

Experimentation Update

GENI Engineering Conference 7 Durham, NC

Mark Berman
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www.geni.net





Two Questions You Should Be Asking

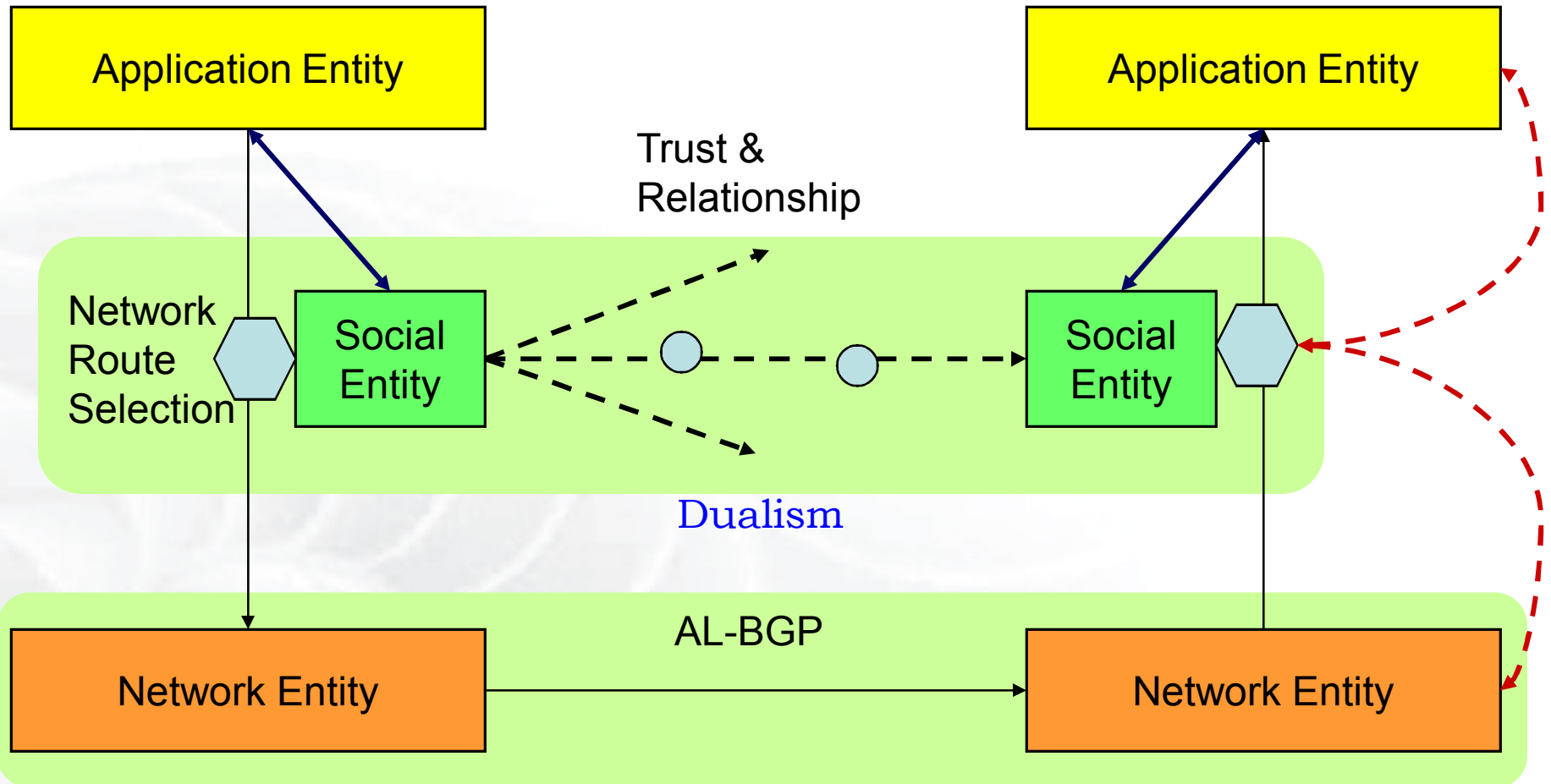
GENI is a virtual laboratory, so:

- Who is conducting research experiments on GENI now?
- How can I get started using GENI in my own research?



Spiral 2 Experiments In Progress



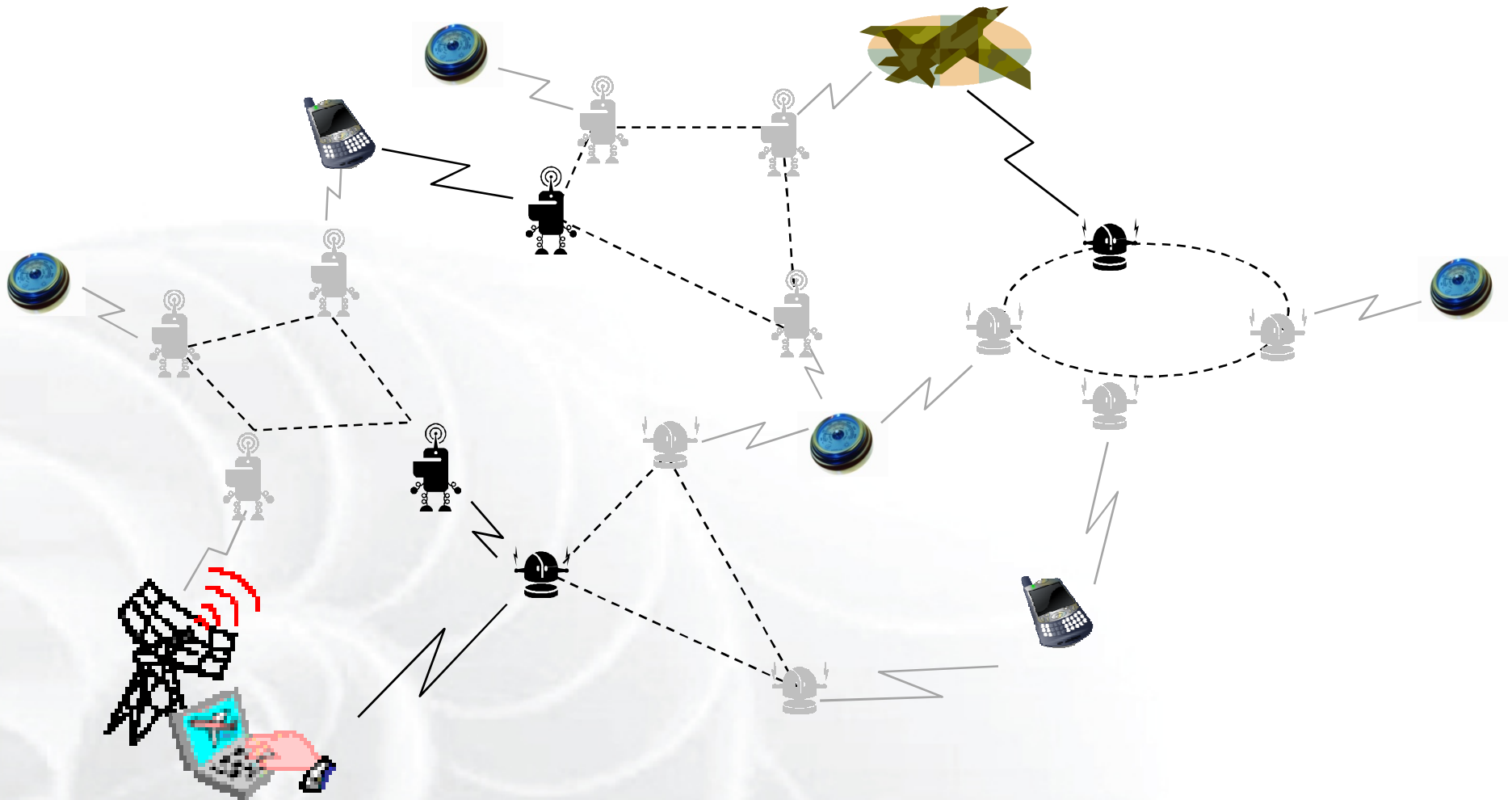


“Social Control Layer” concept diagram, S. Felix Wu, UC Davis

Experiment At A Glance: DSL

- PI: S. Felix Wu, UC Davis
- Research Problem: Evaluate feasibility of incorporating social network data in routing decisions at network (layer 3) or application (layer 7) level.
 - Populate social network routing database via Facebook application data.
 - Evaluate routing performance (delay in computing route, quality of route) in actual use by ~200 users at varying transaction rates.
 - Compare experimental results to prior simulation results.
- GENI resources: ProtoGENI for hosting Facebook applications, routing over backbone via social network paths
- Status: Sample Facebook applications implemented (and being demoed at GEC). Running on ProtoGENI.

Opportunistic Mobile Wireless Network

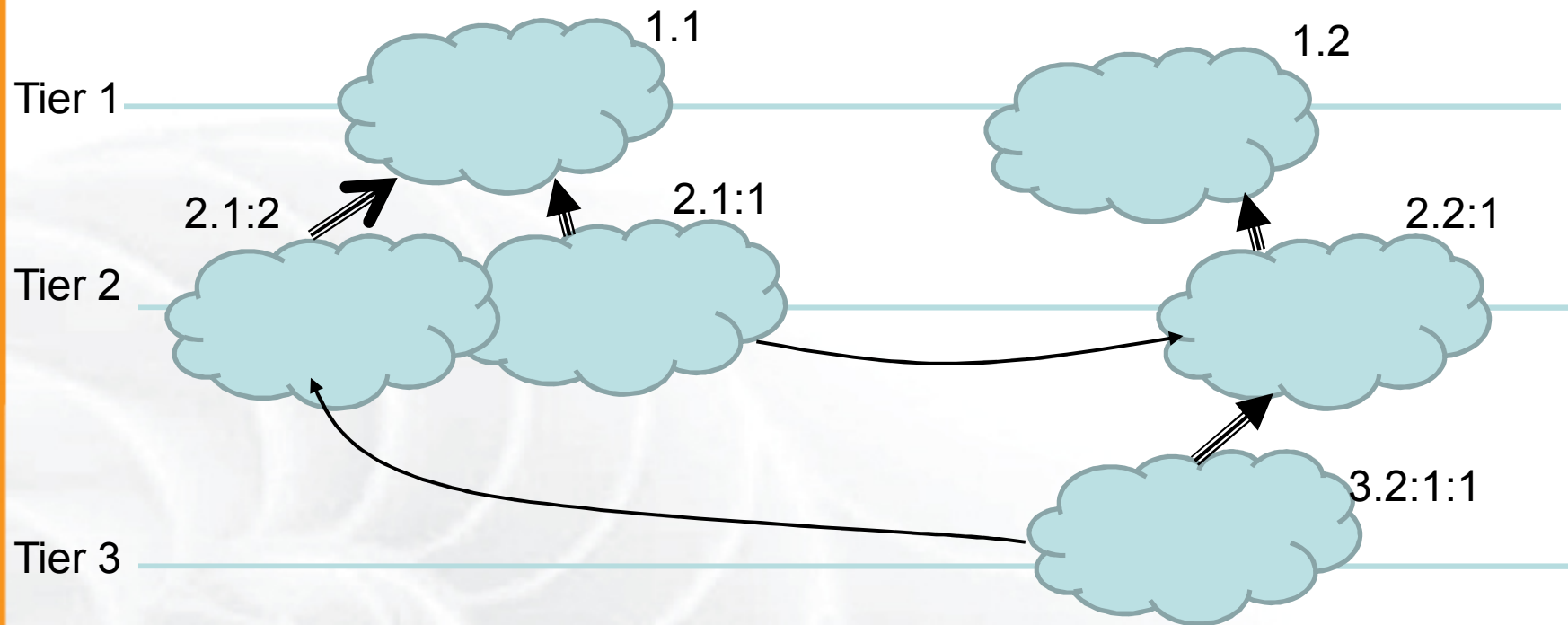


Pigeon Network concept, Jiang (Leo) Li, Howard University

Experiment At A Glance: Pigeon Net

- PI: Jiang (Leo) Li, Howard University
- Research Problem: Measure throughput and delay statistics under changes to:
 - Pigeon departure algorithm (“smart” pigeons)
 - Mobility scenariosCompare to results from numerical simulation.
- GENI resources: CMULab wireless emulation testbed (cluster C)
- Status: Analytical simulation software under development. Simulation results expected soon.

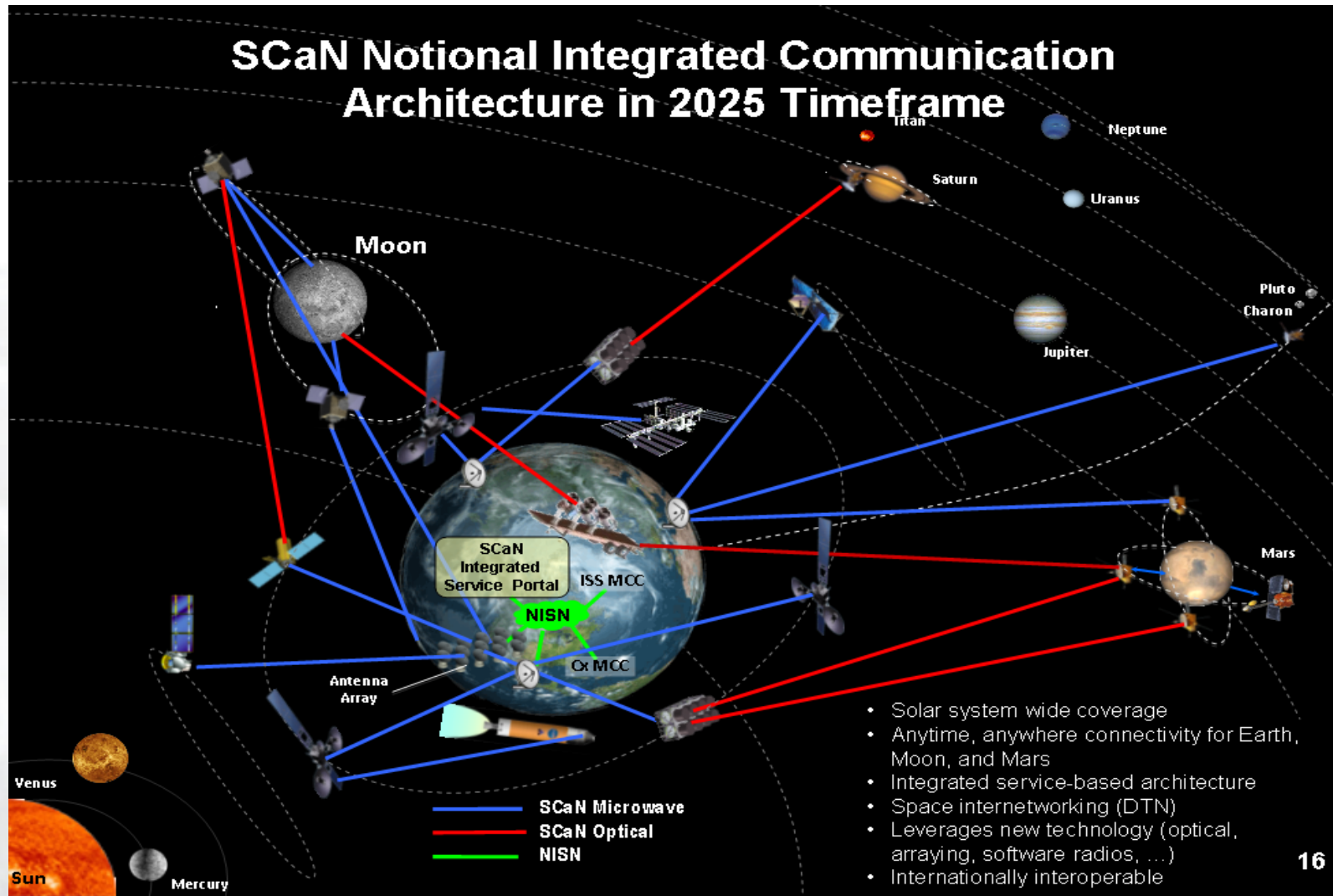
Floating-Cloud Tiered Internet



“Floating-Cloud Tiered Internet” example, Nirmala Shenoy, RIT

Experiment At A Glance: FCT

- PI: Nirmala Shenoy, RIT
- Research Problem: Compare performance of floating-cloud tiered routing architecture to IPv4 and IPv6 implementations, specifically:
 - convergence times for changes in network topologies and link/node failures
 - end to end traffic delays
 - storage requirements for routing data
- GENI resources: Slice incorporating ProtoGENI and possibly OpenFlow with layer 2 (or tunneled) VLAN, scaling to target of 100+ nodes in Spiral 2
- Status: Initial FCT implementation running in Emulab.



- Solar system wide coverage
- Anytime, anywhere connectivity for Earth, Moon, and Mars
- Integrated service-based architecture
- Space internetworking (DTN)
- Leverages new technology (optical, arraying, software radios, ...)
- Internationally interoperable

Ed Birrane, JHU APL. (Image credit: NASA/JPL)

- PI: Ed Birrane, JHU APL
- Research Problem: Validate selected DTN algorithms for packetized file transfer and multipath routing in emulated space networking topologies and scenarios.
 - Assess delay, throughput, and overhead with changes to BER and topology.
 - Validate that terrestrial algorithms scale with increasing delay.
 - Longer-term goals: scale up to larger network, incorporate flight-like hardware, incorporate historical link error data.
 - Raise technology readiness level to TRL3-4 with target of TRL6.
- GENI resources: ProtoGENI / Internet2 / OpenFlow slice
- Status: Emulation scenarios under development. Initial lunar topology prototyped in Emulab.

How can I get started using GENI in my own research?



Glad you asked!

1. Become a GENI alpha user
2. Attend GENI training events
3. Participate in GENI experiment workshop

The Alpha Opportunity

To demonstrate your best ideas

in networking and distributed systems

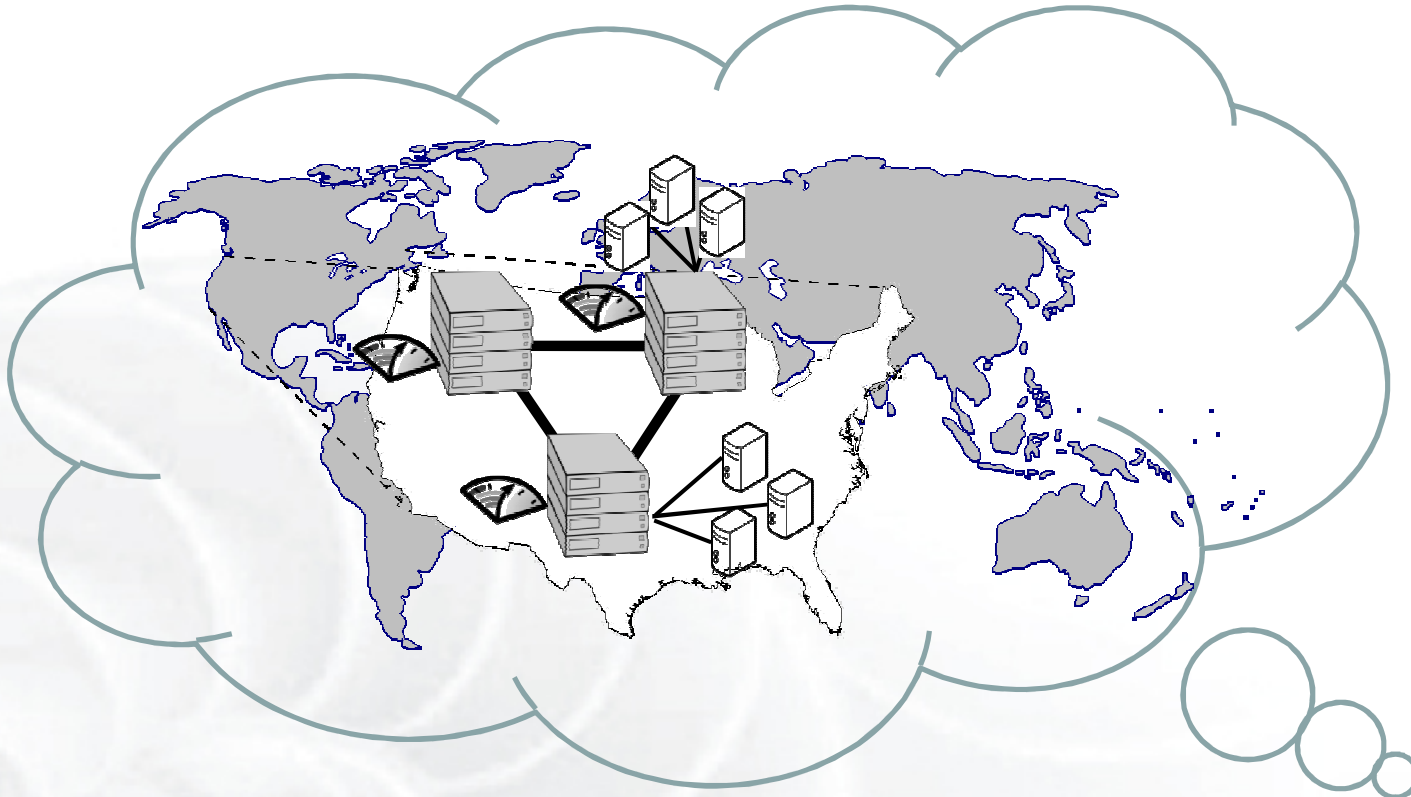
on a nation-wide computing and networking infrastructure

to government, university, and corporate leaders

With help and support of professional engineering team

- Special GENI Engineering Conference in Washington DC, November 2010
 - Invitees to include leaders from Government agencies, companies, and your peers from academia and industry
 - Plenary session to be one of the best show and tell performances
 - Large video screens
 - Carefully planned and executed GUI and demo sequences
- To communicate your message and have maximum impact

Claim Your GENI Slice



Integrated, sliced access to:

- OpenFlow enabled net over national backbones
- ProtoGENI emulation and compute resources
- PlanetLab's global research network



- GENI Alpha: A nation-wide integrated sliceable computing and networking infrastructure
- Networking substrate
 - OpenFlow support in backbones
 - Up to 8 campus networks interconnected by NLR/I2 backbones (access per campus decision)
- Computing substrate
 - PlanetLab/ProtoGENI based
 - Clusters across campuses and backbone POPs
 - PlanetLab/ProtoGENI at large
- Get one or more slices of this infrastructure to demo your ideas

- GPO will assign engineers to help with the
 - Design
 - Integration
 - Presentationof your demo
- The infrastructure providers (GPO, Princeton, Utah, Stanford, NLR, I2, and other campuses) will help to ensure you get stable slice(s)
- Demo videos will be produced and posted on various sites: GPO, YouTube, ...

What We Need from You

A proposal that would demonstrate
An exciting distributed system or networking capability
that can exploit and benefit from
a sliceable computing and networking infrastructure

And your commitment to realize this demonstration in
collaboration with the larger team

- Send your proposals to Mark Berman
(mberman@bbn.com) before April 1st, 2010
Plan to accept 2-4 demo proposals – so make your best case

GENI Training Opportunities

Opportunities for direct knowledge transfer from GENI infrastructure developers to GENI experimenters

- Include tutorial sessions in future GECs
 - E.g., Jon Turner's Supercharged PlanetLab Platform tutorial
 - Currently considering 1 or 1.5 days of half-day tutorials in conjunction with GEC8 in San Diego
 - Travel funding may be available
 - Interested in leading or attending? Contact Mark Berman or Aaron Falk
- And looking ahead ...
 - Specialized local seminars, like Ivan Seskar's planned WiMax meso-scale installation seminar
 - GENI Boot Camp?

GENI Experimentation Workshop

Larry Landweber