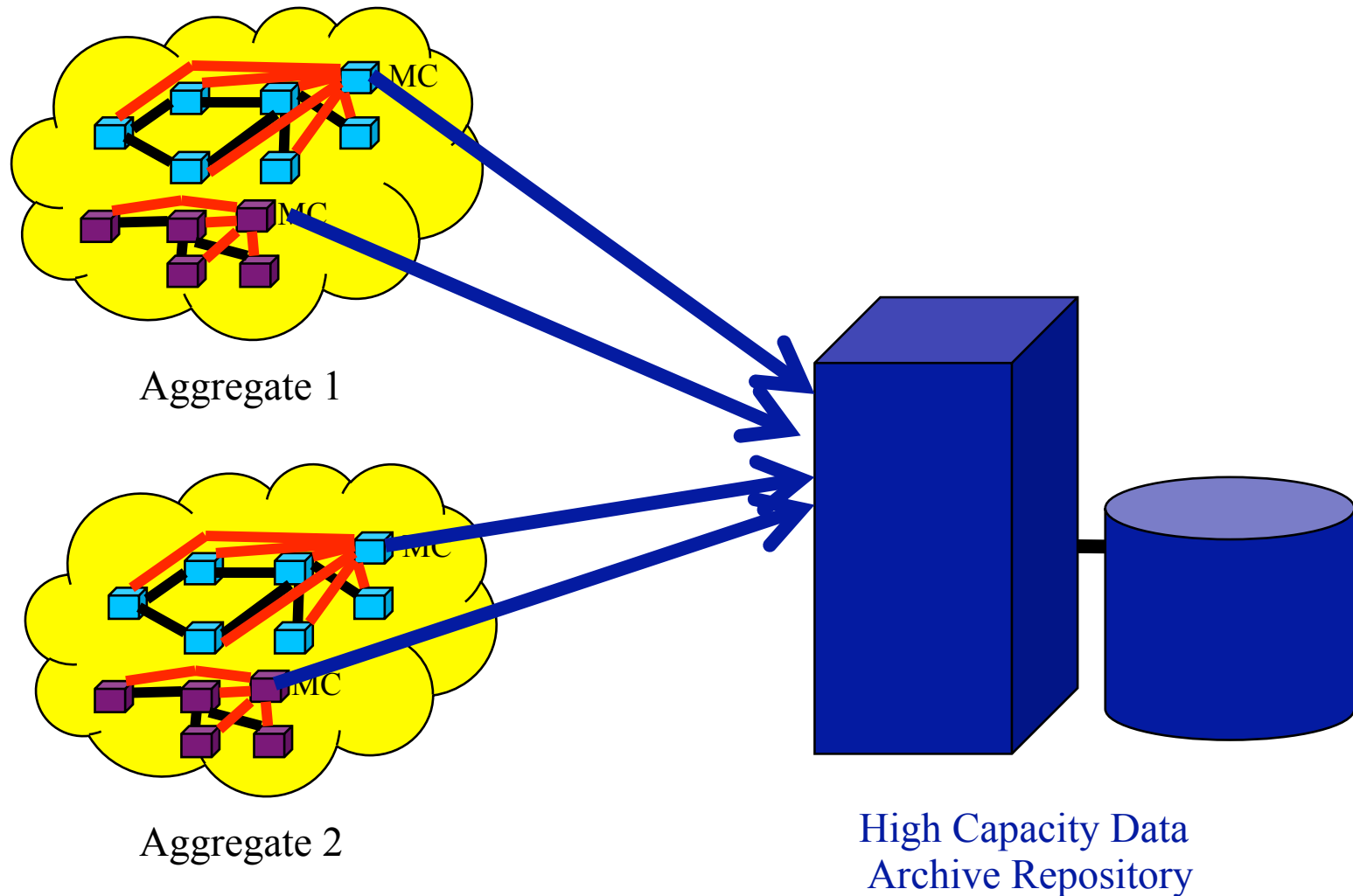
Measurement Controllers

- Each experiment has its own **measurement controller (MC)** that controls and collects packets and network state from measurement points in that experiment.
 - A **measurement point (MP)** is a packet sensor (link sensor in *GIMS* terminology) or a network state sensor.
- An experiment that spans aggregates will have (at least) one measurement controller per aggregate.
- Each MC is an extra sliver in the experiment (e.g., an additional node or virtual node).
- MCs are not dependent on the experimental network for connectivity to MPs.
- MCs obtain experiment topology information from the slice and component managers.
- Assume that MCs have significant amounts of storage.
- MCs offer a web-based interface to the data collected.
- Debating a global MC for each experiment.

Measurement Controller in ProtoGENI



Sharing and Archiving



Measurement-Capable ProtoGENI Nodes

- Working with Utah to develop a ProtoGENI node image that will be capable of capturing network state and packet state (i.e., an MP) .
- Packet capture software (tcpdump or custom code)
- SNMP daemon + extensions
- Node state daemon
- Control daemon to enable/disable monitoring
- Data processing on the MP should be avoided

Thank You!

Questions?

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A ShadowBox-based ProtoGENI Instrumentation and Measurement Infrastructure

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ShadowBox Participants

- James Griffioen (University Kentucky)
- Zongming Fei (University of Kentucky)
- Jacobus (Kobus) van der Merwe (AT&T)
- Eric Boyd (Internet 2)

The Big Picture

- ShadowBox is part of a larger effort to develop a **ProtoGENI Instrumentation and Measurement Infrastructure (pGIMI)**
- The pGIMI team consists of:
 - **Kentucky** - Instrumentation Tools and Interfaces
 - **AT&T** - Control software for virtualizable routers
 - **Internet 2** - Router deployment and connectivity
 - **Delaware** - Incorporate perfSONAR software
 - **Utah** - Integrate the above into ProtoGENI

ShadowBox Project

(A Carrier-grade Virtualized Backbone Router)

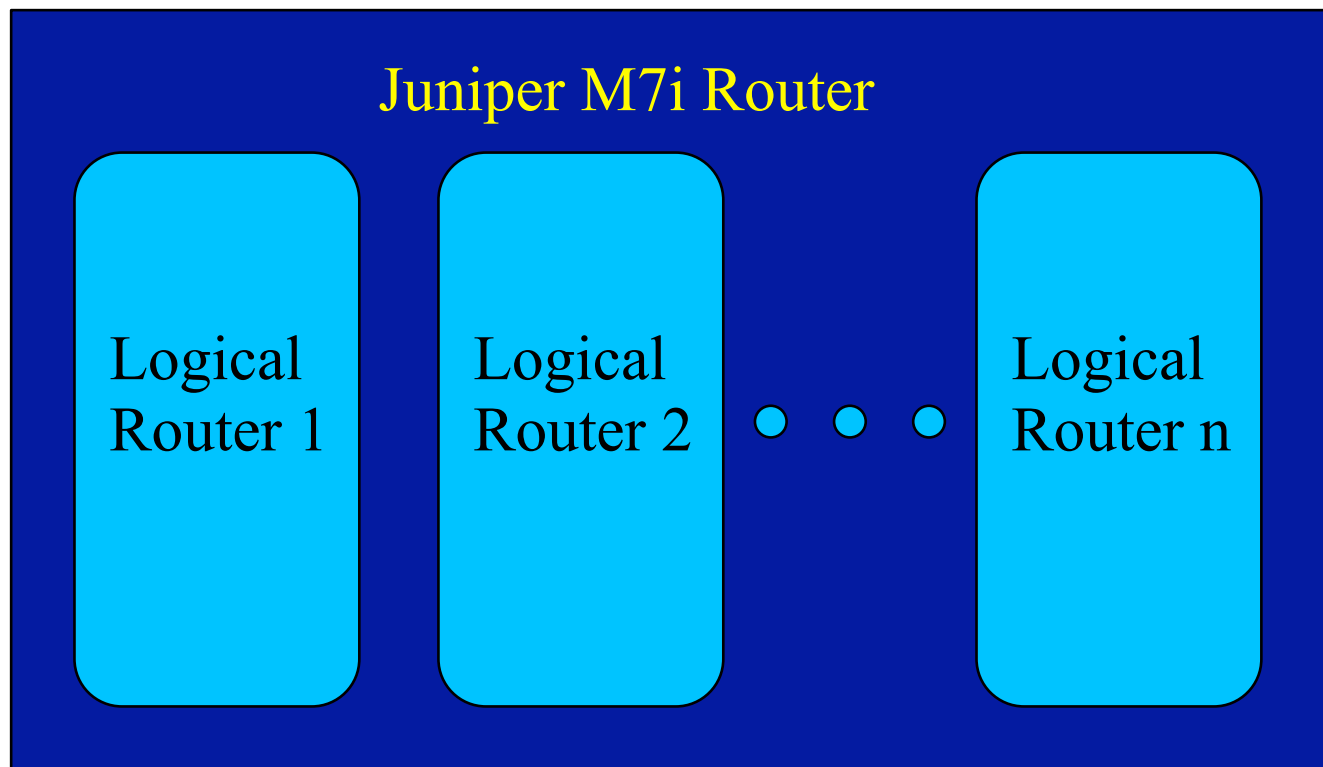
- Problem: ProtoGENI backbone router resources are limited and can be challenging to use.
- Idea: Leverage the logical router features of Juniper routers to **dynamically create virtual routers (slivers) in the backbone that provide carrier-grade performance and services.**
- Challenge 1: Creating the control software needed to virtualize the Juniper M7i and integrate with the ProtoGENI network
- Challenge 2: Make it easy for users to “see” what is happening on their backbone router slivers.

Shadowbox Project Goals

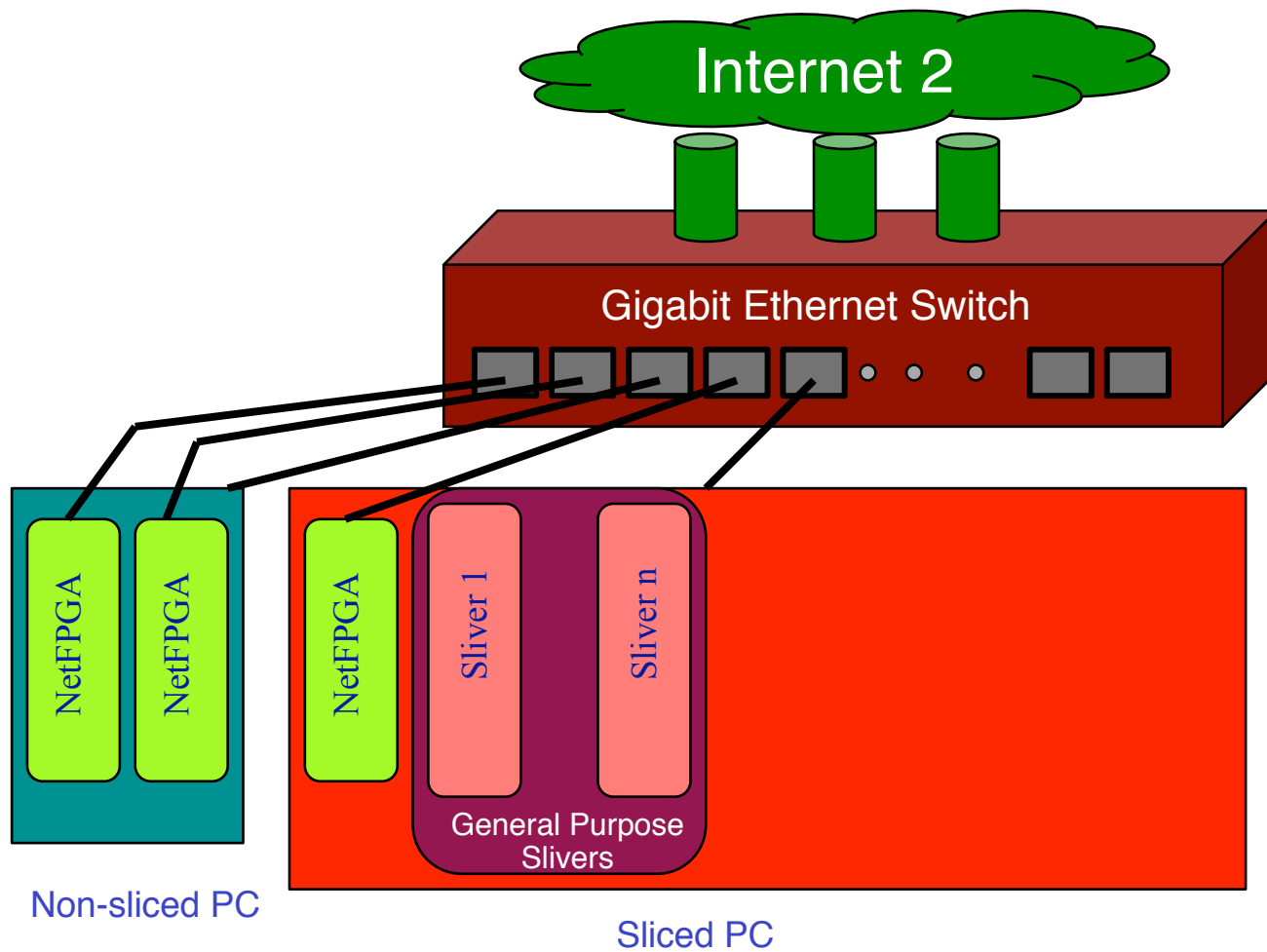
1. Deploy "virtualizable" commercial routers capable of supporting conventional measurement software into the ProtoGENI backbone as the basis for a new ProtoGENI measurement infrastructure.
2. Add software support to these virtual routers that will enable per-slice monitoring and measurement.
3. Develop tools and interfaces that will allow slice users to use the measurement infrastructure in simple and easy ways.

New Shadowbox Router

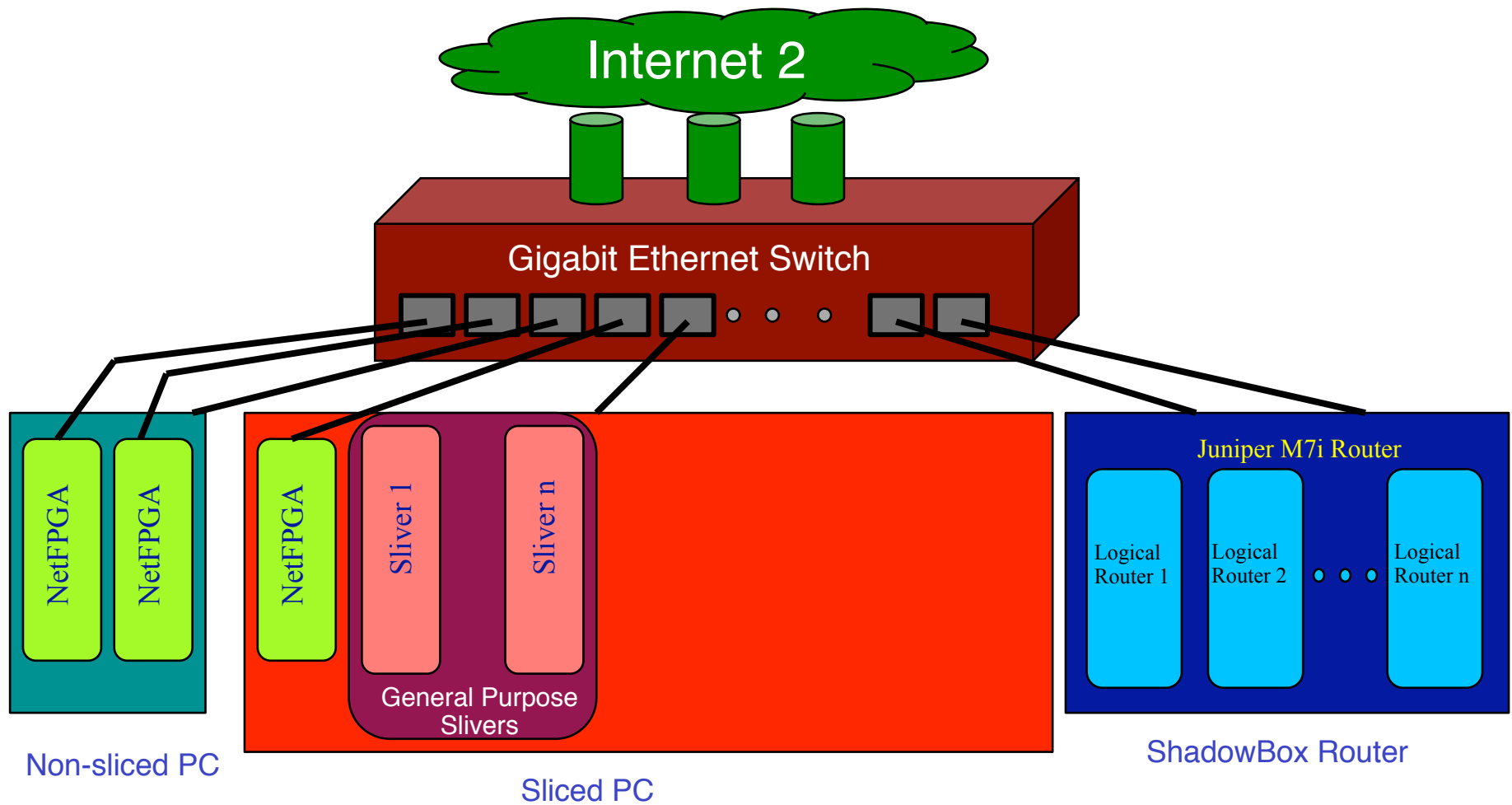
(to be deployed at Internet 2 co-location centers)



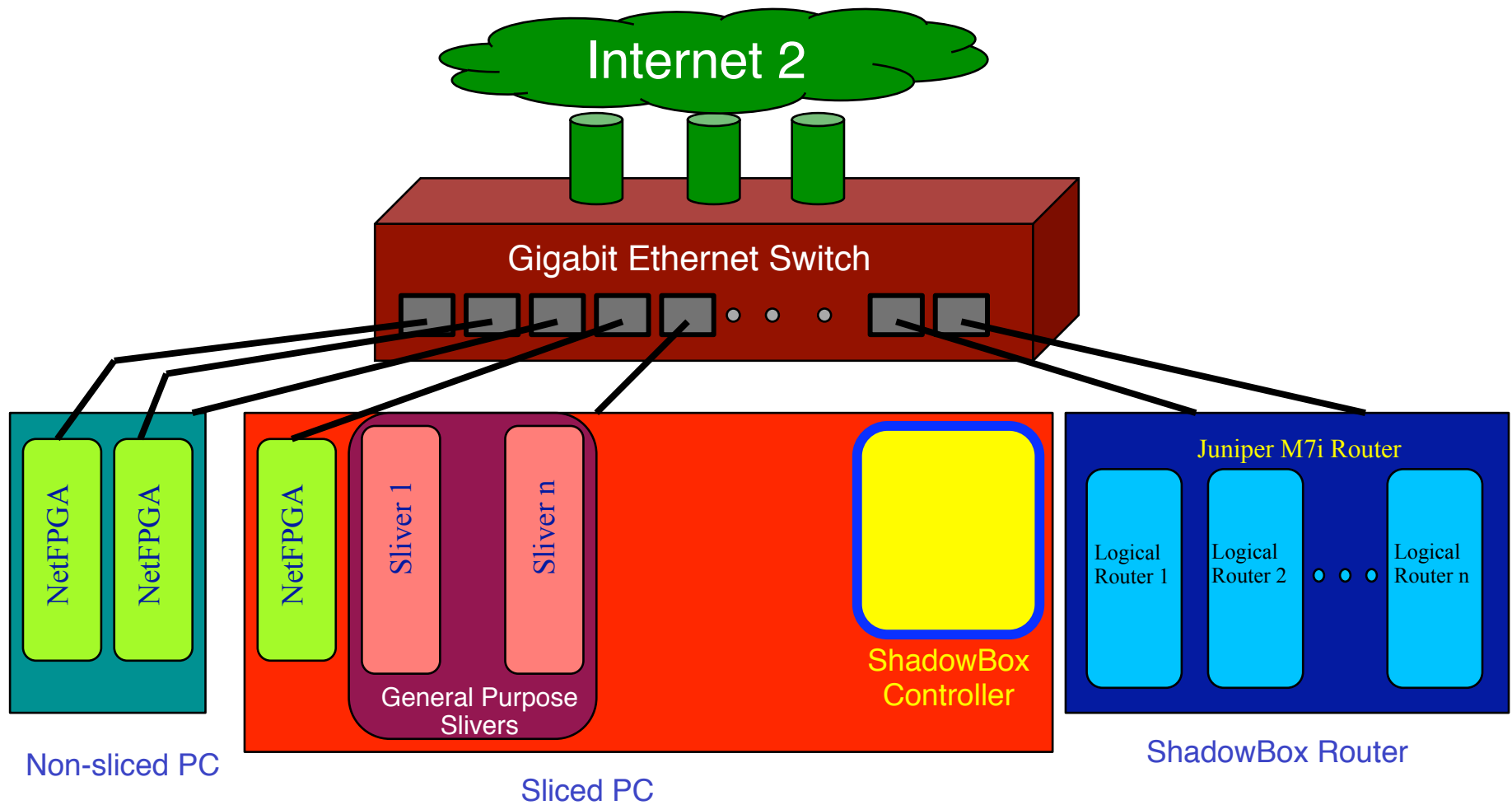
ProtoGENI Backbone Node Architecture



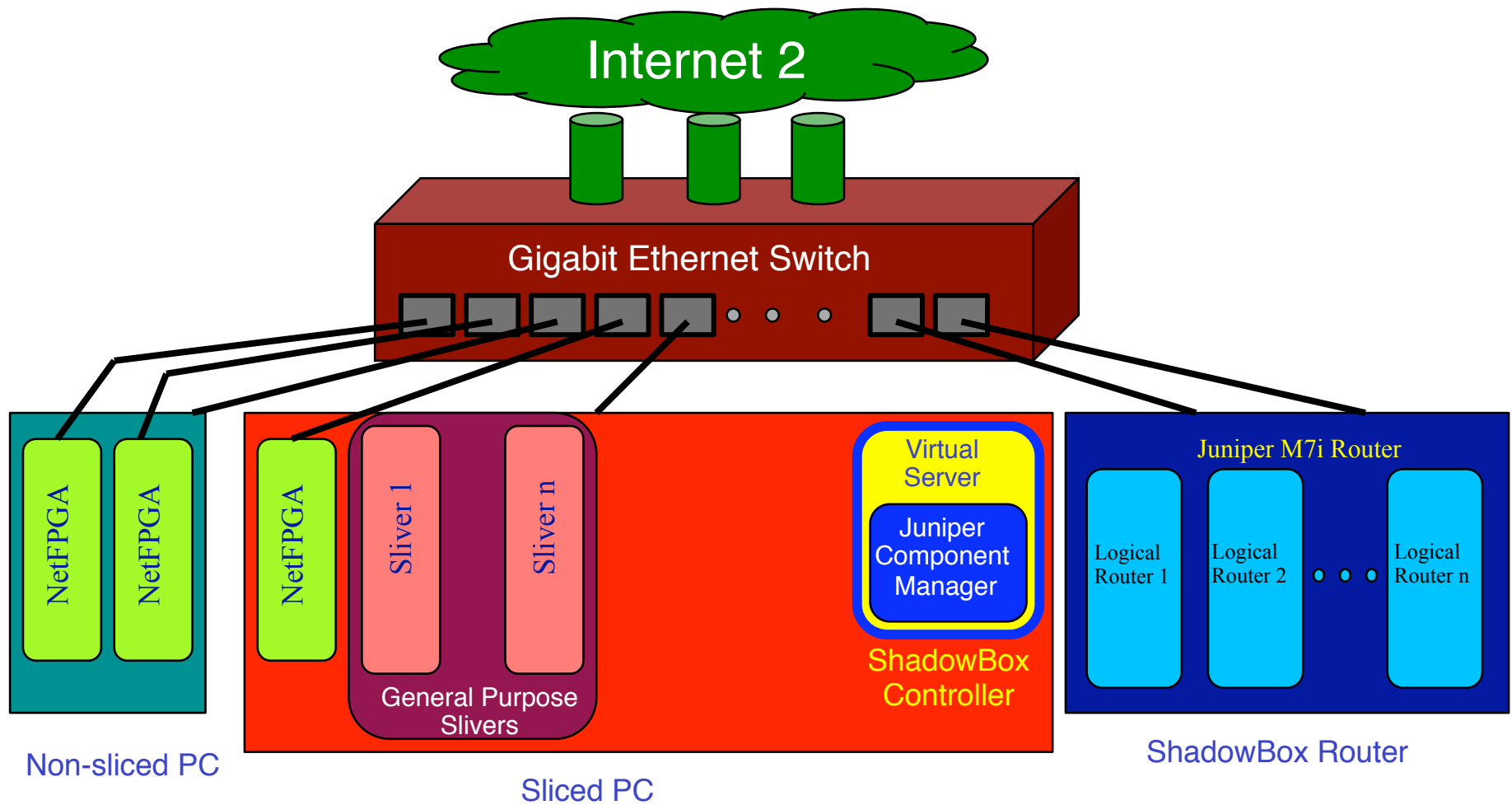
ProtoGENI Backbone Node Architecture



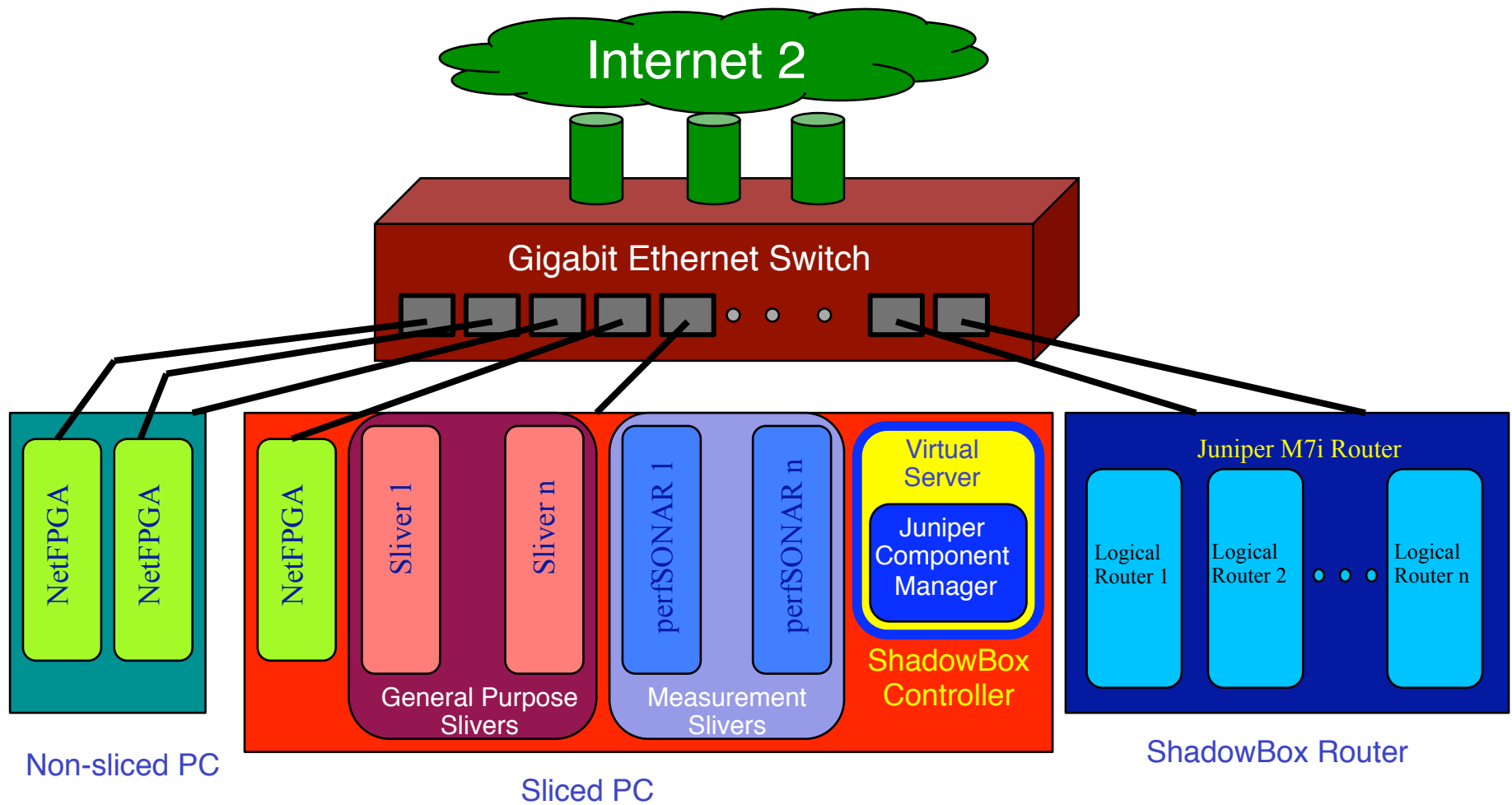
ProtoGENI Backbone Node Architecture



ProtoGENI Backbone Node Architecture



ProtoGENI Backbone Node Architecture



Project Plan

- Deploy four Juniper M7i routers in the Internet 2 PoPs occupied by ProtoGENI.
- Develop control software to allocate logical routers on the M7i (i.e., a new component manager to allocate M7i resources)
- Integrate M7i CM with the ProtoGENI Clearinghouse
- Create Measurement Controllers to run on the slicable PC(s) in the PoPs - for the purpose of instrumenting and measuring the logical routers.
- Integrate M7i MCs with the Kentucky INSTTOOLS system.
- Develop a "pGEMI MC" that collects shared measurement data and makes it available (ideally to the GMOC).

Thank You!

Questions?