



GENI takes flight and the PI in the Sky



Suman Banerjee
(suman@cs.wisc.edu)



Aerial vehicles need connectivity

- MedFlights
- Crop dusters
- Delivery drones



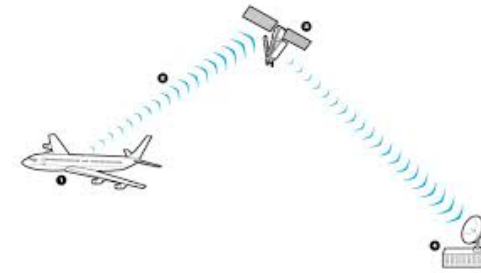
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Satellites?



The Transformational Satellite Communications System



Cellular?

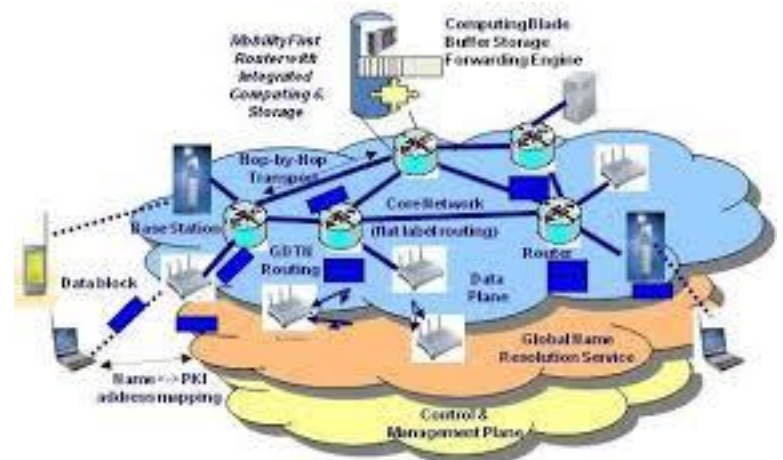


Goals of experiment

- Explore a new application domain --- aerial vehicles

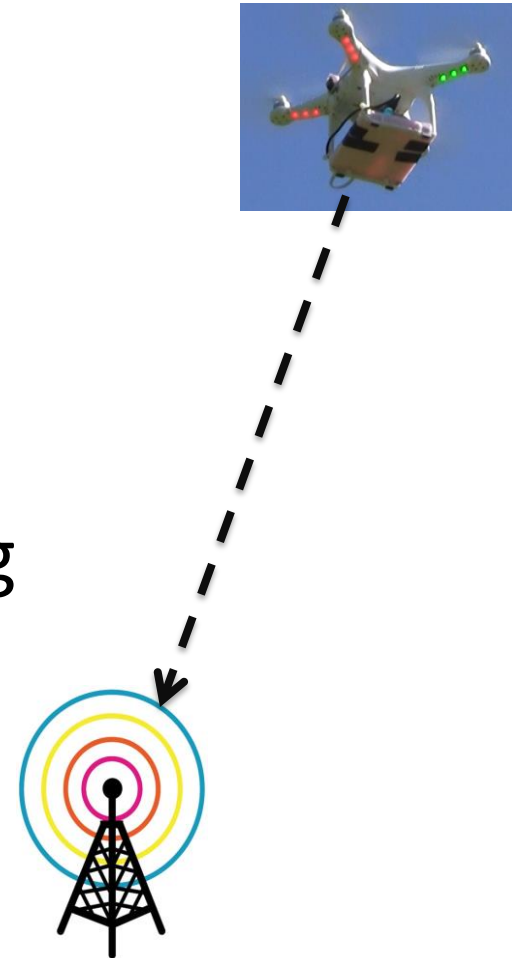


- Experiment with the MobilityFirst compute layer concepts



MobilityFirst Compute layer for local adaptation

- Significant channel variability
 - Interference, fading
- Video adaptation via transcoding
 - Channel aware
 - On-the-fly and efficient

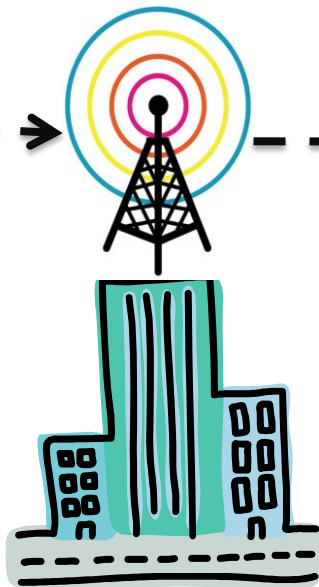


Implementation

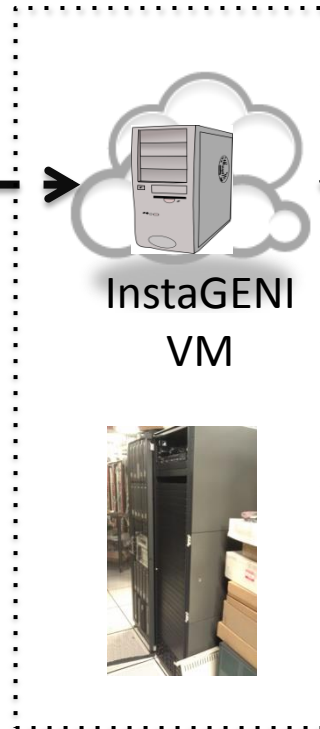
- Different versions
 - Server co-located with the base station (software only)
 - A Raspberry PI module on the aircraft (hardware support)
- Supports different media formats using Gstreamer

Setup #1: Drone

Raspberry Pi
Video Transcoder



GENI WiMAX
Wisconsin
(Airspan)



Wisconsin
InstaGENI
Rack



UC Davis

PI (when on the ground)

DJI Phantom Quadcopter

Camera

PI



Drone flight area



FaceTime/Skype



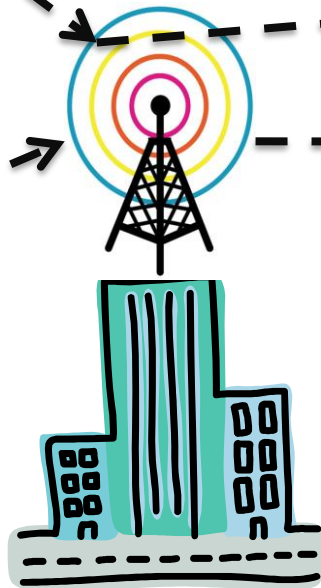
Setup #2: Aircraft



Raspberry Pi
Video Transcoder



GENI* WiMAX
Wisconsin
(Alvarion)



Hosted by 5Nines



InstaGENI
VM



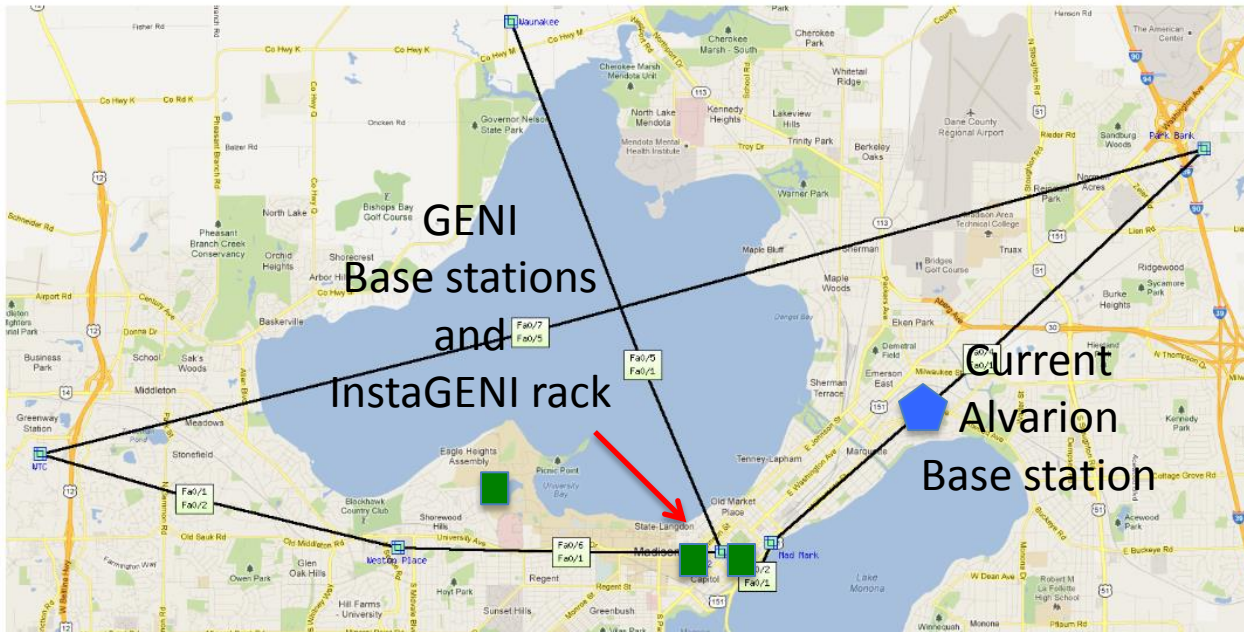
Wisconsin
InstaGENI
Rack



UC Davis

A new city-wide WiMAX deployment in the works

Where everything are

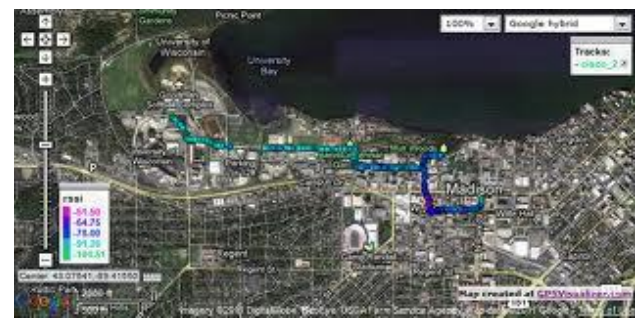


10 miles

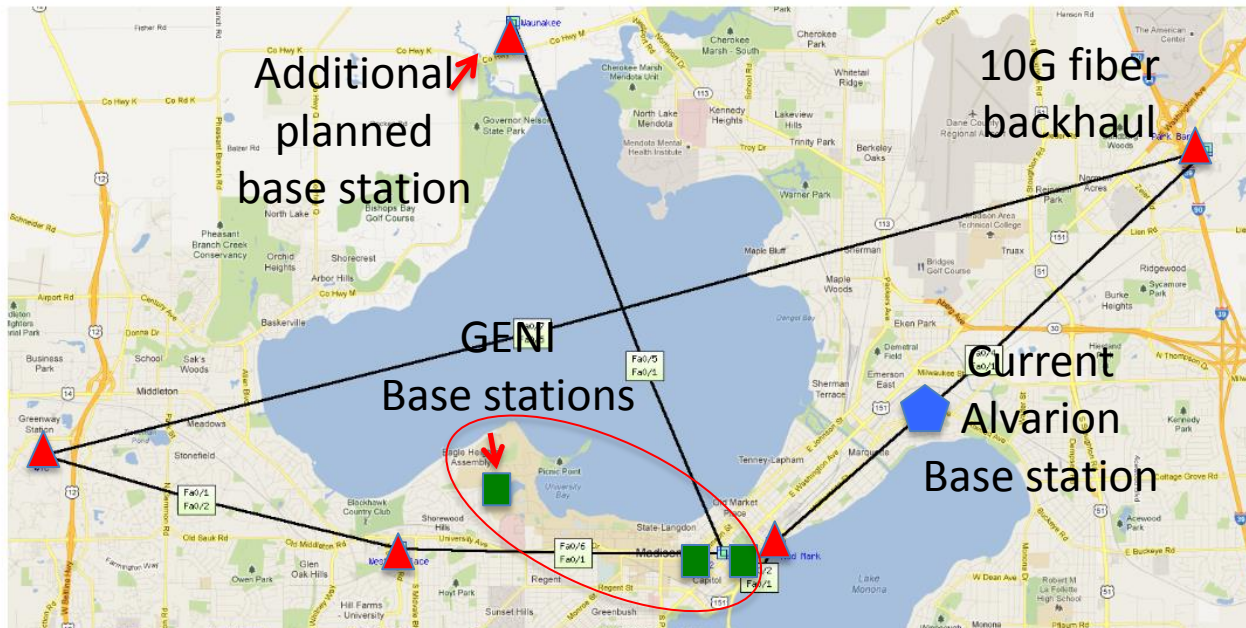


- <http://pcvm2-12.instageni.wisc.edu/camera/>

WiNEST: An outdoor, city-wide wireless infrastructure in Madison, WI

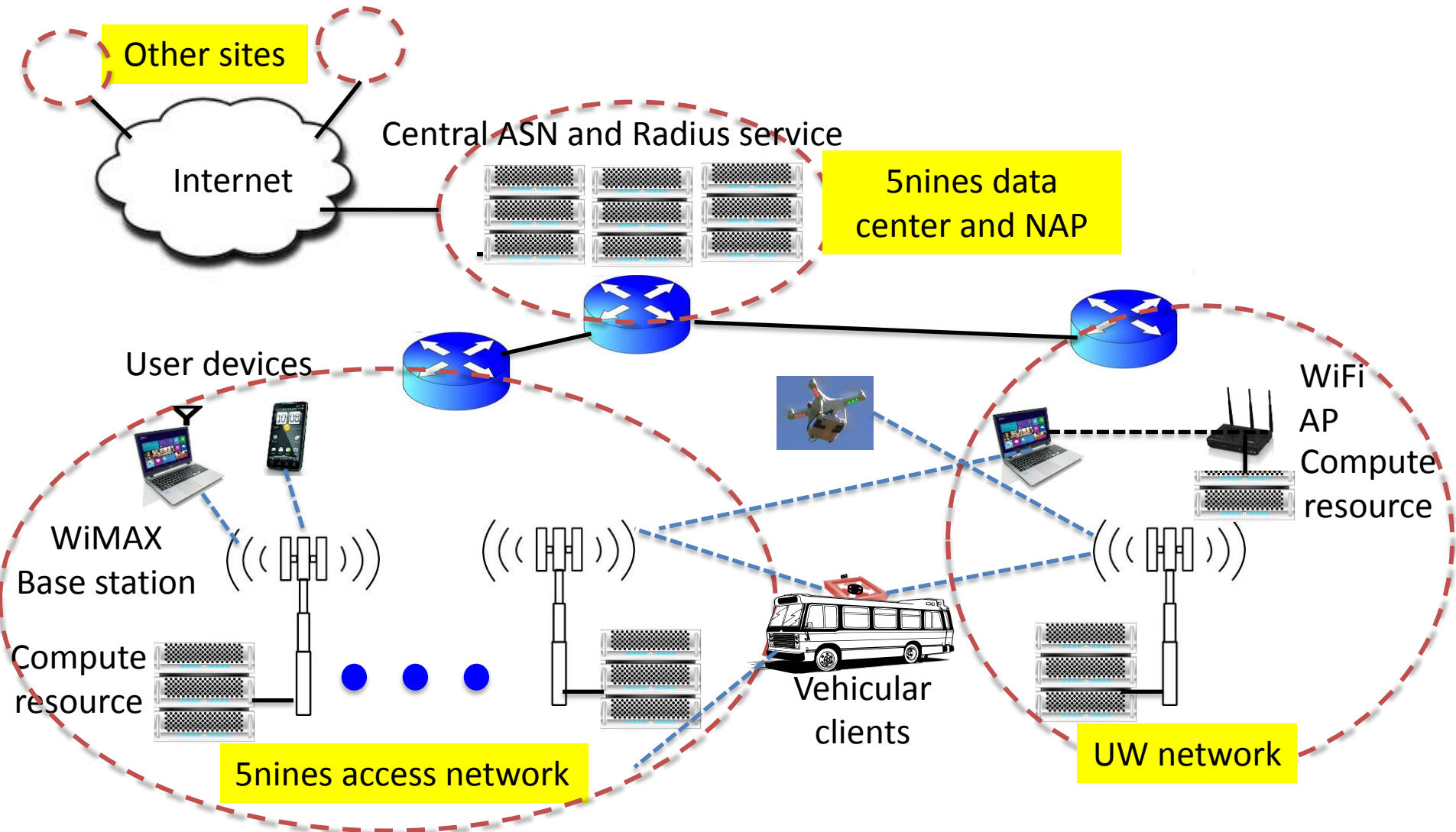


GENI++ WiMAX infrastructure



6-8 additional WiMAX base stations will be deployed in Madison, WI, jointly owned and operated by UW-Madison, city of Madison, and 5Nines

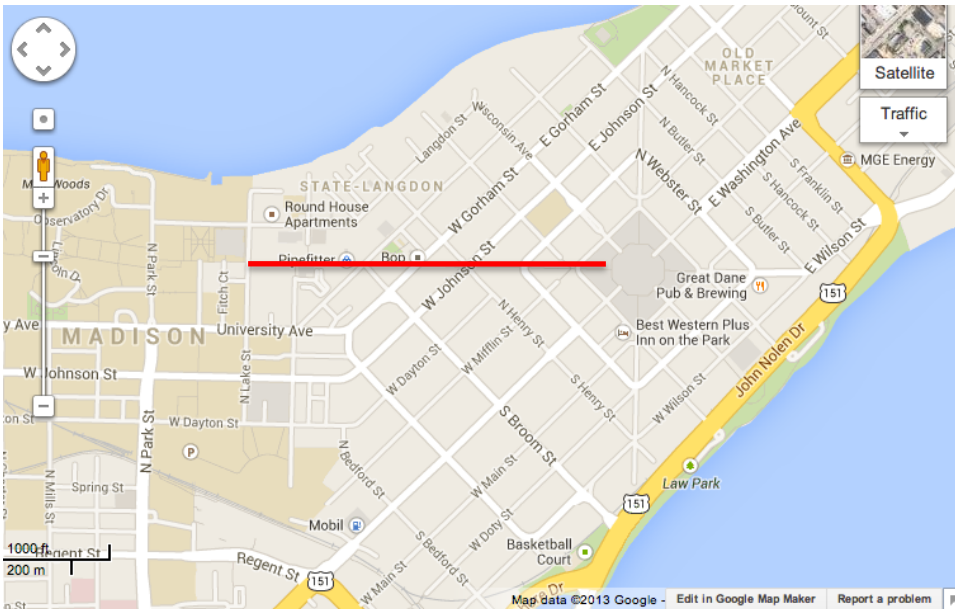
Infrastructure network plan



Users and use cases

- Students, staff, and faculty at UW-Madison
 - Can be introduced in a controlled manner
 - Upto 40,000 people in and around downtown Madison
- Student housing and nearby neighborhoods
 - State Street area
- Public utility and safety services
 - Public buses, police, ambulance, fire, etc.
- Aerial vehicles

A “living lab”



Spans a popular student hangout
and to serve an under-developed
community in Madison

Strong support and interest from
the City of Madison



Linux based open WiMAX
to WiFi base stations

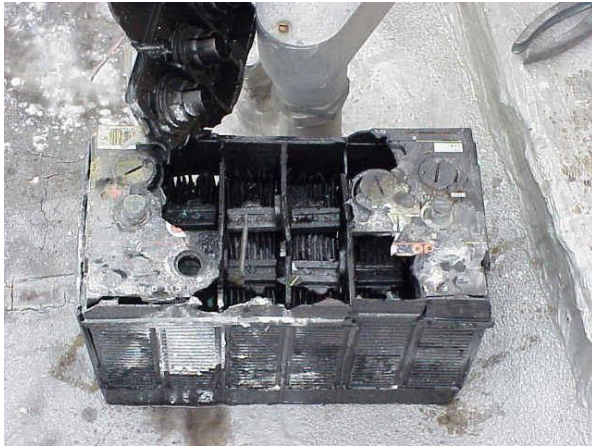
- Open to limited parts of
the community initially
- Expand to a broader
community eventually

Acknowledgments

- Derek Meyer
- Lance Johnson
- Peng Liu
- Jongwon Yoon
- Anton Kapela (5Nines)

- And many from GPO --- Niky Riga, Manu Gosain, and others

The Great Disasters of GEC20



Exploding UPS batteries – U. of Wisconsin

Laptop soaked by hotel sprinkler – Nick Bastin



Dead car battery: calling AAA
– Wayne State U



Flooded datacenter
due to burst water
pipe - NYU