GENI Educational Kits for Wireless Sensor Networks

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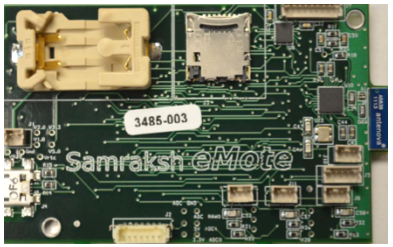
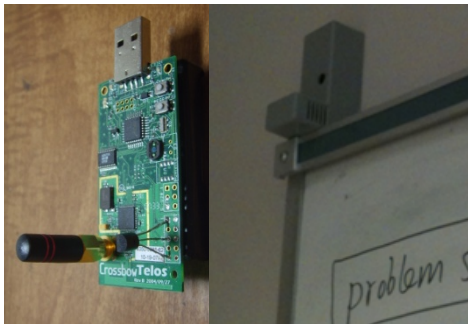
“Motes” as educational tools

- GENI has involved several Wireless Sensor Network testbeds
  - KanseiGenie, Vise, DieselNet, ParkNet, OKGems, Tunie…
  - testing spanned research and education

- Mote-based testbeds support educational user involvement
  - WSN/embedded system courses are popular
  - low cost, low configuration setup
  - user skill level can range widely



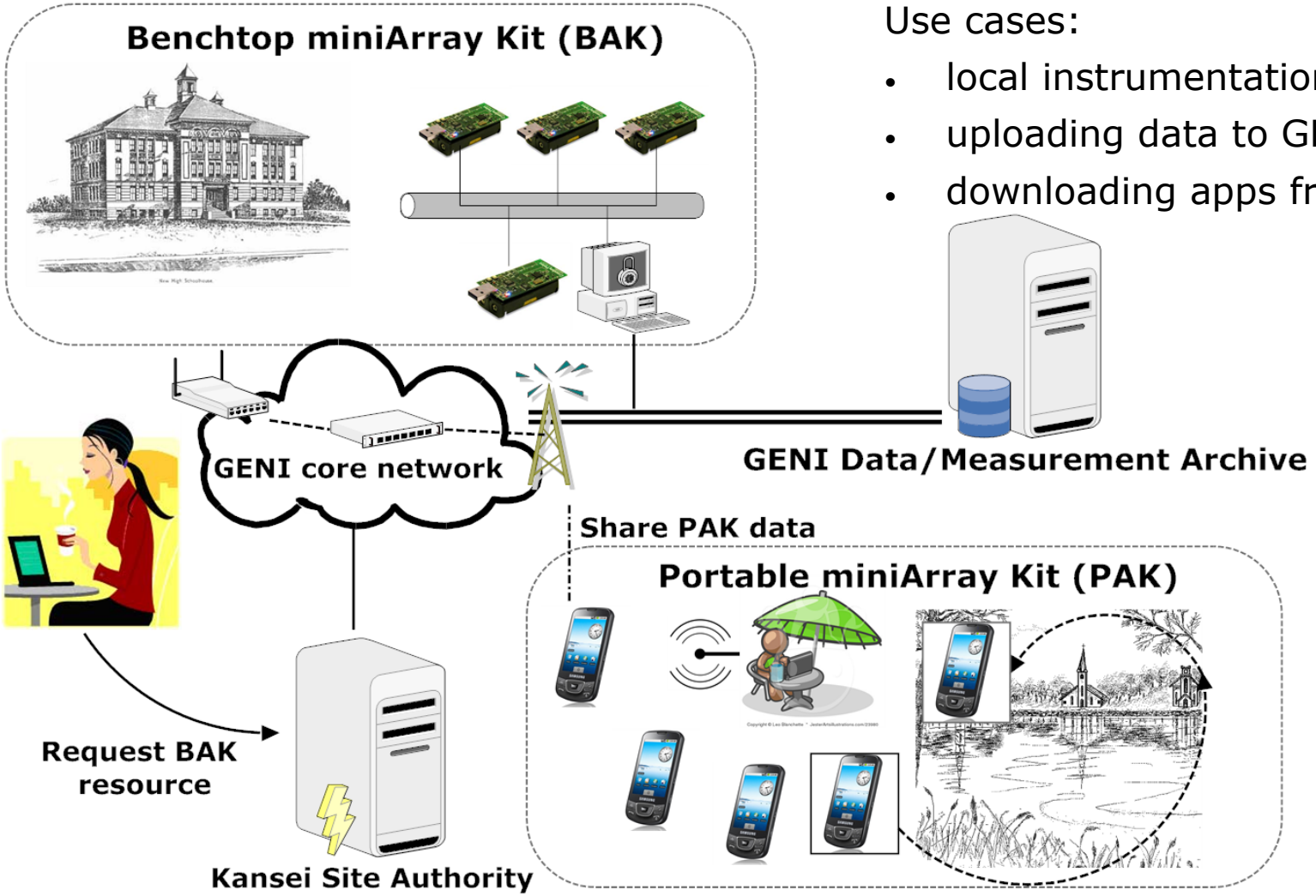
- Educational use cases
  - college testbeds (even small wired arrays ok)
  - outdoor portable arrays (for data collection)
  - science education of middle-to-high schoolers



Our objectives

- Easy to instantiate arrays
  - rapid deployment via installers
  - minimal assumptions about array controller node
  - controller exposes array to GENI control framework
- Easy to use interfaces
  - simplified app model, common functions in run-time
- Ports to other sensor nodes, including smartphones
- Accompanying user/operator docs, WSN tutorials, sample projects, lesson plans

BAK/PAK Overview

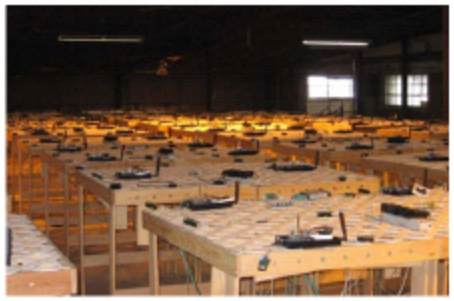


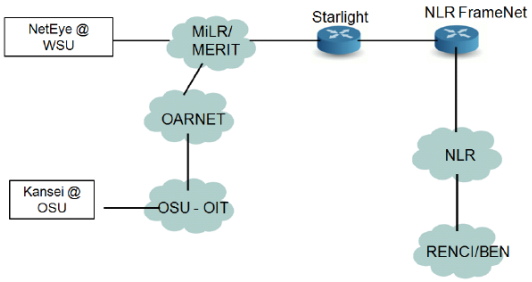
Use cases:

- local instrumentation of apps/data
- uploading data to GENI cloud
- downloading apps from GENI cloud

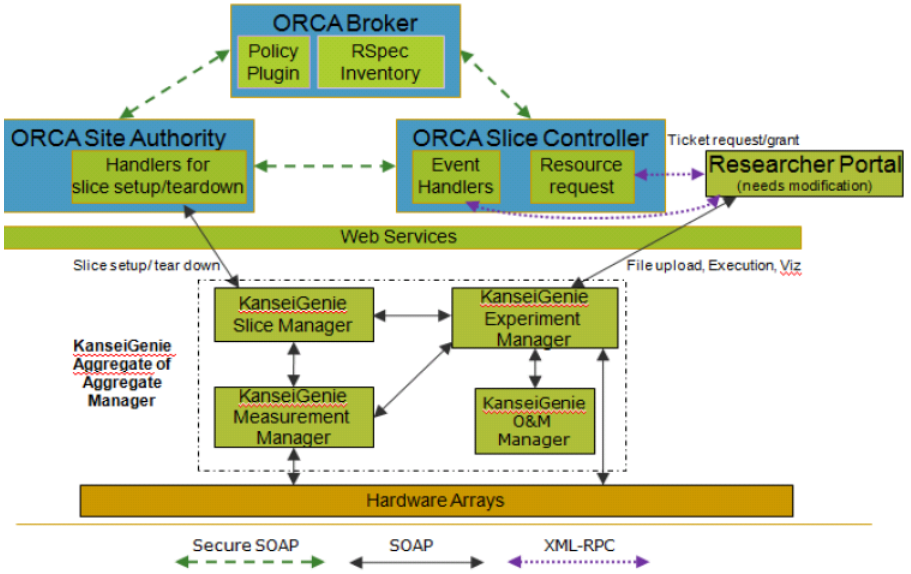
Leveraging KanseiGenie

- Federated WSN site purposing and orchestration via ORCA





LENS RSpec



- Delivered installers, which were used to clone other testbeds
  - NetEye (Wayne St), OKGems (Oklahoma), Tsinghua, AFRL (WPAFB)

First Steps: Stripping down KanseiGenie for BAK

- Retain minimal KanseiGenie functionality on controller
  - low system requirements
    - minimal Ubuntu Linux installation
    - Vmplayer version for Windows
    - design will accommodate porting to thin gateways
  - outsource resource management to GENI cloud

- Extend KanseiGenie
  - wireless programming/collection options
  - DTN network models

- Almost zero configuration for selected platforms and topologies
  - recent experiment at Disaster City, College Station, TX, in fast cloning at a mobile base camp, and rapid deployment at a early disaster response at site

Ongoing Engagement with Users

- Pilots in IIIT-Allahabad and IIIT-D, India
  - science experiments: Radar based pendulum lab
  - data collection experiments: Temp/light maps
  - installation of first lab array planned around year end

- Capstone course at OSU
  - students developing gateway apps