Experimentation in a Multi-site GENI WiMAX Network using Orbit Management Framework (OMF)

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Introduction to GENI WiMAX

- Why GENI WiMAX?
- GENI WiMAX testbeds open to Experimenters
- Tour of GENI WiMAX testbed at NYU Poly
- Resources and Support

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Why GENI WiMAX?

Current and proposed Internet protocols and applications have been developed and tested over **wired** networks (and sometimes **WiFi**), but Internet traffic is moving to **wireless broadband** networks.

- By 2016, global mobile data usage is predicted to reach 10.8 exabytes/month, from over 10 billion mobile devices
- Experiments over commercial wireless broadband networks are subject to changing carrier policies and competing traffic

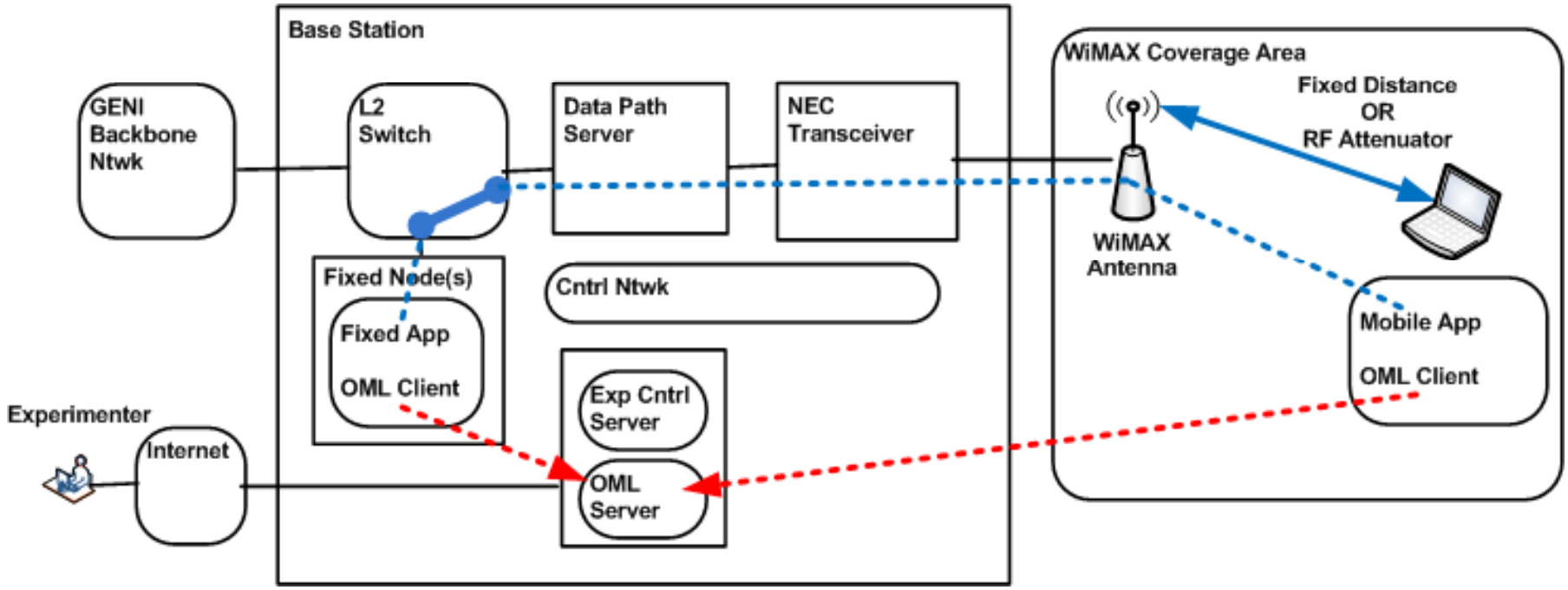
GENI WiMAX testbeds provide:

- Configurable 802.16e (WiMAX) base station and WiMAX-connected computers (mobile stations)
- Some are available to experimenters by reservation

GENI WiMAX Testbeds

- There are currently 8 GENI WiMAX testbeds, available to local experimenters
- Some of these GENI WiMAX testbeds are open to remote experimenters:
  - WINLAB: http://orbit-lab.org
  - NYU-Poly: http://witestlab.poly.edu
  - BBN: coming soon
- All utilize the Orbit Management Framework (OMF) for control
- All utilize the Orbit Measuerment Library (OML) to gather measurements

Configuration of a WiMAX Testbed



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WiMAX Testbed Hardware

- Configurable 802.16e (WiMAX) base station running on a licensed frequency
- Servers to support various experimenter services, e.g., OMF and OML
- Multiple testbed nodes:
  - PC equipped with 40GB Hard disk
  - Intel Centrino Advanced-N + WiMAX 6250 Wireless Network Adapter (for connection to WiMAX base station)
  - 100BaseT Ethernet port for experiment control
  - Chassis Manager card for resetting node
- Connections to Internet, GENI L2 backbone

Tour of the WiMAX Testbed at NYU Poly

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WiMAX Testbed Software

- Web-based interface for reserving resources
- Experiment controller using OMF
  - Uses OMF scripts written in Ruby-like language to describe and instrument an experiment
  - Can load images (bit-exact hard disk copy) into nodes, which include applications
  - Can run on any GENI WiMAX testbed with minimal modification
- Instrumentation and measurement using OML
  - OML clients used for instrumentation, to gather data from base station, nodes and applications
  - OML server used to collect measurements (and metadata) in a standard database format, for easy manipulation and analysis

WiMAX Testbed Applications

- Common applications
  - VLC media player
  - Iperf
  - HTTP server
- Controlled by OMF script
- Instrumented with OML for recording experiment state and metadata
  - Also script for saving base station configuration to OML database – keep configuration and experimental measurements in one place

References

- Tutorials:
  - http://groups.geni.net/geni/wiki/GENIWiMaxTridentcomTutorial
- Documentation, software tools
  - http://witestlab.poly.edu (NYU-Poly Testbed)
  - http://wimax.orbit-lab.org (GENI WiMAX)
  - http://mytestbed.net (OMF)
- Support
  - witestlab@poly.edu (NYU-Poly Testbed)
  - orbit-user@orbit-lab.org (WINLAB Testbed)
  - omf-user@lists.nicta.com.au (OMF)

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