

Lifecycle of a GENI Experiment

**GENI Engineering Conference 4
Miami, FL**

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April 1, 2009
www.geni.net**



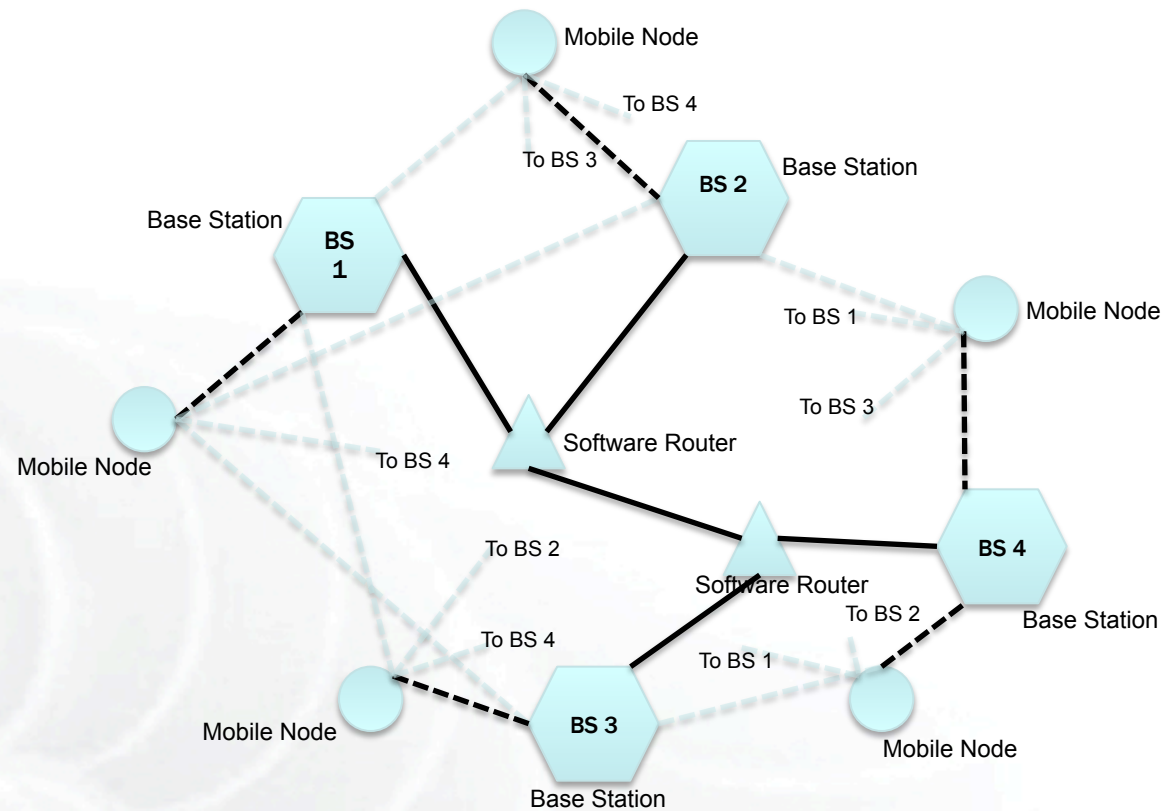
- **Lifecycle of a GENI Experiment**
 - Ready for review
- **Experiment Workflow Services: Spiral 1 Capabilities**
 - Coming soon
- **Workflow Services: Technical Requirements**
 - Not started
- **GENI Measurement System Architecture**
 - Not started

- Available at <http://groups.geni.net/geni/attachment/wiki/ExperimentLifecycleDocument/ExperimentLifeCycle-v01.1.pdf>
- Document review
 - 10am ET on Friday April 17, 2009
 - Open to all: Call-in number will be emailed to WG mailing list

- **Purpose: Identify tools and services to support experimentation with GENI**
 - Steps in the lifecycle of an experiment
 - From experiment planning to experiment sunsetting
 - Tools and services needed to support these steps
- **Illustrated using a “usage narrative”**
 - Fictional story of an experiment that starts at a university, grows to include a industrial collaborator and opt-in users, and eventual transitions to product

- **Background: Increasing numbers of people are accessing the Internet using mobile devices that connect to the cellular network infrastructure**
- **Prof. Adams and grad student Priya at Big State University are developing a new protocol suite**
 - **Routing schemes centered around cellular base station locations**
 - **Networking protocols that incorporate knowledge held by cellular signaling protocols**
 - **Fast proxy deployments based on predictions of user location by mobility models**

- **Prof. Adams and Priya use GENI to emulate a network**
- **Build on experience of a cellular networking experiment archived in GENI**
- **Modify that experiment's *specification***
- **Set up network:**
 - 4 base stations
 - Connected by wired network with s/w routers
 - 100 nodes to simulate mobile nodes

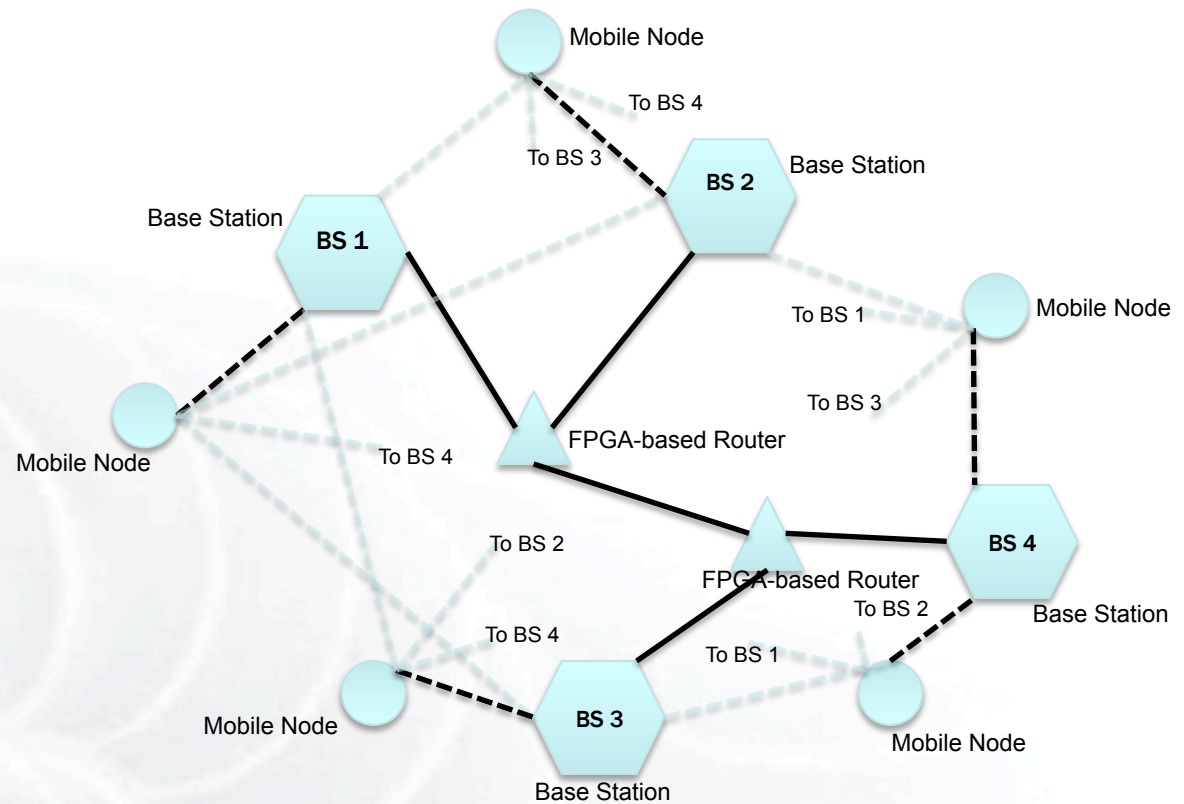


- Base stations connected by a high-speed wired network
- Mobile nodes have physical links to all base stations
- But only one link is active (based on computed signal strengths)
– simulates RF link between mobile device and base station

- **Researchers install appropriate software into nodes using a *provisioning tool***
- **Run and control experiment using an *experiment control tool***
- **Use *instrumentation and measurement tools* to understand performance of protocol suite**

- **Researchers notice periods of dropped packets**
- **Measurement tools point to issue with routers**
 - **Can't keep up with packet processing**
- **Discover and switch to FPGA-based routers**

Emulated Network with Hardware Routers



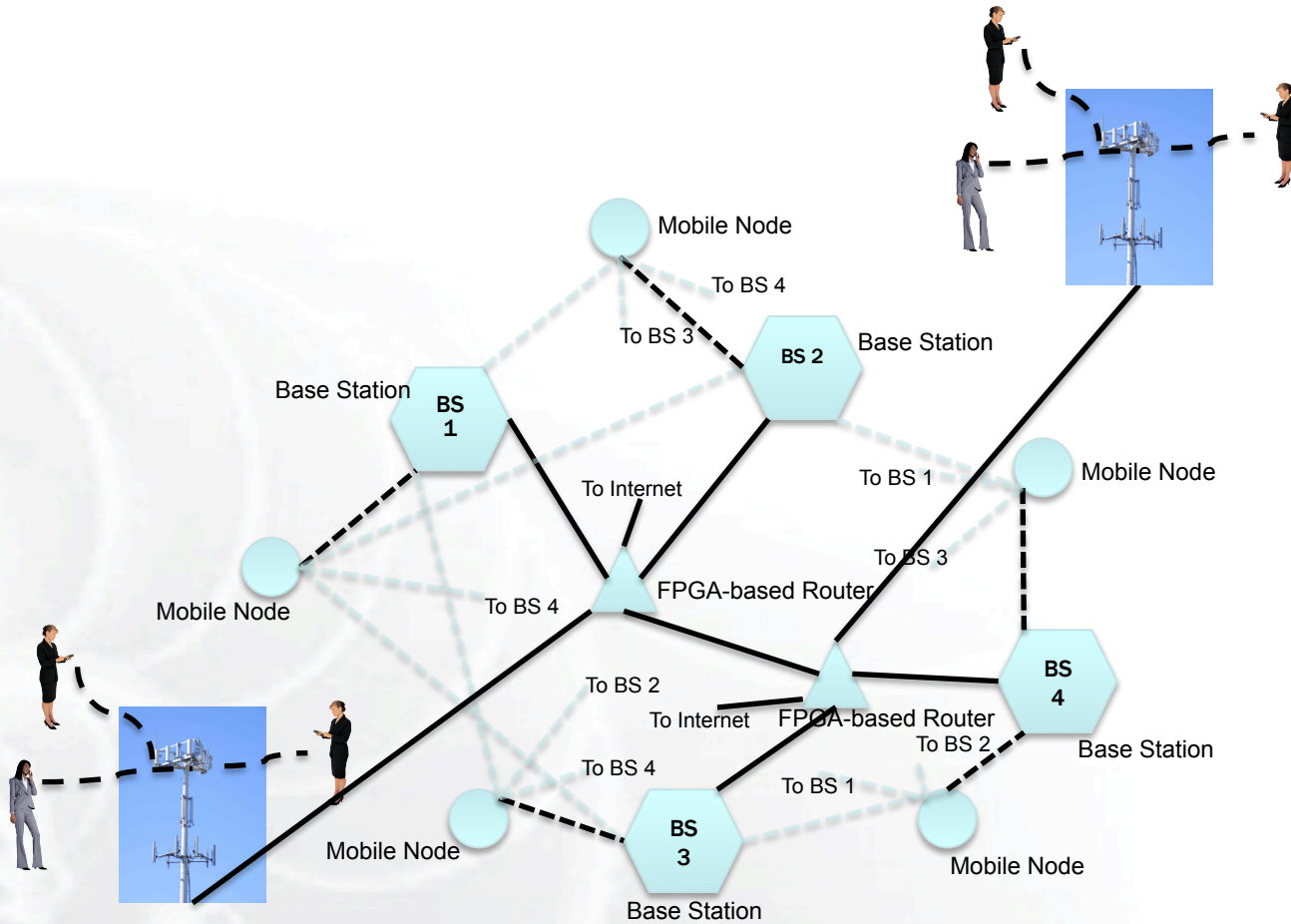
- Base stations connected by a high-speed wired network
- ⋯ Mobile nodes have physical links to all base stations
- - - But only one link is active (based on computed signal strengths)
– simulates RF link between mobile device and base station

- **Researchers add more base stations, routers and mobile nodes**
- **Gather and analyze collected data**
- **Their protocol suite provides better quality of service for cellular network based mobile devices than Internet protocol suite**
 - **Presumably translates to better browsing experience for mobile users**
- **Publish results at leading mobile networking conference**

- **Dr. Enoch of cellular network provider Peripatetic Technologies is interested in this technology**
 - **Agree to work together to validate results using real users and equipment**
- **Formal agreements put in place**
 - **Big State U. and Peripatetic Technologies**
 - **Peripatetic Technologies and GENI for Peripatetic to provide a aggregate consisting of two cellular base stations**
 - **Aggregate visible only to researchers at Big State U.**

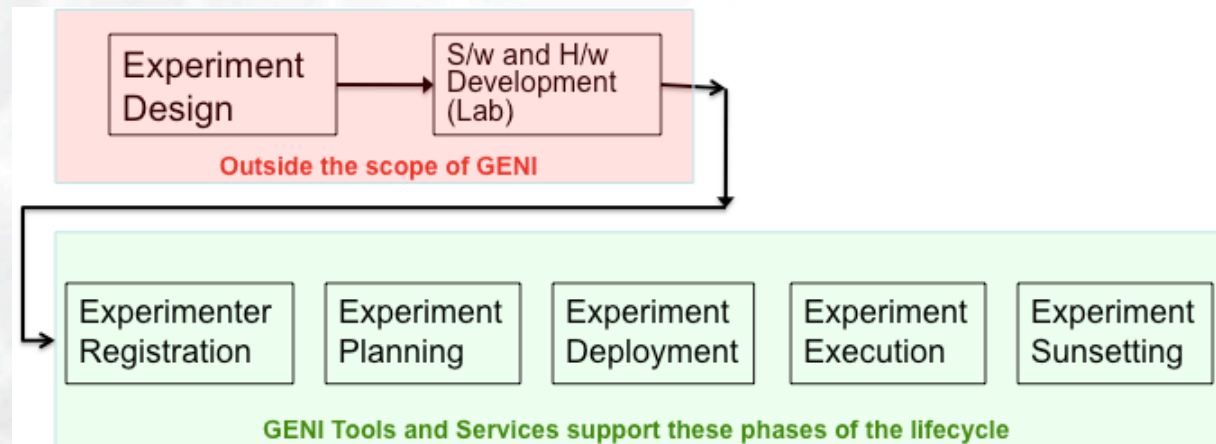
- **2 real base stations connect to emulated base stations**
- **Real base stations run experimental protocol suite in parallel with production suite**
- **Gateway to enable connections to Internet hosts (web servers, mail servers, etc)**
- **Limited number of smartphones to take advantage of new suite distributed to select colleagues by Dr. Enoch**

Network with Combination of Emulated and Real Components



- **Service is wildly popular with Dr. Enoch's colleagues**
- **Peripatetic Technologies decides to turn technology into a premium service**
 - Licenses technology from Big State U.
- **Prof. Adams and Priya add experiment to GENI archives**

- **Outlines the phases in an experiment's lifecycle**
- **Identifies experimenter activities within each phase and tools needed to support them**



- **Please review the document**
- **Participate in upcoming review**
- **Post comments on the WG mailing list**

- **Swatches (these colors are saved in the Master):**

