WIMXCL Project Status Report
Period: 3/22/2013-7/23/2013 (GEC17)

I. Major accomplishments

This project will plan and deploy a multi-cell/multi-sector WiMAX network (three sectors total) in Greenville, SC, with coverage of highways and commercial district, based on base station kits provided by Rutgers. It will deploy a vehicular mobile station with handover features, and demonstrate multi-cell/multi-sector operation. It will ~~collaborate with commercial WiMAX carrier Digital Bridge Communications (DBC) to~~ explore and demonstrate (if possible) roaming and interoperability between GENI and commercial WiMAX networks. It will demonstrate experiments in automotive research and engineering.

During this period, key achievements include:

a) As of June 20 2013, all three base stations are up and connecting (one on Clemson main campus, two on Greenville campus) after working closely with Airspan technical support for ~8 months since November 2012.
b) Completed first prototype code for OpenFlow-based handoff solution, demonstrated at GEC17. Demo showed L2 handoff among two Wi-Fi access points. Two issues blocked a WiMAX-to-WiMAX, L3 handover demo: 1) Teltonica modem bridge mode malfunction; 2) TMIP failures for L3 handover and crashes.
c) Led community discussion on MVNO and GENI-Spring roaming solution; submitted EAGER proposal for MVNO seed trials.

A. Milestones achieved

Milestones inherited from previous period:

- Complete installation of WiMAX base stations, plus associated servers and services. (by GEC14)
    - All three up and running.
- Configure the WiMAX base stations using OMF, and demonstrate connectivity to the GENI Internet 2 backbone. (by GEC14)
    - Waiting for OMF support for Airspan BS.
- Complete basic range and throughput tests of your WiMAX base stations using reference OMF/OML throughput experiment and a reference mobile station. (by GEC14)
    - Pending OMF/OML support on Airspan BS and ORBIT yellow nodes

No other milestones are due this period.

B. Deliverables made

- Three BS up and running. Tunnel and direct vlan to GENI WiMAX core.
- OpenFlow (floodlight + open vswitch) handoff solution for L2 handover across WiMAX base stations; remaining issue with WiMAX modem bridge mode operation to be resolved.
- MVNO proposal to NSF

II. Description of work performed during last quarter

A. Activities and findings

1. Completed fixing two faulty Airspan base stations. Now all three Clemson base stations are in operation.
2. Completed implementation of OpenFlow-based L2 handover solution (pending WiMAX modem issues to be resolved in coordination with WINLAB)
3. TMIP operation across WiMAX base stations (in different IP subnets) are still having issues. Working with UW team to root cause the issue and plan for next steps for L3 handover support.

B. Project participants

The project team members are:

PI: Kuang-Ching Wang (ECE Associate Professor)
Co-PI: James Martin (CS Associate Professor), Jim Pepin (CTO)
IT: Dan Schmiedt (Director of Network Services and Telecommunications), Joseph Bernard (Network Engineer)
ECE graduate research assistant: Reece Johnson (MS), Fan Yang (PhD), Ryan Izard (PhD)

C. Publications (individual and organizational)

1. Fan Yang, Vamsi Gondi, Jason O. Hallstrom, Kuang-Ching Wang, Gene Eidson, Christopher J. Post, "Wireless Infrastructure for Remote Environmental Monitoring: Deployment and Evaluation", in Proceedings of MOWNET 2013, pp. 1-7.
2. Ke Xu, Ryan Izard, Kuang-Ching Wang, and Jim Martin , "Cloud-based Handoff as a Service for Heterogeneous Vehicular Networks with OpenFlow", in Proceedings of GENI Research and Education Experimentation Workshop 2013, pp. 1-5, March 2013.
3. Ke Xu, Saravanan Sampathkumar, Kuang-Ching Wang, and Parmesh Ramanathan, "Network Coding for Efficient Broadband Data Delivery in Infrastructure-based Vehicular Networks with OpenFlow", in Proceedings of GENI Research and Education Experimentation Workshop 2013, pp. 1-5, March 2013.

D. Outreach activities

Not available at this time.

E. Collaborations

The project is conducted in collaboration with University of Wisconsin, Madison's GENI WiMAX project (PI: Parmesh Ramanathan) on support for mobility (handoff) on GENI WiMAX networks.

F. Other Contributions

None in this reporting period.