A Mobile Programmable Radio Substrate for Any-layer Measurement and Experimentation (1740)

Project Status Report
Period: 10/1/2009-12/31/2009

I. Major accomplishments

The project contract is fully executed on 11/17/09. The project will study and report on the capabilities recommended for a programmable radio substrate in GENI to best support wireless networking innovations. It is expected that a key capability should be to provide programmability and measurement at all layers. This project will also recommend the capabilities that should be included in the cognitive radio systems that are being developed in the "Cognitive Radios for GENI Spiral II" project.

During this period, key achievements include:

a) Project kickoff meeting at GEC6 (11/16-18, 2009).
b) Defined white paper outline.
c) Surveyed existing wireless testbed architectures and capabilities for different protocol layers.

A. Milestones achieved

No milestones are due at this time. Future milestones include:

a) White paper on recommended capabilities for a programmable radio substrate in GENI, and review of white paper with staff of "Cognitive Radios for GENI Spiral II" project. (Due 7/20/10, GEC8)

B. Deliverables made

a) White paper outline
b) Literature references for surveyed wireless testbed architectures and capabilities.

II. Description of work performed during last quarter

A. Activities and findings

a) Project kickoff meeting at GEC6

   The meeting was held on 11/17/09 in conjunction with the ORBIT cluster meeting. With Ivan Seskar, PI for the "Cognitive Radios for GENI Spiral II" project, the meeting covered:
   1) An overview of the FPGA-based cognitive radio platform to be used by the Spiral II Cognitive Radio project.
   2) Consensus in co-authoring a survey paper on existing wireless testbeds' architectures and capabilities and emerging testbed research needs in different layers. The paper will be prepared for publication in Q1 2010.

b) White paper outline

   Based on the kickoff meeting discussions, enabling of any-layer programmable wireless network testbeds must address the following key issues:
   1) Different experimentation objectives in different protocol layers.
   2) Hardware and software capabilities needed for different layer implementations.
   3) Hardware and software programming features and interfaces for different layer research.

   Accordingly, the white paper plans to develop recommendations for the GENI cognitive radio testbed by studying the following:

1) Part I: Synopsis of experimentation objectives for different protocol layers.
2) Part II: Synopsis of capabilities for realizing different layer protocols.
3) Part III: Synopsis of programmable features and interfaces for different layers.

The white paper will be developed incrementally in a series of technical papers co-authored and/or reviewed with the staff of the "Cognitive Radios for GENI Spiral II" project.

c) Survey on existing wireless testbed architectures and capabilities

The literature survey has been completed with 60+ wireless testbeds developed in US and countries around the world. A paper summarizing the findings is in working progress.

B. Project participants

PI Kuang-Ching Wang is the only participant in this project.

C. Publications (individual and organizational)

Not available at this time.

D. Outreach activities

Efforts have been made to explore potential research opportunities. In this period:

a) Visited two research groups at ETH Zurich on 10/22/2009 to present this project and explore potential outreach opportunities. Specifically,
    1) Dr. Bernhard Plattner's group has been involved in the Europe OneLab projects focusing on adaptable network architecture and network security. Their experiences and interests in developing reconfigurable (ad hoc) wireless network testbeds are in close synergy to this project and GENI as a whole.
    2) Dr. Armin Wittneben's group focuses on physical layer and MAC/PHY cross-layer research for MIMO and UWB communications. Their experiences can be a potential resource to the project.

E. Collaborations

This project is performed in collaboration with the "Cognitive Radios for GENI Spiral II" project staff, specifically Ivan Seskar (Rutgers WINLAB) and Dirk Grunwald (University of Colorado).

F. Other Contributions

Not available at this time.