



GENI

A Vision for GENI Wireless Research Infrastructure

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- A huge segment of the future of network service delivery is via wireless platforms.
- Network researchers have been severely hampered in their ability to experiment with novel mechanisms because of the closed nature of commercially-operated cellular systems.



“I have a great idea!”

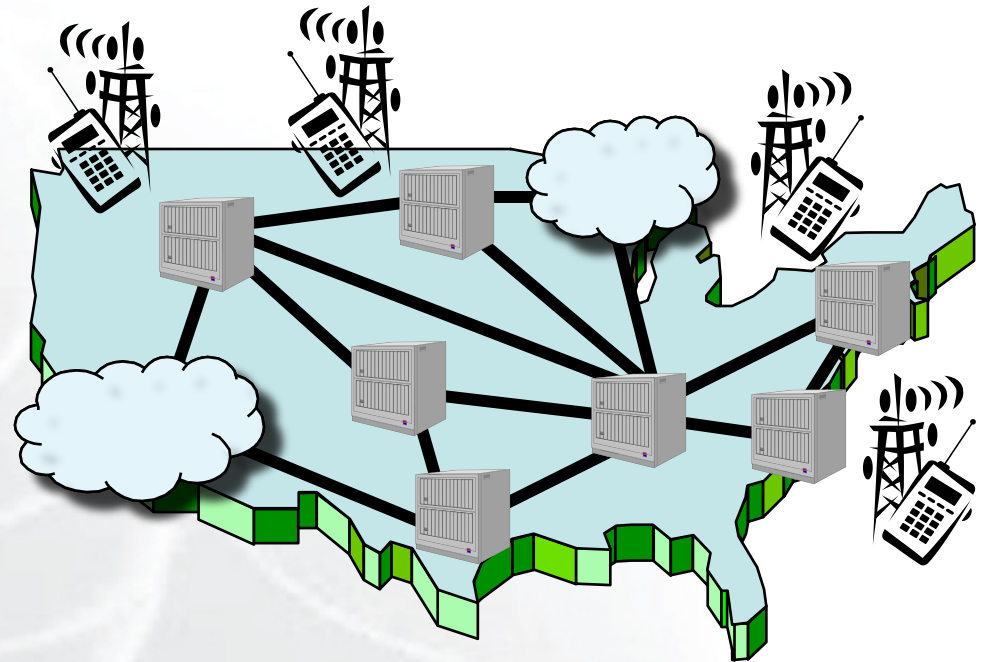


“Show me!”



- We are now witnessing a breakthrough period. GENI WiMAX provides the first (only) suite of researcher-owned and operated cellular systems. It is enabling a significant number of researchers to overcome the barriers and conduct studies in a wide range of research areas.

“Let’s try it out!”

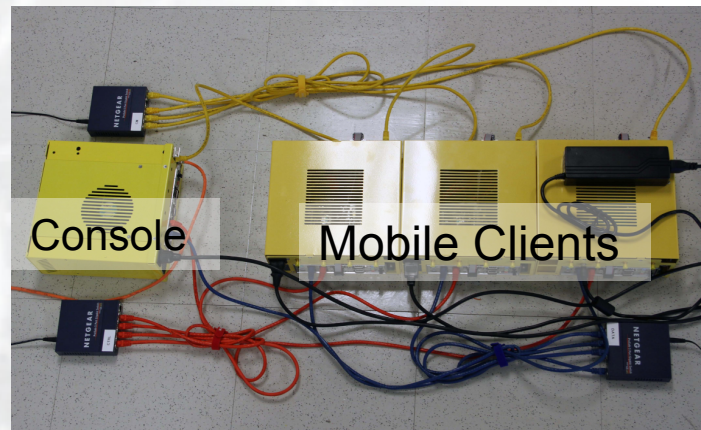


- Evaluation of novel, mobile internetworking protocols at a national/global scale
- Vehicular networking and applications
 - Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) networking
 - Vehicular sensing and control and safety applications, plus future applicability to self-driving cars
- Network coding for better data rates in heterogeneous cellular networks (small cells/WiFi + macrocells)
- Emergency communications and healthcare IT applications

Several presentations in this session will (sparsely) sample this space.

- Hit a sweet spot in the tradeoff space of research flexibility and deployment simplicity
 - Build on commercial base stations and mobile devices
 - Master spectrum license agreement
 - Standard deployment package
 - Integrate with GENI tools and infrastructure

“Wow, I learned a lot!”



- Expand wireless research infrastructure deployment
 - Support research at more sites
 - Bigger coverage areas at select sites – urban areas, highway / major road segments
- Transition infrastructure to LTE
- Broaden support for more research styles
 - Researchers using wireless chiefly or exclusively for data transport
 - » Target group for SciWiNet
 - Novel wireless networking research for applications
 - » Target group for expanded GENI LTE deployment
 - Lower-level wireless infrastructure research
 - » Need support from specialized testbeds
 - » Examples include spectrum agility (“cognitive radio”), femto-cell systems

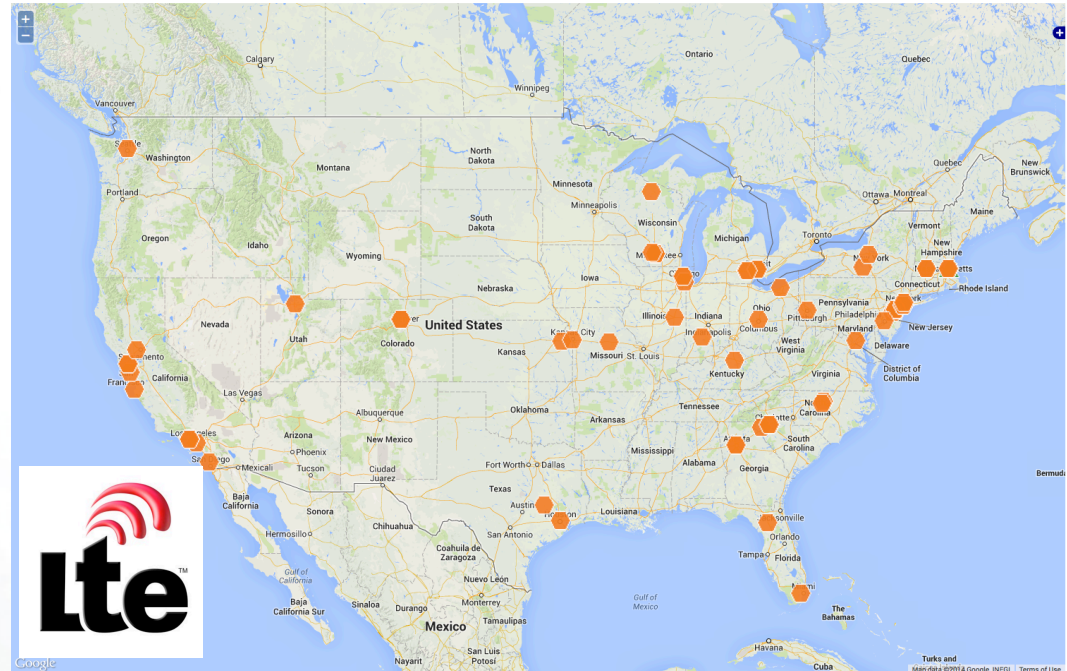
- Continue to offer research-friendly wireless data transport on top of commercially available MVNO infrastructure
 - Build on SciWiNet model
- Expand current GENI wireless infrastructure to more base stations and transition to LTE
 - Use existing GENI rack sites as nucleation points
 - Piggy back on GENI network for layer two infrastructure, deep programmability, stitched configurations
 - Start now to maximize benefit and match commercial product cycle
- Employ existing and emerging low-level wireless testbeds for “under the hood” access, and integrate with GENI tools
 - Several key GENI experimenter tools have roots in ORBIT testbed and in GENI wireless deployment
 - PhantomNet is integrating experiment capabilities with Emulab, the parent of InstaGENI
 - Seek opportunities to expand

Candidate GENI LTE Research Infrastructure

From this:



To this:



- Co-locate GENI LTE base stations at fifty GENI rack sites, operating under revised master agreement
- GENI experiment infrastructure implemented on Airspan Air4G LTE base station
- Connect to GENI racks and backbone for wide-area experiments
- Standard smartphones, USB modules, embedded devices

