ORBIT Lab

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Starting with experimentation in the ORBIT Wireless Lab

What is ORBIT?

- Wireless research lab
- Offers resources for 802.11, WiMAX, LTE, SDR, and Bluetooth experiments
- Partner of the GENI project
- Main “grid” lab consists of 400 nodes in a two-dimensional grid

Hello World

- Labs are reserved in blocks of time for exclusive access
- Experimenters log in to a central console, with access to a set of wireless nodes
- Experiment definitions written in Ruby, with a high level API for ORBIT
  - OMF docs: https://omf.mytestbed.net/projects/omf54/wiki/OMF_User_Guide
- Hello World tutorial
  - http://cs-people.bu.edu/sajarvis/orbit-pres.html

Beyond “Hello World”: Custom Experiment Workflow

General steps to build and run a custom experiment

1. Build and install the application on a node
    - Corresponds to the role of otg2 and otr2 in “Hello World”
2. Save the node’s disk image
    - Saved image is equivalent of the baseline.ndz image
3. Load the image onto all nodes (could be at a later date)
4. Run experiment with OMF and the custom experiment definition
5. Collect results

ORBIT Mapper

One challenge is to find non-trivial topologies consistently on wireless, but the radio reaches across the grid.

There are four noise antenna in the grid to raise noise floor, which prevents 100% visibility, but how to tell who can see whom?

These issues inspired ORBIT Mapper. It helps by mapping the connectivity of the lab and doing two primary things:

1. Offers RESTful API to post updates and get connectivity information for nodes
2. Dumps connectivity information into GEXF file for visualization

https://github.com/stevejarvis/orbit-mapper

Other ORBIT Resources

- Full access to operating system on nodes
  - Can test kernel modules, different L2-L4 implementations
- OMF - ORBIT Management Framework
  - Coordinates and manages running experiments
  - https://omf.mytestbed.net/projects/omf/wiki/Introduction
- OML - ORBIT Measurements Library
  - Measurement tool that helps experimenters add instrumentation and metrics to applications
  - https://oml.mytestbed.net/projects/oml/wiki/Quick_Start_Tutorial
  - <Brief demo of oml2_scaffold and the app structure, if we have time>
- Node image repository
  - “omf save -n node1-1.grid.orbit-lab.org”