Quarterly Status Report
YR 1 Q 3

Control, Measurement, and Resource Management Framework for Heterogeneous and Mobile Wireless Testbeds

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Major Accomplishments

We have conducted a GEC demo that demonstrated L2 connectivity from the New Jersey based ORBIT testbed to testbed facilities at NICTA in Sydney, Australia.

Activities and Findings

Work in this quarter has concentrated on achieving the Wimax integration and L2 connectivity milestones, and conducting a GEC demonstration featuring L2 tunnels. We have also started work on the YR2 b milestone to support experimentation driven by context, particularly geographic location.

Integrating OMF with WIMAX Basestation

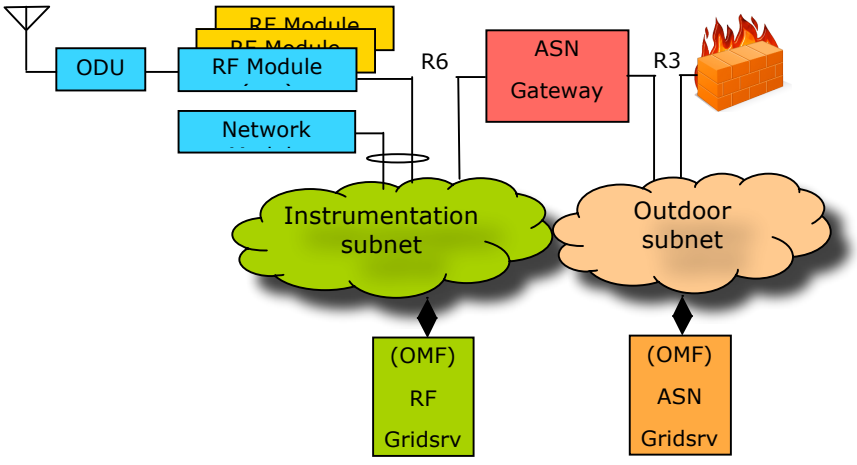


Fig 1: Integrating OMF with WiMAX basestation.

The WiMAX basestation was integrated into the ORBIT network as shown in Fig 1. This setup enables full accessibility of both the RF and ASN portions of the basestation. In addition, we designed interfaces for two new OMF components: RF Aggregate Manager (Gridservice) and ASN Aggregate Manager (Gridservice) that will allow experimental end-users to access the features of the

WiMAX device and to control basestation settings from OMF experiment scripts. We created a reference implementation that allows access to RF parameters for each node that participates in the experiment and allows creation of virtual machines on the ASN aggregate manager (to support multiple simultaneous experiments).

Providing L2 connectivity to ORBIT

The missing fiber link between the Rutgers Food Science building and the Route 1 fiber corridor (~1 mile) was installed and tested in early June. Unfortunately, due to manhole fire in Philadelphia, the Winlab 1 Gig lambda to MAGPI East (at 401 Broad Street) provisioning had to be postponed for early August. As for the next step, from what we've heard so far, GENI is not using the DCN 10Gig Wave yet, so we are planning to use direct handoff to Internet2 in our current location in Philly.

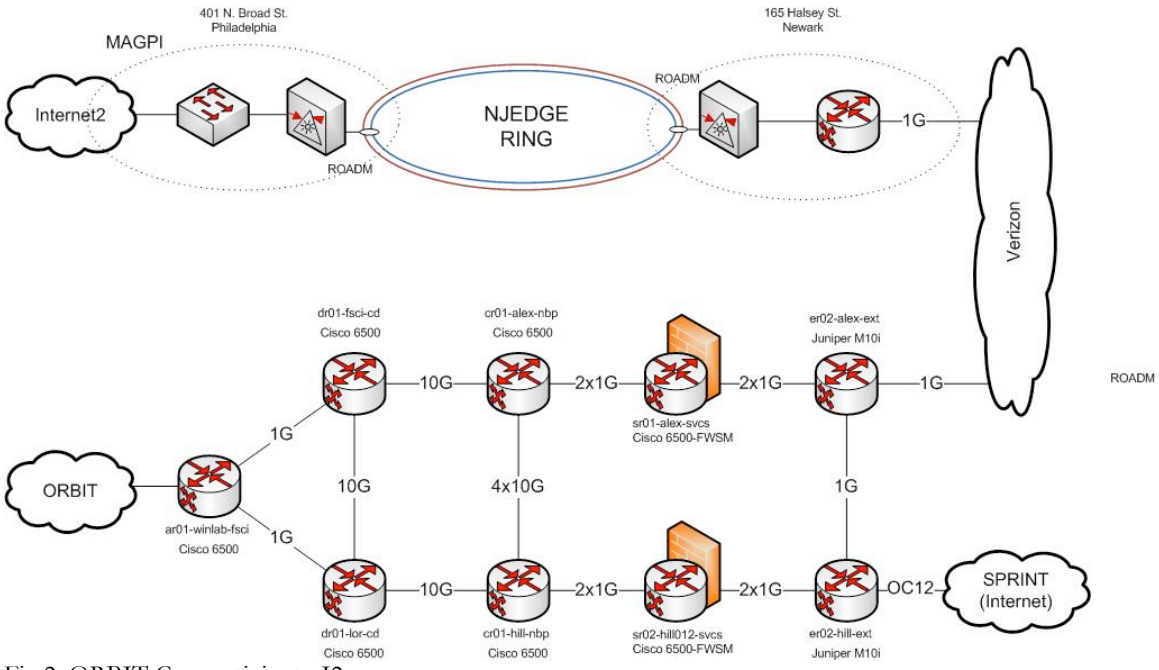


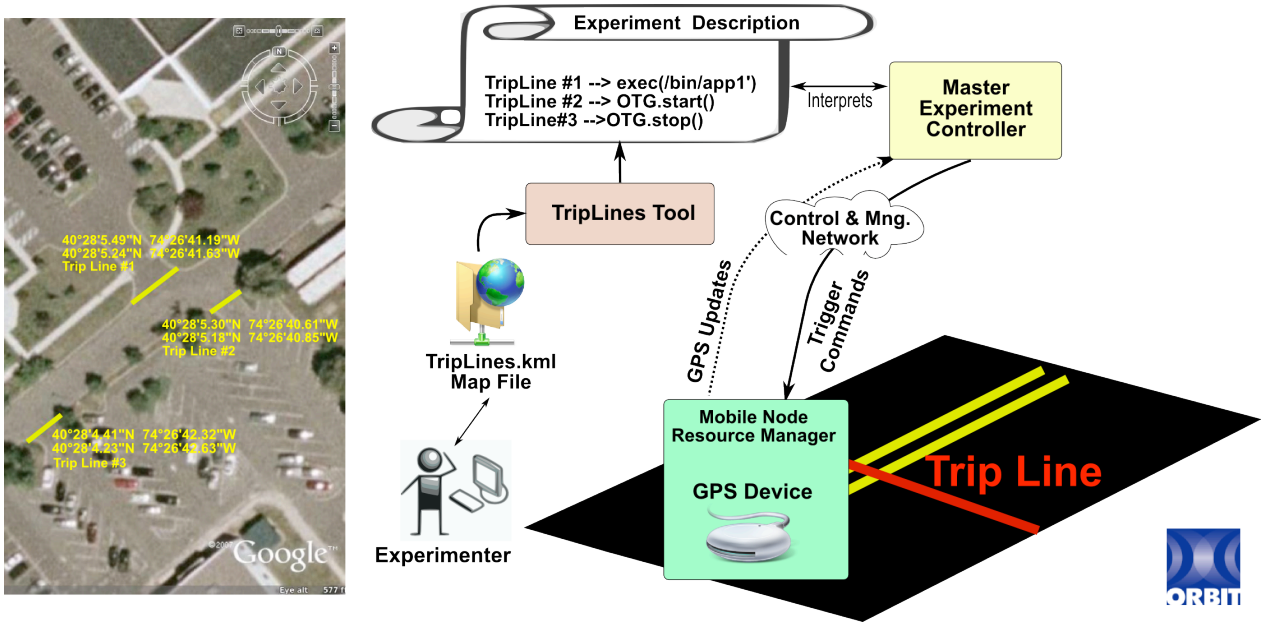
Fig 2: ORBIT Connectivity to I2.

As an alternative, we created and successfully demonstrated L2 connectivity using overlay L2TP connection between WINLAB and NICTA, Australia over the existing Rutgers University's commodity feed to I2 shown in Figure 2. This link was used for a variety of testing scenarios, including a single experiment with a mixture of individual resources on both ends of the tunnel (with experiment coordination from both ends of the tunnel over multicast traffic), running an aggregate manager for the resource on the opposite end of the tunnel and measurement collection across endpoints.

GEC Demo

We have developed and shown a demonstration at GEC that runs a protocol through an L2 tunnel between our New Jersey and Australia testbeds and uses vehicular nodes on both ends. The demo scenario assumes that an experimenter, let us call her Alice, wants to evaluate an ad-hoc enhanced bittorrent client for vehicular networks. She envisions that most cars in the future will be able to connect to a mostly-on wide area wireless network and will also be equipped with a high-speed short range radio to establish ad-hoc networks with other nearby cars. She has designed an extension to the bittorrent (BT) protocol which can take advantage of the additional, transient communication channel. She is especially interested in the impact of the encounter duration of vehicles on various stages of a BT download.

Location-based Experiment Scripting



We have begun work on location-based experiment control through trip lines. Quite often, static indoor experiments can be scripted with OEDL to have workload-generating applications started after O/S networking settings have settled down. However, mobile experiments require spatial triggers as well as existing temporal ones. To address this mobile experiment need, we are extending OMF to support spatial triggers to start an action when a mobile crosses a line in geographic space (in addition to the support for temporal triggers, which is already implemented). The spatial triggers, named trip lines, will utilizes OMF's MCS for the continuous collection of geo-location information into the experiment database. As this feature comes integrated with disconnected operation mode of OMF, it will allow triggering of actions and collection of measurement data even when nodes are temporarily disconnected from the control infrastructure. To date we have developed a TripLines module that monitors GPS position and can invoke experiment scripts when a trip line has been crossed. These scripts can take actions like *start packet generation*, *stop the experiment,* etc. The trip lines itself can be placed by drawing a line object (one per trigger) using a map utility that could export to Google Earth's markup language (*.kml or *.kmz). Three example trip lines are drawn using Google Earth on Rutgers NJ Tech Centre Facility map and shown in the above figure. We are now testing this module and plan to integrate it into OML during YR 2.

Support and Collaboration

We continue to maintain an external website dedicated to OMF, its user community and its installation, utilization, and ongoing development.. This website is located at: http://www.mytestbed.net/

Project Participants

Marco Gruteser

Max Ott

Thierry Rakotoarivelo

Ivan Seskar

Tripti Singh

Publications

Mobile Experiments Made Easy with OMF/Orbit Christoph Dwertmann (NICTA); Mesut Ergin (WINLAB, Rutgers University); Guillaume Jourjon (NICTA); Maximilian Ott (NICTA & WINLAB, Rutgers University); Thierry Rakotoarivelo (NICTA); Ivan Seskar (WINLAB, Rutgers University); Marco Gruteser (WINLAB, Rutgers University). SIGCOMM Demo, 2009.

Collaborations

None to report.

Outreach

Tripti Singh, a Rutgers graduate student from an under-represented group, continued to be involved in the project. She designed

Other Contributions

None to report.